Integrated Natural Resources Management Plan

2014
Revision

Directorate of Public Works
Environmental Management Division
Fort Benning, Georgia

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PREFACE

Fort Benning's Integrated Natural Resources Management Plan (INRMP) encompassing fiscal years 2001-2005 was a historic document that compiled—for the first time—all of the plans and information relating to natural resource management. It also importantly outlined a natural resource management vision to guide future land use decisions.

The second iteration (2014–2018 of the Fort Benning INRMP translates that vision into a comprehensive management approach that integrates natural resource conservation measures and military activities on mission land and cantonment areas, consistent with federal stewardship requirements. The present document represents a provisional draft of the 2006-2011 INRMP, with several chapters clearly flagged as still under revision. Rapidly changing mission requirements related to Base Realignment and Closure (BRAC), Army transformation, and endangered species management made production of a cohesive five-year plan by September 2006 impossible. As these new requirements are fully realized, this document will be revised and formally reviewed in anticipation of its approval and acceptance as Fort Benning's natural resource management plan through 2011.

Integration is a key element of today's natural resource management planning. Integration ensures that all plans—including the Installation Master Plan, Range Training Land Plan, Pest Management Plan, and many others—are mutually supportive and contain no conflicting information or directives. Integration also ensures that all plans comply with applicable laws, regulations, guidelines, directives, executive orders, and policies. Finally, integration serves to align all aspects of the INRMP itself so that the parts coordinate and operate to achieve the goals and objectives for meeting environmental stewardship responsibilities and ultimately the desired future conditions while sustaining Fort Benning's military training mission.

The 2006–2011 INRMP differs from its predecessor in several respects. Where the first document became a repository of all available natural resource management information, this plan focuses on fundamental planning processes, integrates key management and data elements, and identifies implementation strategies that will bring the plan's goals to fruition. This INRMP also is designed to be user-friendly; it introduces many new graphics, photographs, and illustrations; adopts a clear and improved organizational structure; and provides informational links that will assist those managers charged with executing the INRMP. Finally, several topics have been expanded and new topics are being introduced, such as the Army Compatible Use Buffer program, sustainability, monitoring plans, Army transformation, BRAC, MCoE, management of unique ecological areas (UEA), and forest decline.

The size of this INRMP reflects the vastness and complexity of the systems it covers. Fort Benning consists of 182,000 acres of which 145,000 acres are manageable forestland. Wetlands constitute another 16,926 acres. There exist 19 UEAs, and more than 60 different vegetation alliances are represented. Five federally protected species and 91 other species of conservation concern also occupy the area. Fort Benning has been designated as one of 13 recovery populations for the federally endangered red-cockaded woodpecker (*Picoides borealis*), and the relict trillium (*Trillium reliquum*), a federally endangered plant species, depends on the continued viability of its populations at Fort Benning for its recovery.

Further, Fort Benning's tripartite mission—to train Infantry and Armor soldiers, to serve as a power projection platform, and to provide training to a diverse group of resident and visiting

units—results in thousands of annual training events as well as extensive construction and maintenance activities in support of those events. Fort Benning's responsibility to sustain the training environment requires managing and documenting environmental impacts from these activities and places natural resource management at the forefront of its mission.

Fort Benning personnel were instrumental in developing this 2014-2018 INRMP. Their participation has enhanced the credibility of the document and, most importantly, ensured that the very individuals charged with implementing the plan understand it thoroughly and are committed to its successful execution. These individuals are named in the Acknowledgements section along with those of The Nature Conservancy and other partners, whose contributions have ensured that the principles of ecosystem management and sustainability are incorporated throughout the plan.

EXECUTIVE SUMMARY

PURPOSE

The primary purpose of Fort Benning's Integrated Natural Resources Management Plan (INRMP) is to ensure that natural resource conservation measures and military activities on Fort Benning mission land and cantonment areas are integrated and consistent with federal stewardship requirements. As a result, the INRMP serves as the Installation Commander's comprehensive plan for purposefully managing natural resources to meet and maintain stewardship requirements, while optimizing training activities on mission land by achieving no net loss criteria and, where compatible, conducting secondary activities such as outdoor recreation.

Mission land is defined as the area—typically unimproved acres outside the cantonment area—where military operations are, or could be, conducted. The execution of mission operations represents the primary activity and provides the justification for the Army having land at Fort Benning, which is the Nation's premier training facility for the U.S. Army Infantry and Armor. All other activities that have the potential to compete with the primary activity, either by using needed space or by the additional consumption of natural resources, represent secondary activities (except when they directly contribute to the sustainable use of mission land by the primary activity). Secondary activities can include forest management, fishing and hunting, other forms of outdoor recreation, and so on.

Fort Benning's first INRMP encompassing fiscal years 2001-2005 is a historic document that compiled—for the first time—all of the plans and information relating to natural resource management. It also importantly outlined a natural resource management vision to guide future land use decisions. A second revision was partially completed in 2006, but due to the 2005 BRAC announcement that the Armor School from Ft. Knox was going to be moved to Ft. Benning all work was stopped in order to be able to determine and assess construction and training impacts. In this iteration (2014–2018) of the INRMP, goals, objectives, and planned projects have been revisited in light of new units, inventory and monitoring data, natural resource management as well as military activities, and Army-wide initiatives—consistent with adaptive management principles.

AUTHORITY

The Sikes Act (Title 16, United States Code 670a et seq.), as amended through 2011, provides the primary legal basis for the Secretary of Defense to carry out a program that provides for the conservation and rehabilitation of natural resources on military installations. To facilitate such a program, the Act requires the secretary of each military department to prepare and implement an INRMP at appropriate military installations throughout the United States under their respective jurisdictions. Moreover, such plans shall be prepared in cooperation with, and reflect the mutual agreement of, the Secretary of the Interior (acting through the Director of the U.S. Fish and Wildlife Service) and the head of each appropriate state fish and wildlife agency for the state(s) where the military installation concerned is located. Fort Benning occupies land in Georgia and Alabama, and satellite areas are located in Georgia, Alabama, and Florida.

MANAGEMENT PHILOSOPHY

Fort Benning's approach to natural resources management is embodied in its vision of the relationship between the military mission and natural resources upon which that mission

depends. The installation also has developed a natural resources management mission statement for how Fort Benning will manage its lands.

> **Fort Benning's Natural Resources Management Vision—**Support the military mission while promoting the ecological integrity of the Fort Benning landscape.
>
> **Fort Benning's Natural Resource Management Mission—**Through a collaborative effort between natural resource professionals and military personnel, Fort Benning will strive to promote the long-term ecological sustainability of its lands for multiple-use opportunities. Fort Benning will apply sound land management practices and adaptive management strategies that conserve ecological integrity through the restoration, maintenance, and preservation of natural biotic communities and otherwise promote the health of installation ecosystems through rehabilitation and maintenance. This ecosystem management approach will encompass stakeholder interests, regulatory requirements, and fiscal constraints.

The underlying theme of this vision and mission statement is an ecosystem-based approach to management. Ecosystem management represents a proactive approach for federal agencies such as the Department of Defense (DoD) to make important contributions to sustaining healthy ecosystems and conserving ecological integrity. Although military lands represent only about three percent of the total federal land inventory (DoD manages about 25 million acres, and the U.S. Army manages half of that total), they have disproportionate value with respect to biodiversity. This is especially true in the southeastern United States where federal public lands are otherwise relatively lacking. In addition, although some military land uses are intensive and result in severely degraded landscapes, significant acreage often is used at low intensity or serves as a buffer, and these latter land uses can be compatible with the maintenance of ecological integrity. A critical assumption of the INRMP is that the availability of future training lands at Fort Benning depends on a sustainable natural resource base and that sustainability is achievable through ecosystem-based approaches.

SCOPE

The Fort Benning Army Installation is located in the southeastern United States. It lies south and east of the cities of Columbus, Georgia, and Phenix City, Alabama. The installation occupies 182,000 acres, approximately 170,000 acres of which are in Muscogee and Chattahoochee Counties, Georgia. Another approximately 12,000 acres are in Russell County, Alabama. The Chattahoochee River meanders through the western part of the installation and separates the Georgia and Alabama portions.

Fort Benning's geographic location contributes to its diverse plant and animal communities and sets the ecological context for INRMP planning and management actions. Fort Benning is located astride two ecologically different regions—the Piedmont and Coastal Plain. The transition between these regions occurs along a fall line—a geological boundary that reflects differences in the types of rock occurring in each region. Although the fall line transits in part along the northern boundary of Fort Benning, the actual transition between these two regions does not occur abruptly but rather is spread over a relatively large area of the installation. The result is a mosaic of Piedmont- and Coastal Plain-influenced habitats and the occurrence of a variety of ecotonal plant and animal communities. The effect of this transition between ecological regions is not limited to terrestrial communities, but is reflected as well in the physical features and biotic communities of the rivers and creeks within Fort Benning.

Historically, the Coastal Plain was an area dominated by longleaf pine (*Pinus palustris*) communities. Longleaf pine is the major component of once vast and diverse biotic communities that dominated the southeastern Coastal Plain landscape. The longleaf pine communities have been impacted adversely by fire suppression, conversion to non-longleaf pine plantations and other land development activities, and fragmentation. Some of the best remaining examples of these communities are located on Federal lands, including Fort Benning. As a result, through the INRMP planning process Fort Benning has used knowledge of its ecological context and an examination of pre-European vegetation patterns to set a direction for natural resource conservation and rehabilitation that provides a realistic training environment within a sustainable, natural (to the extent attainable), managed environment. As human understanding of complex ecological processes increases, Fort Benning can improve its understanding of the Installation's ecological context and adapt its management direction accordingly.

Although the management actions described in this plan are confined to those actions the Army is authorized to undertake within the boundaries of Fort Benning, the contextual basis for those actions considers the larger ecological regions of which the installation is a part. For example, monitoring activities are not appropriately bounded by administrative boundaries. Fort Benning also is threatened with loss of mission capability due to encroachment from surrounding lands and limitations on full use of Installation lands for training activities and infrastructure. As a result, the condition of natural resources and the presence of potential sources of disturbance outside the boundaries of Fort Benning are considered when making natural resource management decisions. In addition, actions by the Army's conservation partners, such as The Nature Conservancy, may affect land use and land ownership outside of Fort Benning's boundaries, in the interests of deflecting encroachment and expanding natural habitats.

This Integrated Natural Resources Management Plan is fully integrated with Fort Benning's Real Property Master Plan, including the Range Complex Master Plan component, overall aspects of the installation's training mission, and specific programmatic plans that may affect natural resources (for example, the Integrated Cultural Resources Management Plan and Pest Management Plan). New and ongoing mission activities that may impact natural resources will be coordinated with appropriate natural resource managers. Fort Benning's Integrated Training Area Management (ITAM) Program and its various components serve as an implementation vehicle of the INRMP; as a result, ITAM provides the bridge between training requirements on mission lands and natural resource management activities that promote the conservation and sustainability of Fort Benning's natural resources.

RELATIONSHIP TO THE MILITARY MISSION

Fort Benning's primary military activities include: training entry-level soldiers, providing the Nation's primary facility for training the U.S. Army Infantry and Armor, conducting Airborne and Ranger candidate training, hosting the Western Hemisphere Institute for Security Cooperation and the Army's Noncommissioned Officer Academy, and providing a power projection platform for rapid deployment. Besides its resident training units, Fort Benning also is home to a number of tenant units that conduct much of their training at the installation. Tenant units include the 3rd Heavy Brigade Combat Team, 3rd Infantry Division (mechanized) and the 3rd Battalion 75th Ranger Regiment, as well as the 75th Ranger regimental headquarters. Over 14,000 soldiers call Fort Benning home.

The types of training and the requirements of units present at the Installation affect the nature and extent of natural resource impacts at Fort Benning. Impacts result from direct removal of or damage to vegetation, digging activities, ground disturbance from vehicles, use of obscurant smoke and teargas-like agents, and munitions detonation. The mechanized forces in particular, which use vehicles that include the M1A1 Main Battle Tank and the M2A2 Bradley Fighting Vehicle, can produce adverse direct and indirect impacts to natural resources. Often these impacts are related to soil disturbance and movement that may result in soil erosion and stream sedimentation. Fort Benning has numerous ranges, eight of which can accommodate fire from mechanized vehicles, and ten impact areas that can accommodate a variety of munitions. Cleared areas include bivouac sites, landing strips and pads for fixed-wing aircraft and helicopters, and drop zones for airborne training. Projected training, proposed future range improvements, and upkeep and maintenance of so many training assets necessitate a close integration with the resource management strategies specified in this management plan to ensure a sustainable training environment.

A realistic training environment is a prerequisite for effective training at Fort Benning. For example, the presence of natural vegetation enables realistic training scenarios involving cover, concealment, or line-of-sight firing constraints. To ensure that Fort Benning can meet its mission needs now and in the future, the natural resources that provide the training context must be managed such that they are sustainable over the long term. Plant and animal communities that are locally adaptive are those that, once restored, can be sustained with a minimum of management action. Because of past land management practices—conversion of native plant communities to pine plantations, failure to adequately prevent and mitigate the effects of soil erosion and the introduction of non-native species, fire suppression, and inappropriate habitat removal—a portion of the present environment at Fort Benning is highly altered and not presently sustainable. As a result, failure to conserve and rehabilitate the natural communities of the Installation could impact future training missions at Fort Benning. The INRMP builds on those important remnants of natural diversity that are present at Fort Benning and provides an ecosystem-based approach for restoring or mimicking, where appropriate, the native biota and ecological processes characteristic of the installation.

The federally endangered red-cockaded woodpecker (*Picoides borealis*) is a non-migratory bird endemic to the pine forests of the southeastern United States. A primary reason for the decline of red-cockaded woodpecker populations has been the loss of longleaf pine-dominated communities, such as those present at Fort Benning. In September 1994, the U.S. Fish and Wildlife Service (USFWS) determined that military training and related activities at Fort Benning were likely to jeopardize the continued existence of the red-cockaded woodpecker on Fort Benning. As required by Army Regulation 200-1 (Environmental Protection and Enhancement, 13 December 2007), Fort Benning complied with the reasonable and prudent management alternatives specified by the USFWS. These alternatives are those the USFWS believed, when implemented, would avoid jeopardizing the continued existence of the Installation's red-cockaded woodpecker population. Implementation has resulted in some training restrictions over a relatively small portion of the Installation, but these restrictions have not substantially impacted overall training. Although other federally listed species also are present on Fort Benning, no noteworthy conflicts have arisen between training activities and the persistence of these species. In September 2002, the USFWS issued a Biological Opinion for Fort Benning's Red-Cockaded Woodpecker Endangered Species Management Plan and no jeopardy was found. The non-jeopardy opinion for Fort Benning was based on significant improvements in land management, environmental compliance, and red-cockaded woodpecker recovery progress. Additionally, Fort Benning is currently operating under 4 other Biological Opinions: 2004 Digital Multi-Purpose Range Complex Biological Opinion, 2007 Transformation/BRAC

Realignment and Closure Biological Opinion, 2009 Maneuver Center of Excellence Biological Opinion, and 2013 Malone Complex Biological Opinion. More details for each biological opinion can be found in the Red-cockaded Woodpecker Endangered Species Management Component which is currently being revised in conjunction with this Integrated Natural Resources Management Plan. This new Endangered Species Management Component will be replace the 2002 Endangered Species Management Plan.

In summary, Fort Benning's mission may be negatively impacted if natural resource management activities are unable to provide a sustainable training environment. This INRMP focuses management efforts on achieving a sustainable training environment across the landscape by using an ecosystem-based approach that attempts to maintain overall ecosystem integrity while also addressing the needs of listed species.

PARTNERSHIPS

The INRMP has been prepared in cooperation with the U.S. Fish and Wildlife Service, the Alabama Department of Conservation and Natural Resources, and the Georgia Department of Natural Resources and in consultation with the 10 federally recognized Indian Tribes that have an historical association with Fort Benning lands.

Because the Department of Defense has had an ongoing relationship of mutual cooperation on biodiversity conservation and ecosystem management issues on military lands with The Nature Conservancy (TNC) since 1988, Fort Benning enlisted the help of TNC to assist with preparation and, in part, implementation of the INRMP. In addition, Fort Benning and TNC led the formation of the Chattahoochee Fall Line Conservation Partnership (CFLCP), a partnership of key organizations and individuals who have a stake in the conservation and restoration of the longleaf pine ecosystem. The CFLCP is considered a "local implementation team" (LIT) for achieving the conservation goals set forth in the America's Longleaf Conservation Initiative. As a result, Fort Benning has had access to the best scientific minds in the region during preparation of the INRMP.

Partnerships within the Installation can be just as important as external partners when the goal is effective implementation of natural resource management strategies. Military personnel from Fort Benning's Directorate of Plans, Training, Mobilization and Security (DPTMS) have worked alongside resource managers and others to prepare this INRMP. Their participation has ensured that the military perspective on training needs has been integrated fully with the natural resource management strategies contained within this plan.

Fort Benning fully recognizes that a key component of the INRMP's ecosystem-based approach is a continued reliance on partners. Data sharing, regional conservation strategies and monitoring activities are enhanced through the use of partners. Through INRMP implementation, and to the extent that it is authorized by mission considerations and available funding, Fort Benning will continue to work with its conservation partners.

PLANNED MAJOR INITIATIVES

To implement an ecosystem-based approach at Fort Benning through the INRMP, desired future conditions are necessary to provide natural resource managers with target conditions and long-term goals for ecosystem management. Ecosystem-level targets include the upland longleaf pine ecosystem, slope hardwood ecosystem, seepage bogs, depressional wetlands, and Fall Line streams and bottoms. Species-level targets include the red-cockaded

woodpecker, gopher tortoise, and relict trillium. All programs within natural resources management are aligned to attain the desired future conditions.

A key principle of this approach is that management must be adaptive; that is, the response of natural systems to management actions must be monitored and subsequent management actions modified accordingly. As a result, each management program initiative outlined below is couched in terms of an adaptive management framework. Initiatives are not presented in any order that indicates priority. The major program initiatives planned in the INRMP to be implemented over the next five years are:

Watershed Management—The movement of water through an ecosystem establishes a spatial relationship between biotic and abiotic components of terrestrial and aquatic resources. By establishing an outlet (pour point), a watershed can be delineated where all rainfall within the watershed boundary moves toward the pour point. Stream characteristics at the pour point integrate the effects of both the natural resources and human land use. Monitoring at the pour point provides an efficient assessment of conditions throughout the watershed.

The determination of the pour point locations is a management decision that considers geological/hydrological homogeneity and Installation management objectives. Fort Benning has established 28 Watershed Management Units (WMUs) on this basis, providing a practical geographic and ecologically relevant context for management. The WMUs are not necessarily limited to the various Installation administrative boundaries, providing for the consideration of the impacts of off-Post land use on the internal surface water system. Specific water quality concerns are addressed by determining appropriate pour points to create Sub-Watershed Management Units.

Due to the efficiency and ecological validity of the Watershed Management approach, it has been adopted by the Army as the preferred delineation of management areas of interest for all land management planning and decisions. The Fort Benning Watershed Program was established to implement this policy by integrating this approach into all management actions and maintaining a knowledge base of techniques, research and monitoring data. The Watershed Program's primary mission is to support compliance with non-point source CWA pollution regulations.

Forest Management Practices—To achieve the landscape vision described above, the INRMP outlines several forest management practices. First, the Installation will implement an uneven-aged management approach as part of its Forest Management Program. Uneven-aged management results in a stand composition that more closely mimics the structure of a natural forest. Thinnings constitute the primary management prescriptions. Second, where appropriate, Fort Benning will restore longleaf pine communities through planting or by promoting natural regeneration. Planting opportunities generally arise as a result of trees dying and/or logging operations that removes other pine species, such as loblolly (*Pinus taeda*) and shortleaf (*P. echinata*), that are more pest- and disease-prone than longleaf. Historically, much of the Installation's upland forest was dominated by longleaf pine. Third, prescribed fire will be used at the frequencies and intensities appropriate to maintain the longleaf pine communities and overall plant community diversity at Fort Benning. Additionally, methods of site preparation to accommodate plantings are adjusted based on the presence of species sensitive to ground disturbance. Fourth, Fort Benning has an aggressive program to control the spread of, and for some species to eradicate, undesirable non-native plant species as part of its overall Pest Management Program.

Fish and Wildlife Management—Five federally protected species and 91 other species of conservation concern occupy Fort Benning. Recovery of red-cockaded woodpecker and relict trillium populations on the installation have been deemed critical to the recovery of these species. Management of the bald eagle primarily involves habitat protection and nest monitoring. The American alligator is listed as threatened due to its similarity of appearance to other crocodilians. From a range-wide perspective, the alligator is considered to be biologically secure and is no longer protected under the Endangered Species Act (ESA). Wood storks are a transient species on Fort Benning, occurring during their post-breeding dispersal from Florida, Georgia, Alabama, and South Carolina. State-listed species and species at risk are managed through protection and management of the habitat in which they exist. Listing of any of these species pursuant to the ESA could have a significant impact on the military mission of one or many Army installations. Fort Benning will work with the USFWS on listed species to devise management strategies that are consistent with maintaining the ecological integrity of an area while still contributing to the population recovery or maintenance of the individual species of management concern. Such an approach is consistent with trying to direct the majority of management actions at an ecosystem level rather than focused on single species.

Although the USFWS' September 2002 non-jeopardy opinion cited significant improvements in land management, environmental compliance, and recovery progress, the red-cockaded woodpecker continues to play a significant role in determining natural resource management actions at Fort Benning. The Forest Management Program is actively restoring longleaf pine-dominated communities for this species. Fort Benning also will seek opportunities to work with conservation partners to develop regional strategies for conservation of the red-cockaded woodpecker.

Fort Benning will continue to provide fish- and wildlife-related recreational opportunities to include hunting, fishing and trapping consistent with training mission requirements, listed species recovery, and the ecological integrity of the landscape. Game and sport fish species include but are not limited to white-tailed deer, wild turkey, largemouth bass, and channel catfish to name a few. Management of these species is important to meet user demands and includes ensuring adequate enforcement of the hunting and fishing regulations, providing reasonable opportunities to hunt and fish, manipulating habitat, conducting censuses and surveys of game and sport fish populations, setting regulations, and controlling populations of selected species when needed. In addition to providing outdoor recreational opportunities, these species also are components of the native biodiversity of the area.

Although feral swine are considered a game species in some states, they are considered a nuisance species at Fort Benning. Feral swine through soil disturbance and competition for resources present a threat to many of the Installation's native flora and fauna. Implementation of the INRMP includes monitoring and controlling the exotic and invasive feral swine population (to the extent feasible).

Gopher Tortoise Population Monitoring and Management— On 26 July 2011, U.S. Fish and Wildlife Service released its determination regarding inclusion of gopher tortoises on the endangered species list; with the finding that "listing is warranted, but precluded by other, higher priorities". The agency decided to classify the tortoise as one of nearly 250 "candidate" species, which federal officials can try to protect by encouraging voluntary help from property owners. On 11 March 2008 the Army finalized its "Management Guidelines For The Gopher Tortoise On Army Installations". The purpose of the guidelines is to establish baseline management standards Benning has implemented a new population monitoring program for gopher tortoises. The installation has been divided into 4

Habitat Management Units (HMU) for monitoring purposes. The installation will determine the current gopher tortoise population levels and demographics by conducting line transect distance burrow surveys using GIS land cover data and DISTANCE 6.0 software. Surveys using consistent and systematic re-sampling will be repeated every 4 years to monitor long term population trends. Initial survey of all HMU's will be completed at time of publication of this INRMP

Fort Benning will strive to establish management strategies that will maintain or increase population numbers where compatible with the installations training needs. Fort Benning will also work with adjacent landowners through education and outreach, cooperative management efforts, and information sharing to help benefit the species on a regional level.

Native Vegetation Reestablishment and Management— As part of the ongoing restoration efforts for the Longleaf Pine Forest Ecosystem Fort Benning will continue to develop methods for the restoration of native ground cover. Due to past land management practices (farming, livestock and fire suppression) much of the native ground layer vegetation has been altered or extirpated from many areas on the installation. Fort Benning will foster projects and programs that will help to re-establish the diverse native grasses and forbs that were once a part of the natural community. This objective will be accomplished through forming partnerships with NGOs and through internal efforts. Fort Benning personnel have identified areas on the installation that have good native ground cover. These areas will be used as seed sources to establish new production plots for seed that will then be harvested and used to establish native grasses in areas that are being converted back to a long leaf overstory. Fort Benning will also explore the possibility of working with private nurseries in an effort to establish regional seed genotypes that can be used on the installation and surrounding areas to promote native grass programs on a larger scale**.**

Sustainability Initiatives—A sustainable Army is one that simultaneously meets the mission requirements worldwide, protects human health and safety, enhances quality of life, and safeguards the natural environment. In response to the Army's "Sustain the Mission, Secure the Future" initiative, Fort Benning has undertaken a systematic approach to identify 25-year sustainability goals, creating a foundation for a viable strategic plan that is supported with realistic action plans, and most recently has implemented DOD's new policy and guidance of "Net Zero Installations – Energy, Water, and Waste." Sustaining its resources will require a long-term commitment to radically change the way Fort Benning designs, builds, transports, and otherwise performs its mission, as it transforms its weapons systems, tactics, infrastructure, and assets in the coming decades. Fort Benning also is developing and instituting a Sustainability Management System that integrates environmental accountability in both daily and long-term decision making. It provides an explicit structure to manage activities and processes and decrease negative impacts to the environment. Associated goals, objectives, and targets are reviewed annually.

For Army Installations to be sustainable, activities in the surrounding area must be taken into consideration. Fort Benning is threatened with loss of mission capability due to encroachment from surrounding lands and limitations on full use of Installation lands for training activities and infrastructure. There are also opportunities for expanding natural habitat for threatened and Endangered species in the vicinity of the installation. Therefore, an Army Compatible Use Buffer (ACUB) proposal was developed in 2006 that outlines the rationale and approaches to establish an ACUB around portions of Fort Benning, using a combination of no-development easements, conservation easements, and conservation-focused land acquisitions. Fort Benning also is participating in the Joint Land Use Study program. The objective of this program is twofold: (1)

encourage cooperative land use planning between military installations and the surrounding communities so that future community growth and development are compatible with the training or operational missions of the installation; and (2) seek ways to reduce the operational impacts on adjacent land. The Fort Benning study commenced in 2006 and considered a 10-mile radius around the Installation, analyzing parameters such as regional growth, ecology, and the environment.

Monitoring—Without monitoring, adaptive management and an ecosystem-based approach to natural resource management in general are not achievable. Monitoring activities must be appropriate to the management objectives they are designed to support, repeatable, statistically analyzable, and scientifically rigorous. The results of monitoring must translate into information resource managers can use to craft appropriate management responses to changing resource conditions.

The Nature Conservancy developed the forest monitoring program in 2004 and has implemented the program since that time providing annual reports and presentations to Fort Benning personnel. In 2013 LMB began working with TNC to assist with monitoring data collection data collection and data interpretation, with the intent to transition the monitoring program to LMB in 2014. This allows LMB to actively take part in monitoring and see the effects of forest management and military training on the Fort Benning landscape. This process will allow forest management activities to appropriately adapt management activity to address needs identified during the monitoring process.

There is, however, a need for continued integration among the various programs present at Fort Benning and for implementation of adaptive management via infusion of monitoring and research results into the management decision making process.

Environmental Awareness—Implementation of the INRMP is accomplished, in part, through Fort Benning's Environmental Awareness Program. Program elements instruct installation military and civilian personnel on their responsibilities under the ESA to prevent impacts on listed species as well as their responsibility to protect streams and soil, prevent wildfires, chemical spills, and damage to cultural resources. Also included are lessons on legal requirements, policy, safety, and documentation of environmental incidents. Environmental awareness on the part of Fort Benning's personnel involves senior as well as unit leadership and responsible individuals. To that end, Fort Benning has established the following installation policy—units that are responsible for unauthorized and avoidable resource impacts are held accountable for their actions.

Environmental Compliance— The existence of an INRMP for Fort Benning does not by itself achieve environmental compliance. It is by the effective implementation of the plan contained herein that Fort Benning will ensure compliance with those environmental laws and regulations, as well as federal Executive Orders that apply to natural resource management. For example, the requirements of the Endangered Species Act (Title 16, US Code 1531-1543) provide a primary legal emphasis for natural resource management actions at Fort Benning, especially as those actions relate to the continued viability of the red-cockaded woodpecker. It is Army policy that mission requirements do not justify actions that violate the Endangered Species Act (see Army Regulation 200-1). As a result, the management actions contained in this management plan will assist Fort Benning in meeting its compliance obligations as they relate to the recovery of the red-cockaded woodpecker, as well as other listed species present at the Installation.

A variety of other environmental laws provide a legal context for natural resources management at Fort Benning. For example, because bald eagles, numerous migratory bird species, and undesirable non-native plant species occur on Fort Benning, the installation must comply with the appropriate provisions of the Bald Eagle Protection Act (Title 16, US Code 668), Migratory Bird Treaty Act (Title 16, US Code 703), and Federal Noxious Weed Act (Title 7, US Code 2801), respectively. Implementation of the INRMP enables Fort Benning to comply with these and other applicable environmental laws.

Compliance with the procedural requirements of the National Environmental Policy Act (Title 42, US Code 4321) are especially important in ensuring that federal actions avoid or minimize to the extent practicable adverse effects to the environment. Because the INRMP serves to ensure that Army activities on Fort Benning mission land are consistent with natural resource conservation measures, implementation of the INRMP should result in a beneficial impact to the environment. The direct and indirect environmental impacts that result from implementation of the INRMP per se, the proposed action (as contrasted to possible alternative actions), are evaluated in the Environmental Assessment that accompanies this plan.

BENEFITS OF IMPLEMENTATION

Over the course of its implementation, the INRMP:

- enables Fort Benning to make progress toward achieving a sustainable natural resource base and a safe, realistic training environment in support of the military mission;
- establishes appropriate stewardship policies that serve to protect both natural and cultural resources;
- facilitates compliance with environmental laws;
- provides a continuity of direction and effort that can accommodate changes in personnel and leadership;
- promotes cost-effectiveness through improved planning and coordination and by adapting management actions to changes in resource condition;
- improves the quality of installation life by providing recreational opportunities consistent with the military mission and natural resource management goals;
- promotes good public relations by demonstrating the installation's commitment to stewardship;
- accommodates multiple uses; and
- makes use of innovative strategies to accomplish specific management objectives.

CHAPTER 1 PURPOSE, AUTHORITY, AND DIRECTION

The Fort Benning Army Installation is located in the southeastern United States (Figure 1.1). It lies south and east of the cities of Columbus, Georgia and Phenix City, Alabama. The Installation occupies approximately 182,000 acres, of which approximately 170,000 acres are in Muscogee and Chattahoochee Counties, Georgia with the remaining 12,000 acres lying in Russell County, Alabama. The Chattahoochee River meanders through the western part of the Installation and separates the Georgia and Alabama portions. Fort Benning is located within 100 miles of Albany, Atlanta, and Macon, Georgia, and Montgomery, Alabama.

The 2005 Base Closure and Realignment Commission (BRAC) recommended the relocation of the Armor Center and School from Fort Knox, Kentucky, to Fort Benning, Georgia. This supported the establishment of the Maneuver Center of Excellence (MCoE) at Fort Benning. Fort Benning and The Maneuver Center provide "trained, adaptive, and ready Soldiers and leaders for an Army at War, while developing future requirements for the individual Soldier and the maneuver force, while providing a world class quality of life for Soldiers and Army Families."

Fort Benning's primary military activities include training entry-level Soldiers, providing the Nation's primary facility for training the Infantry and Armor, conducting Airborne and Ranger candidate training, hosting the U.S. Army Western Hemisphere Institute for Security Cooperation and the Army's Noncommissioned Officer Academy, and providing a power projection platform for rapid deployment. Besides its resident training units, Fort Benning also is home to a number of tenant units that conduct much of their training on the Installation.

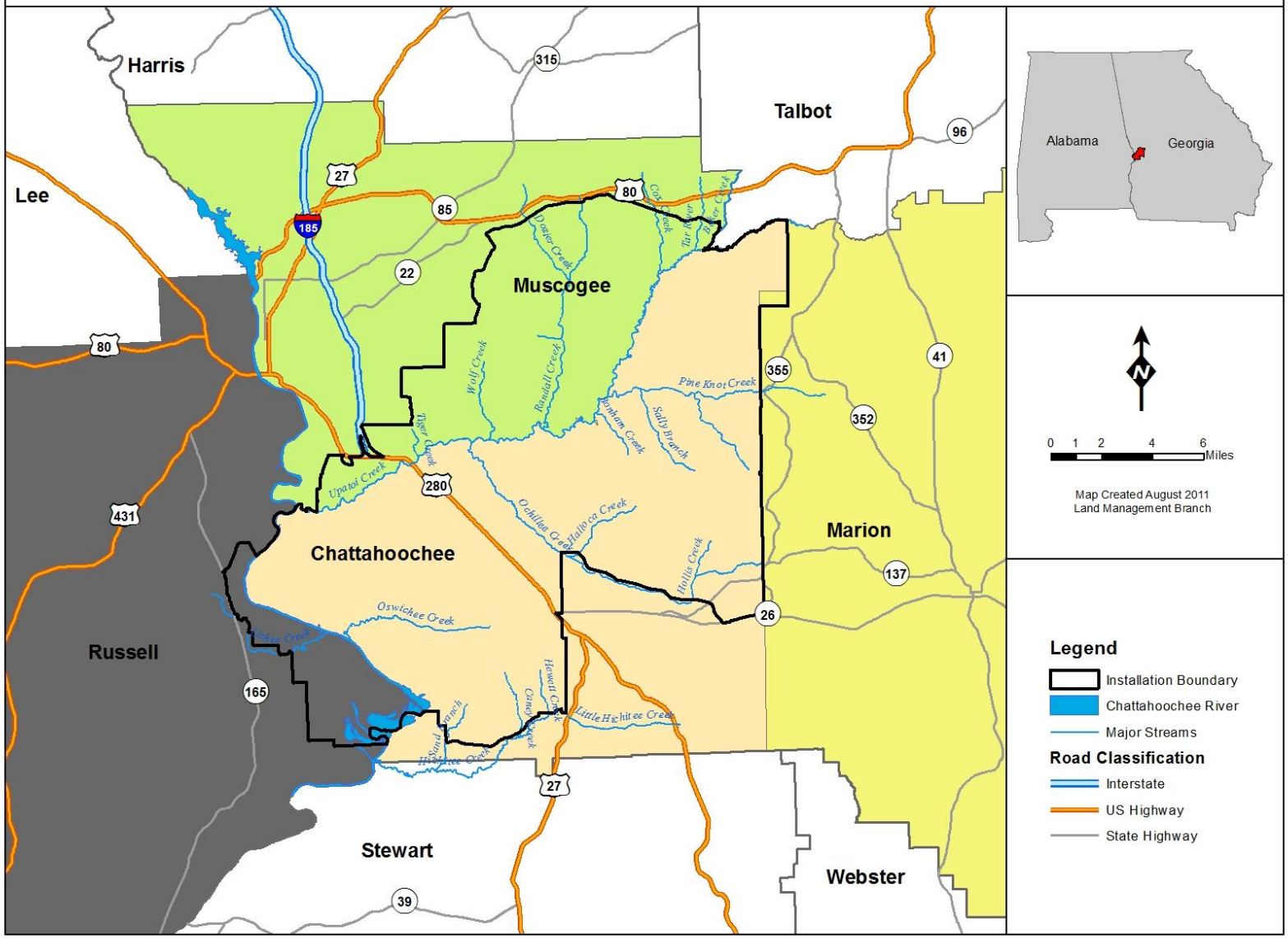
1.1 PURPOSE AND SCOPE

The primary purpose of Fort Benning's Integrated Natural Resources Management Plan (INRMP) is to ensure that natural resource conservation measures and military activities on mission land are integrated and consistent with Federal stewardship requirements. As a result, the INRMP serves as the Garrison Commander's comprehensive plan for managing natural resources to meet and maintain stewardship requirements while optimizing primary activities on mission land and, where compatible, conducting secondary activities.

The execution of mission operations represents the primary activity and provides the justification for the Army holding land at Fort Benning. All other activities that have the potential to compete with the primary activity, either by using needed space or by the additional consumption of natural resources, represent secondary activities (except when they directly contribute to the sustainable use of mission land by the primary activity). Such activities can include forest management, fishing and hunting, and other forms of outdoor recreation.

Although the focus of the INRMP is on natural resource management issues associated with training lands, natural resource management activities that occur within the Installation's Cantonment areas also are addressed.

Figure 1.1 Geographic Location and Major Features of the Fort Benning Army Installation



1.2 AUTHORITY

The Sikes Act (Title 16, United States Code 670a et seq.), as amended, provides the primary legal basis for the Secretary of Defense to carry out a program that provides for the conservation and rehabilitation of natural resources on military installations. To facilitate such a program, the Act requires the Secretary of each military department to prepare and implement an INRMP at appropriate military installations throughout the United States under their respective jurisdictions. Moreover, such plans shall be prepared in cooperation with, and reflect the mutual agreement of, the Secretary of the Interior (acting through the Director of the U.S. Fish and Wildlife Service [USFWS]) and the head of each appropriate state fish and wildlife agency for the state(s) where the military installation concerned is located. Because Fort Benning occupies land in Georgia and Alabama, both the Georgia Department of Natural Resources (GADNR) and the Alabama Department of Conservation and Natural Resources (ADCNR) have been involved in development of this plan.

Army Regulation (AR) 200–1 (Environmental Protection and Enhancement, 13 December 2007), the relevant implementing regulation, identifies general requirements for the contents of installation INRMPs, as well as criteria for achieving integration with the installation's mission and other activities.

1.3 MANAGEMENT PHILOSOPHY

Fort Benning's approach to natural resources management is embodied in the Installation's vision of the relationship between its military mission and the natural resources upon which that mission depends. The Installation also has developed a natural resources management mission statement (presented below) that provides an overarching premise for how Fort Benning will manage its lands. Because Fort Benning's natural resources management philosophy is based on an ecosystem approach, this section also includes a brief overview of ecosystem management policy, conservation concepts, and ecosystem management principles and guidelines and their relation to the Installation's management philosophy. The section concludes with a discussion of the relationship between Fort Benning's natural resources management philosophy and the Installation's military mission.

1.3.1 INRMP Vision and Mission Statements

Fort Benning's Natural Resource Management Vision – Support the MCoE mission while promoting the ecological integrity of the Fort Benning landscape.

Fort Benning's Natural Resource Management Mission – Through a collaborative effort between natural resource professionals and military personnel, Fort Benning will strive to promote the long-term ecological sustainability of its lands for multiple-use opportunities. Fort Benning will apply sound land management practices and adaptive management strategies that conserve ecological integrity through the restoration, maintenance, and preservation of natural biotic communities and otherwise promote the health of Installation ecosystems through rehabilitation and maintenance. This ecosystem management approach will encompass stakeholder interests, regulatory requirements, and fiscal constraints.

1.3.2 Ecosystem Management Approach

In its simplest form, ecosystem management represents a proactive approach to Federal environmental policy. Due to vast land holdings and the nature of activities that have the potential for adverse impacts on the environment, Federal agencies such as the Department of the Defense (DoD) can make important contributions to sustaining healthy ecosystems and

conserving ecological integrity using an ecosystem management approach (National Performance Review 1993). Moreover, although military lands represent only about three percent of the total Federal land inventory (DoD manages about 25 million acres, and the U.S. Army manages half of that total), they have disproportionate value with respect to their biodiversity (Leslie, et. al 1996). This is especially true in the southeastern United States where Federal public lands are otherwise relatively lacking. Finally, although some land uses for military training are intensive and may degrade landscapes if not properly managed, significant acreage often is used at low intensity (e.g. land navigation), or could serve as a buffer. These latter land uses could enhance ecological integrity across the Installation.

1.3.2.1 Policy Background

The DoD and Department of the Army (DA) have embraced the concept of ecosystem management, and along with other Federal agencies are signatory to a *Memorandum of Understanding Between The U.S. Department of Defense and The U.S. Fish and Wildlife Service and The Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resource Management Program on Military Installations, 29 July 2013.* This Memorandum of Understanding (MOU) fosters and ecosystem approach to natural resource management, and establishes the following policy:

> "INRMPs provide for the management of natural resources, including fish and wildlife and their habitats. To the maximum extent practicable, they incorporate ecosystem management principles, and describe procedures and projects that manage and maintain the landscapes necessary to sustain military-controlled lands for mission purposes. Effective communications and coordination among the Parties, initiated early in the planning process at national, regional, and the military installation levels, is essential to developing, reviewing, and implementing comprehensive INRMPs."

Even before the MOU was signed, the DoD already had made a strong policy commitment to the implementation of ecosystem management across the Defense complex (Goodman 1994). The Deputy Under Secretary of Defense (Environmental Security) articulated an overall ecosystem management goal, as well as principles and guidelines for an ecosystem management approach that included a shift in focus from the protection of individual species to management of ecosystems, formation of partnerships to achieve shared goals, public participation, use of the best available science, and implementation of adaptive management techniques.

1.3.2.2 Ecosystem Management Principles and Guidelines

The ecosystem management principles and guidelines articulated by the Deputy Under Secretary of Defense (Environmental Security) provide a useful vehicle for outlining Fort Benning's ecosystem-based approach to natural resources management. The Secretary's principles and guidelines, in some cases restated to reflect changes in conservation concepts discussed above, are provided below and discussed briefly with respect to their use at Fort Benning.

Restore and maintain the ecological integrity of biotic communities; rehabilitate and maintain the health of ecosystems. The distinction between biotic communities and ecosystems and their respective management goals is critical to the application of ecosystem management in contexts where both human exploitation of a particular environment and conservation of biodiversity must be accommodated. Such is the situation at Fort Benning

where the Installation must be able to accomplish its primary mission of military training and, at the same time, must be a steward of the environment.

Administer with consideration of ecological units and timeframes. Ecosystem management compels resource managers to look beyond present administrative boundaries to consider spatial and temporal ecological scales that are relevant to natural systems and processes. To effectively manage its natural resources, Fort Benning resource managers must consider how the Installation's biotic communities and their ecological integrity interact and are affected by the biotic and human communities that exist outside the Installation's boundaries. Consideration of ecological time scales, and their variety, also is important, especially when certain natural processes (e.g. fire) have been disrupted and now must be mimicked by human managers in regard to their estimated intensity and frequency.

Support ecologically sustainable human activities. Continued military training at Fort Benning ultimately depends on healthy ecosystems and maintaining ecological integrity at the landscape scale. For a project or activity to be ecologically sustainable, it must not compromise ecosystem health. In addition to training, construction activities have the potential to cause soil erosion and sedimentation without implementation of erosion control measures and BMPs as outlined in Federal and state laws, as well as Installation guidelines. Fort Benning and its contractors must comply with Clean Water Act (CWA) and National Pollution Discharge Elimination System (NPDES) regulations. Projects are reviewed through the Fort Benning NEPA process with submittal of a Form FB 144-R (Request for Environmental Analysis) to ensure CWA, NPDES, and Endangered Species Act (ESA) requirements are in place prior to any land disturbing activities. All required permits would be obtained and all appropriate site-specific management practices and existing mitigation measures would be implemented to offset potential impacts form land disturbing activities associated with construction. Land disturbances and soil erosion will be monitored to ensure compliance with applicable regulations.

Develop a vision of landscape ecological integrity. Because Fort Benning is critical to regional biodiversity conservation, its conservation success at the landscape scale must be measured in terms of ecological integrity. In conjunction with conservation partners, technical experts, and stakeholders, Fort Benning will develop a vision of landscape ecological integrity for the Installation. The Installation's objective is to determine how the Fort Benning landscape should appear and function as a sustainable, natural (to the extent achievable), managed forest within a military training environment. In addition, there are legacy erosion from historical agricultural land uses and forestry practices. This vision of landscape ecological integrity should account for restoration of longleaf pine (*Pinus palustris*) communities to include conversion from other forest vegetation types, and maintenance of the diversity of alliance vegetation types appropriate to the physiognomic, soil, hydrologic, and microclimates present. This INRMP incorporates this vision throughout the operational management plans.

Develop priorities and reconcile conflicts. Preparation of the INRMP relied in part on the advice of technical experts who assisted Installation natural resource managers in identifying management issues. These issues drove the development of natural resource management goals, objectives, and guidelines as discussed in Chapter 4. Individual management programs (see Chapter 5) used the preceding information to develop and prioritize their day-to-day and long-term management actions. All program operational plans are fully integrated to avoid potential conflicts in management direction.

Develop coordinated approaches to ecological integrity and ecosystem health at the appropriate geographic scales and locations. Successful restoration and maintenance of designated areas at Fort Benning for their ecological integrity depends, at least in part, on achieving the same goals in the human inhabited and developed areas of the Installation. In turn, the ecosystem health of developed areas relies on proximate areas that have maintained their ecological integrity. The latter serve both as reference sites for normal ecosystem function (Leopold 1941) and as reservoirs of native species for recruitment (Naeem 1998, Callicott et. al. 1999). These benefits are reciprocal at the regional scale. In other words, the ecological integrity of the Fort Benning landscape benefits the health of surrounding human-inhabited and developed lands. Similarly, to whatever extent the lands surrounding Fort Benning can be managed for ecological integrity either through the Army Compatible Use Buffer Program (ACUB) or otherwise, chances improve for successfully managing for ecological integrity at Fort Benning.

Coordination and collaboration must occur across ownership and political boundaries and with diverse entities, including other Federal agencies, Tribal, state, and local governments, non-governmental organizations, private landowners, and the public. Achievement of ecological integrity and ecosystem health at regional scales requires active participation and a shared vision. Ecosystem-based management goals and objectives need to be incorporated into strategic, program, and budget designs.

Rely on the best science available. Fort Benning has several research projects in cooperation with DoD and academic institutions to advance scientific knowledge. These research projects are identified throughout this INRMP. Fort Benning personnel routinely coordinate with other DoD organizations, the states, and local communities to identify the best scientific information for resource management strategies. Additionally, Fort Benning personnel attend professional training courses and workshops when funding is available.

Use benchmarks to monitor and evaluate outcomes. Benchmarks can be used to both measure management success and to show accountability. The INRMP management objectives and guidelines are presented in a manner that enables the results of management actions to be determined, though in some cases these results may take several years to appear. For many of the objectives and guidelines, success can be measured by use of ecological monitoring data. Fort Benning uses several measures of accountability to ensure that planned management initiatives will be implemented and their effectiveness (including cost-effectiveness) evaluated. Examples include the Annual Army Environmental Database-Environmental Quality, the Triennial Environmental Performance Assessment System, and the Quarterly Performance Management Review (Common Levels of Service). Chapter 6 addresses additional means of monitoring implementation of the INRMP.

Use adaptive management. Biotic communities and ecosystems are complex dynamic systems. The management objectives and guidelines in the INRMP are designed to accommodate changes in the status of natural resources at Fort Benning as well as new scientific understandings of how biotic communities and ecosystems function. A comprehensive natural resources monitoring program is a vital component of effective adaptive management.

Implement through Installation plans and programs. The INRMP serves as a comprehensive plan for managing natural resources to meet and maintain stewardship requirements while optimizing the Installation's ability to conduct primary activities on mission land and, where compatible, to conduct secondary activities. Operational plans for individual Installation programs that play a role in natural resource management on the Installation are

included as part of the INRMP. The INRMP also is integrated with Fort Benning's Range Complex Master Plan (1 July 2013), Range and Training Land Program Development Plan (Nakata Planning Group 2006), Real Property Master Plan, and overall aspects of the Installation's training mission.

1.3.3 Relationship to the Military Mission

The types of training and units present at Fort Benning dictates the potential impacts to natural resources from military activities at the Installation, as well as the requirements for a realistic training environment. Impacts can result from direct removal of or damage to vegetation, digging activities, ground disturbance from vehicles, use of obscurant smoke and teargas-like agents, and munitions detonation. The mechanized forces in particular, which use vehicles such as the M1A1 Main Battle Tank and the M2A2 Bradley Fighting Vehicle, can cause direct and indirect impacts to natural resources. Often these impacts are related to soil compaction, land disturbance, and movement that can result in soil erosion, and may contribute to sedimentation of the Installation's many creeks.

Fort Benning has numerous ranges that accommodate munition training and ordnance dud areas, cleared areas, (e.g. areas cleared of vegetation other than low level ground cover), include bivouac sites, landing strips for fixed-wing aircraft, helicopter pads, and drop zones for airborne training. Proposals for construction projects to enhance or maintain military training may cause environmental impacts. Examples of these construction projects may include new ranges, permanent erosion control measures, administrative buildings, roads and trails, and a variety of other support facilities. Potential natural resource impacts and mitigation are identified through the National Environmental Policy Act (NEPA) process as described in Appendix C2.

A realistic training environment is a prerequisite for effective training at Fort Benning. For example, the presence of natural vegetation enables realistic training scenarios involving cover, concealment, or line-of-sight firing constraints. To ensure that Fort Benning can meet its mission needs now and in the future, the natural resources that provide the training context must be managed so that they are ecologically sustainable over the long term. The plant and animal communities that are locally adaptive are those that can be sustained with a minimum of management action. Because of past land management practices (e.g. failure to adequately prevent and mitigate the effects of soil erosion, introduction of non-native species, fire suppression, and habitat removal), portions of Fort Benning's present environment is highly altered. Failure to maintain, restore, or rehabilitate the natural communities and ecosystems of the Installation could impact future training missions at Fort Benning. The current INRMP builds on those important remnants of natural diversity that are present at Fort Benning and provides an ecosystem-based vision and management strategy for restoring or rehabilitating (where appropriate) the native biota and ecological processes characteristic of the geographic area.

In summary, the INRMP focuses management efforts on achieving an ecologically sustainable environment across the Fort Benning landscape by using an ecosystem approach that maintains landscape ecological integrity while at the same time addressing the needs of listed species and promoting the ecosystem health of developed areas.

1.4 PLAN DEVELOPMENT

The INRMP has been prepared in cooperation with the USFWS, the ADCNR, the GADNR, and in consultation with the Federally recognized Indian Tribes (Tribes) that have an historical association with Fort Benning lands. This INRMP revision incorporates changes in management strategies since the initial INRMP. Fort Benning intends to send the draft INRMP to state,

USFWS, and Tribal representatives for their review and comments. As per Army NEPA regulation, Fort Benning also intends to prepare an Environmental Assessment (EA) for general public involvement. Any concerns received will be resolved before reaching a final INRMP and EA.

Partnerships within the Installation can be just as important as external partners when the goal is effective implementation of natural resource management strategies. The need for partnerships does not end with the preparation of the INRMP. Fort Benning fully recognizes that a key component of the INRMP's ecosystem approach is a continued reliance on partners to enhance data sharing, regional conservation strategies, and monitoring activities. Through INRMP implementation and to the extent that it is authorized by mission considerations and available budget, Fort Benning will continue to work with its conservation partners.

1.5 RELATIONSHIP TO OTHER DOCUMENTS

The INRMP provides strategic as well as day-to-day guidance for all natural resource management activities occurring at Fort Benning. It is the primary reference, guidance, and policy document for all natural resource-related issues at the Installation. Implementation of and adherence to the management directions specified in the INRMP ensure Fort Benning's compliance with applicable natural resource laws, regulations, and Executive Orders (EOs).

At the Installation level, the INRMP is one component of Real Property Management that assesses current operational and site conditions to guide development strategies for sustainable infrastructure and to support mission requirements. In conjunction with the Installation's Long Range Component of the Real Property Master Plan (Parsons 2011) and the Range Complex Master Plan (1 July 2013), the INRMP provides Fort Benning with background information, guidance, policy, and procedures to manage its land assets now and into the future, especially as such management affects the stewardship of natural resources and the military mission's reliance on an ecologically sustainable natural resource base. To accomplish effective integration of land-use planning decisions, the INRMP relies in part on a fully funded and functional Integrated Training Area Management Program (ITAM). ITAM's land management objectives, in support of training missions, are incorporated into the INRMP as well, and can be found as part the Land Management Plan found in the Red-cockaded woodpecker (RCW) Endangered Species Management Component (ESMC)in Appendix E1.

At the major command and above levels, information contained in the INRMP can be used to assist the development of decision documents for proposed projects or actions, including stationing actions, weapon system deployment, construction projects, and funding distribution. At regional scales, the INRMP can serve as a site conservation plan that represents a component of an overall regional conservation plan.

1.6 PLAN ORGANIZATION AND USE

Fort Benning's 2014-2018 INRMP is divided into an Executive Summary, six subject chapters, and appendices. The six chapters highlight (1) the role of the INRMP; (2) baseline information on the physical and biotic environment at Fort Benning; (3) the military mission and its potential effects on natural resources; (4) the management intent for natural resources in terms of desired future conditions and recommended goals and objectives by program area; (5) operational plans describing the purpose, framework, activities, administrative needs, and planned initiatives for ten program areas; and (6) personnel, funding and support as well as long-term strategies required for implementation of the INRMP and its recommended projects. The appendices include detailed information on the natural resources found at Fort Benning,

management issues and guidelines by program area as well as program summaries, other elements of an effective natural resource management program such as monitoring and compliance, species lists, threatened and endangered species management components and plans, unique ecological areas management plan, plans for land use in the area surrounding Fort Benning, and the references, and acronyms and abbreviations. The appendices generally will be of interest to those who require or desire access to detailed technical information or to the specifics of management program planning, implementation, and budget forecasting.

1.7 PLAN REVIEW AND REVISION

In keeping with an adaptive management approach to natural resource management this INRMP is intended to be updated on a frequent basis to incorporate changes in environmental resources, management practices, regulatory requirements, or scientific research and advancements. Based on DoD policy, the INRMP is required to be reviewed annually and updated if necessary as mission or environmental changes warrant, and revised at least every five years (DoD 2011). Each revised version of the INRMP must be approved by Headquarters, Installation Management Command (IMCOM) before execution. Additionally, DoD Instruction (DoDI) 4715.03 requires internal (Installation personnel) self-assessments of conservation programs at least annually and external (designated DoD representative from outside the Installation) assessments at least once every three years.

CHAPTER 2 SYNOPSIS OF NATURAL RESOURCES

Fort Benning is in many ways a physical, ecological, and historical crossroads. Its natural resources are shaped by intersections of geology, climate, ecology, and history. Detailed descriptions of the Installation's lands, waters, and natural resources can be found in Appendix A1. This chapter provides a synopsis and synthesis of Fort Benning's natural resource elements, both their history and character, as a context for associated management planning.

2.1 SETTING

Fort Benning lies near the intersection of the Chattahoochee River and the Fall Line. The Chattahoochee River originates in the Appalachian Mountains, flows through metropolitan Atlanta, and joins the Flint River in southwestern Georgia to form the Appalachicola River before its outfall into the Gulf of Mexico. The Fall Line is a feature that can be defined in the context of physiography, geology, soils, or ecology, but it is perhaps best described as the ancient Cretaceous shoreline left by the furthest inland advance of the Atlantic Ocean. Inland of the Fall Line lies the Piedmont physiographic region, and coastward lies the Coastal Plain. Fort Benning includes areas whose geology, hydrology, and ecology have characteristics of both physiographies, as well as the Fall Line itself, which is often considered a physiography distinct from both Piedmont and Coastal Plain.

Several tributaries of the Chattahoochee River originate from seeps, springs, and wetlands in the dissected Fall Line landscape. Some of these "Fall Line streams" originate north, east, or west of Fort Benning and flow through Installation lands, often supporting unique communities of aquatic flora and fauna. But, perhaps the most dramatic physical characteristic of the Fall Line landscape are sand hills and ridges of the northeastern part of Fort Benning, with deep sandy soils that are highly permeable, droughty, and low in organic matter. Several distinctive plant and animal communities occur on these sites, often with longleaf pine as the dominant canopy tree, with an associated ecology dependent on soil characteristics, fire return interval, and land-use history. Finer textured soils and more mesic sites tend to occur south and west of these Fall Line sand hills, but upland and riverine topography with fire-adapted plant and animal communities also extend to parts of Fort Benning below the Fall Line and on both sides of the Chattahoochee River floodplain.

2.2 LAND-USE HISTORY

The lands and waters of Fort Benning have been used and shaped by human inhabitants for at least 10,000 years. Native American land use dominates this history, from approximately the time of the most recent recession of glaciers from eastern North America to European colonization in the 1800s. Native Americans relied heavily on the waters of the Chattahoochee River and its tributary streams, both for navigation and sustenance. The floodplains, forests, and grasslands in the surrounding hills also provided food and materials, both from hunting/gathering and agriculture. Major Native American impacts on the landscape included land clearing for villages and agriculture and expansion or modification of natural (lightning-caused) fire occurrence.

European settlers substantially increased the clearing of land for agriculture and settlements in the 1800s. Dramatic examples of soil erosion became evident regionally, and some examples of unstable soils persist today both on and off the Installation. Burning of woods and fields, which Native Americans had undertaken for millennia, was continued by the early European settlers,

but the extent of forestland declined and the seasonal timing of fire was further altered. Introduction of free-range livestock, especially hogs, began to impact forest regeneration dynamics. Stream waters often were diverted or impounded to turn waterwheels and millstones, and many streams were likely impacted by sedimentation and hydrologic shifts. Cotton fields were the dominant land use on what is now Fort Benning in the late 1800s and early 1900s. Throughout the southern United States, abandoned cotton fields grew up in pine trees in the early to mid 1900s after the boll weevil decimated the cotton resource. Upland forests are dominated by longleaf pine, loblolly pine (*Pinus taeda*), and shortleaf pine (*Pinus echinata*) often originated from these abandoned agricultural fields and were far less likely to experience the kind of fire regimes imposed by Native Americans or the earliest European settlers.

This conversion of forests to agriculture and back to forest again, combined with alteration or cessation of fire occurrences, represented significant ecological "bottlenecks" common throughout the Southeast. Loss of native groundcover, fire-adapted flora and fauna, and late-successional habitat conditions represented the most critical losses to the native regional ecology. The establishment of Fort Benning as an Infantry training facility removed land-development pressures across large unpopulated or depopulated landscapes and created a new source of fire (incidental to military training); it also provided an unintended but critical refuge for flora and fauna that may otherwise have been lost.

Nevertheless, twentieth-century forest management practices favored loblolly pine over longleaf, removed fire from the landscape, and created high stand densities and/or pine-hardwood mixtures which collectively limited recovery of native habitat conditions over much of Fort Benning. Establishment of loblolly pine plantations was standard practice following clearcut harvests. Non-native species were sometimes established for reforestation (e.g., slash pine [*Pinus elliottii*] and Virginia pine [*Pinus virginiana*]) or for soil stabilization or wildlife food. Establishment of kudzu (*Pueraria montana*) may pre-date Army land management but it certainly exists on the Installation, as do exotic species of *Lespedeza* and other problematic plants. Fire *prevention* was emphasized more than broader fire *management* practices in the mid-twentieth century. Flora and fauna associated with frequent fire, open mid-stories and undisturbed ground cover often survived by chance rather than through intentional conservation programs.

In the late 1980s and 1990s, Fort Benning's forest management approach shifted significantly from a timber production and fish-and-game management perspective to an ecosystem management perspective. Recovery of the endangered RCW, restoration of longleaf pine habitat, aggressive fire management, forest ecosystem management, and designation of unique ecological areas became hallmarks of Fort Benning's Land Management and Conservation efforts. These objectives were initially documented in the installation's first INRMP (USAIC 2001) and are updated in the current document.

2.3 CURRENT STATUS

Fort Benning's land management approach has always recognized the importance of soil conservation, forest management, water quality, forest health, wildfire prevention, and healthy wildlife populations toward sustaining the training mission. Fort Benning's land managers consist of Army foresters/biologists, consultants, and academics that are focused on sustainable forest management, erosion prevention, recovery of important game animals, and minimization of losses from pests, disease, and fire.

Today, Fort Benning's natural resources are a diverse and dynamic assemblage of species and ecosystems representing a broad range of vegetation types, land-use histories, and management objectives. Timber harvesting, tree-planting and recreational hunting and fishing continue to be important elements of Fort Benning's land management approach. These practices are compatible with (and often required by) the more recently emphasized goals of ecological restoration, species recovery, and conservation of unique ecological areas. All such management is conducted within the context of providing a sustainable military training infrastructure, including lands and waters, a mission that is both paramount and continually changing.

CHAPTER 3 MCoE MISSION AND NATURAL RESOURCE IMPLICATIONS

3.1 MILITARY MISSION OVERVIEW

3.1.1 Mission of MCoE and Fort Benning

The Maneuver Center of Excellence (MCoE) provides trained, agile, adaptive and ready Soldiers and Leaders for an Army at war while developing capabilities for the Maneuver Force and the individual Soldiers and providing a world-class quality of life for our Soldiers, Civilians and Army families.

3.1.2 Fort Benning Population

Fort Benning supports a variety of schools and numerous tenant units. Fort Benning's total Installation daily population (including Active Army, civilians, Permanent Change of Station students and trainees) is approximately 39,250 individuals (USAEC 2013); this does not include military dependents. Fort Benning Soldiers and employee households include another estimated 40,200 Family members (spouses and dependent children). The total population of Fort Benning's full-time Soldiers, civilians, trainees, and Family members is estimated to be approximately 79,450 people. In addition, military personnel are supported by civilian employees, (Department of the Army, Non-Appropriated Fund, Contract, Post Exchange, etc.). Approximately 11,000 military retirees also use the facilities on Fort Benning (USACE 2011).

3.2 PRE-ARMY HISTORY OF THE FORT BENNING AREA

Before its use as a military installation, the lands that constitute Fort Benning today were used in several capacities. At different times in history, American Indian villages and European settler farms, mills, and cotton plantations once occupied the current site of Fort Benning. As a result, the landscape has been influenced by previous inhabitants through such activities as agriculture, timber harvest, use of fire (or lack thereof), and impoundment of water for mill operations. Besides providing a land-use context insofar as that context affects the ecological condition of Fort Benning's natural resources today, a review of the historical record also provides an indication of the cultural and historical importance of Fort Benning lands. Detailed discussion of the cultural and land use history of the area can be found in Fort Benning's Integrated Cultural Resources Management Plan (ICRMP 2008).

3.3 HISTORICAL PERSPECTIVE OF FORT BENNING

Dating back to the revolutionary war, it was evident that Infantry Soldiers were inadequately trained in uniformity, organization, and teamwork. As training methods were improved with the publication of a series of Infantry regulations and manuals in the 1860's and 1870's, the adoption of uniform training methods and standard tactics contributed to the advancement of Infantry training, however, at the onset of World War I an Infantry training center did not exist.

On 18 September 1918, the Adjutant General of the Infantry School directed that the Infantry School of Arms with all its personnel, property, and equipment move from Fort Sill, Oklahoma, to Columbus, Georgia, beginning 1 October 1918. The first troops arrived on 6 October 1918 and occupied a temporary camp three miles east of town on Macon Road. The next day the camp was officially opened. At the request of the Columbus Rotary Club, the camp was named in honor of a Civil War General, GEN Henry Lewis Benning, a Columbus native many thought was the area's most prominent military officer.

The search for a permanent location for the camp led to a plantation site south of Columbus owned by Mr. Arthur Bussey. The Bussey land featured terrain considered ideal for training Infantrymen. Once purchased by the government, the plantation would serve as the core of the camp, and the large frame house, known as Riverside, would serve as quarters for a long line of commanders. In February of 1920, the War Department officially assigned the title of "Infantry School" to Camp Benning. Two years later, Camp Benning was designated a permanent military Installation and named Fort Benning. From the 1920's through 1940's, the Installation increased in size through a number of land purchases throughout the surrounding areas in Georgia and Alabama, with a final "land swap" with the City of Columbus occurring in 2001.

After years of struggling for appropriations and attention from Army policy makers, Fort Benning enjoyed a construction boom in the mid-1930s as a result of Federal work projects during the Great Depression, and continued into the 1940s with the eruption of World War II in Europe. Troop strength swelled with the arrival of the 1st Infantry Division and the establishment of the Officer Candidate School and airborne training. Ranger training began at Fort Benning in the 1950s, and the 1960's saw the formation of the 11th Air Assault Division to test air assault concepts. By 1978, all US Infantry Soldiers were trained at Fort Benning as part of One Station Unit Training.

In November 2005, the Army announced its intent to implement the Base Realignment and Closure (BRAC) 2005 recommendation at Fort Benning, Georgia (GA). Under this recommendation, the Armor Center and School would relocate from Fort Knox, Kentucky to Fort Benning and eventually consolidate with the Infantry Center and School to form the Maneuver Center of Excellence (MCoE) for maneuver forces training. This BRAC recommendation also resulted in the construction and operation of numerous new ranges, training facilities, and infrastructure upgrades to support the relocation of the Armor School and associated training requirements. In September of 2011, the relocation of the Armor School to Fort Benning was complete.

3.4 CURRENT TRAINING ON FORT BENNING

Fort Benning is the home of the United States Army MCoE and prides itself on being one of the world's premier warfighting centers and deployment platforms. Fort Benning is used for a variety of military training, military administration, and management activities. Of the currently owned property, approximately 141,500 acres are primarily designated for training and maneuver areas. The MCoE trains over 50 percent of Training and Doctrine Command (TRADOC) institutional training requirements in 19 MCoE, 86 Infantry, and 53 Armor training programs that occur 5-6 days per week for 50 weeks annually. Fort Benning has a robust and highly used range infrastructure with several unique ranges supporting Special Operations Command units. Overall, units training on Fort Benning conduct an average of 117 daily training missions. Fort Benning has a total of 86 live-fire and 9 non-live-fire ranges with the surface danger zone acreage of over 15,800 acres.

In peacetime, Fort Benning provides ranges and maneuver training areas principally designed to support the TRADOC mission to conduct:

- Initial entry training for Armor and Infantry Soldiers and officers
- Professional Military Education for commisioned and noncommissioned officers
- Army Basic Airborne Training and Ranger School
- Functional Training for a variety of weapons and weapon systems

- Continued study, testing, and development of future joint and combined Infantry doctrine; weapon systems; and tactics, techniques, and procedures

Fort Benning also provides the home station training facilities for several Army Forces Command (FORSCOM) and Special Operations Command (SOCOM) units, and is the home to the Western Hemisphere Institute for Security Cooperation (WHINSEC), which has the mission to train cadets, noncommissioned officers, and officers from Latin American countries.

3.5 CATEGORIES OF LAND USE

Fort Benning's non-cantonment lands are subdivided into military trainingcompartments which are designated alphanumerically. Compartment designation facilitates the scheduling of particular types of military land use (training) in a safe and orderly manner. It also can be used to roughly assign the types of training that are authorized within any particular compartment. Such designations provide a crucial first step in the management of training and its environmental impacts. Training operations include a variety of weapons systems from small arms to mounted maneuver, using wheeled and tracked vehicles, and mortar and field artillery training (USACE 2007). Fort Benning training lands also include, drop zones, landing zones, dudded and non-dudded impact areas, and live-fire ranges for small arms and mounted maneuver systems. Land is coded for use as "light maneuver" for dismounted and wheel mounted training and "heavy maneuver" for track mounted maneuver. The remainder of this section briefly describes the types of land uses and designated military training areas on Fort Benning.

3.5.1 Heavy Maneuver Training Areas

The training activities in these areas include maneuvering tracked vehicles primarily on tank trailswith limited off-road, and cross-country training. Mechanized infantry and tank units are limited to the areas where the terrain is suitable for heavy vehicle movement. The general characteristics of a heavy training area are relatively flat and open terrain, with limited natural obstacles (such as creeks and thickly forested areas). Land coded for heavy maneuver training can be used by mounted and dismountedforces. The areas designated for heavy training are illustrated in Figure 3.1.

3.5.2 Light Manuever Training Areas

Light training areas are used for several types of training that do not involve heavy mechanized equipment. Most training activities at Fort Benning consist of personnel movement through wooded and open areas, moving wheeled vehicles over dirt and gravel roads, and establishing bivouac sites. Many courses involve Soldiers on foot for navigation, survival, observation, offensive and defensive operations or similar training. Areas designated for light training are illustrated in Figure 3.2.

3.5.3 Ranges

Fort Benning has ranges to accommodate small arms from .22 caliber to .50 caliber firearms. Large caliber weapons are those above .50 caliber such as 120 mm tank rounds, 60 mm mortar rounds, and 155 mm artillery rounds. Ranges on Fort Benning support basic and advanced marksmanship, sniper, missile, mounted direct-fire gunnery, collective (two man to platoon) live-fire, firing points for mortars and field artillery, shoot-houses for urban assault, and special live-fire ranges for training with grenades or explosive ordnance. Figure 3.2 depicts all military training areas on Fort Benning.

Figure 3.1 Fort Benning Mechanized Training Land Use

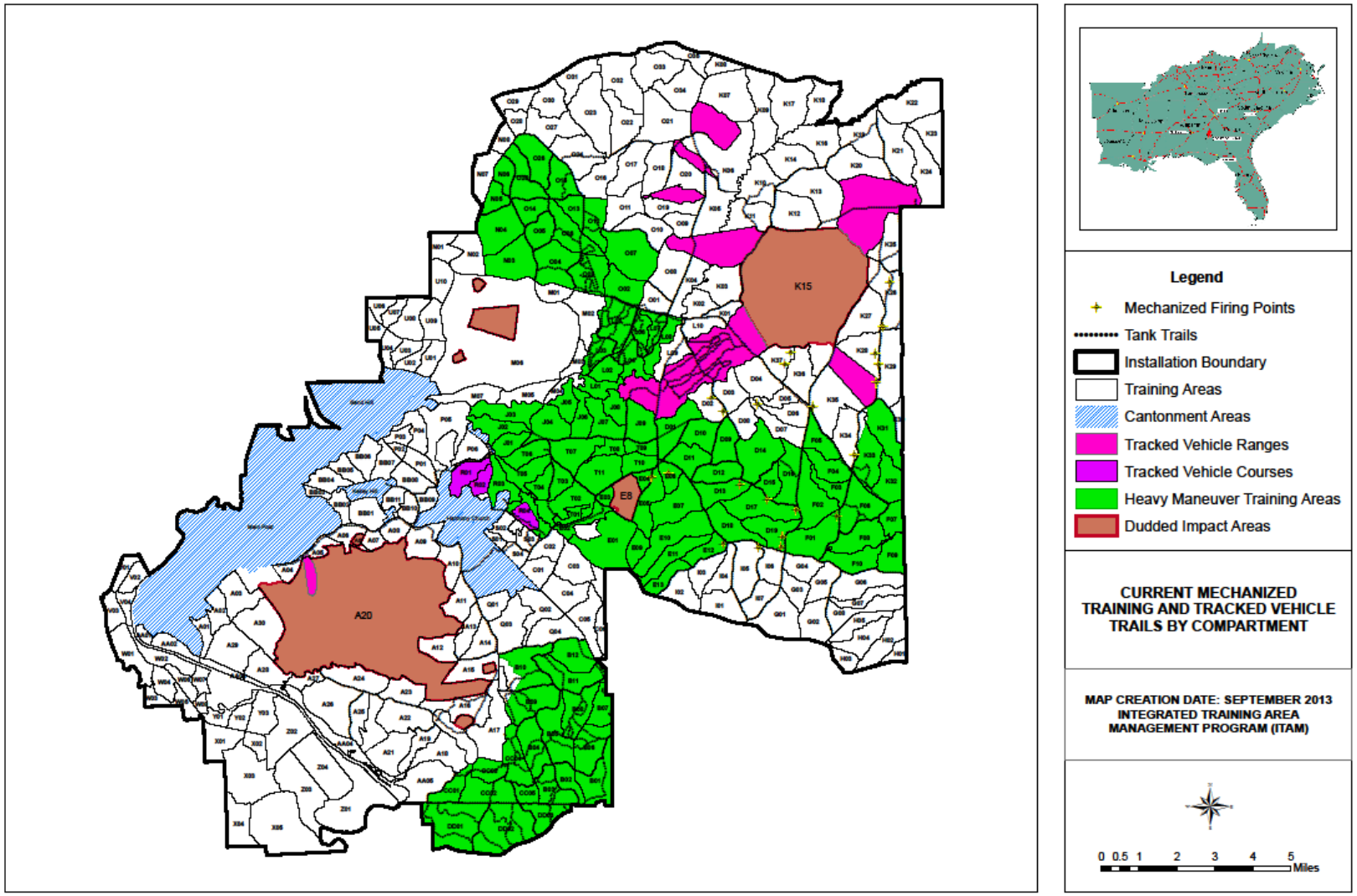
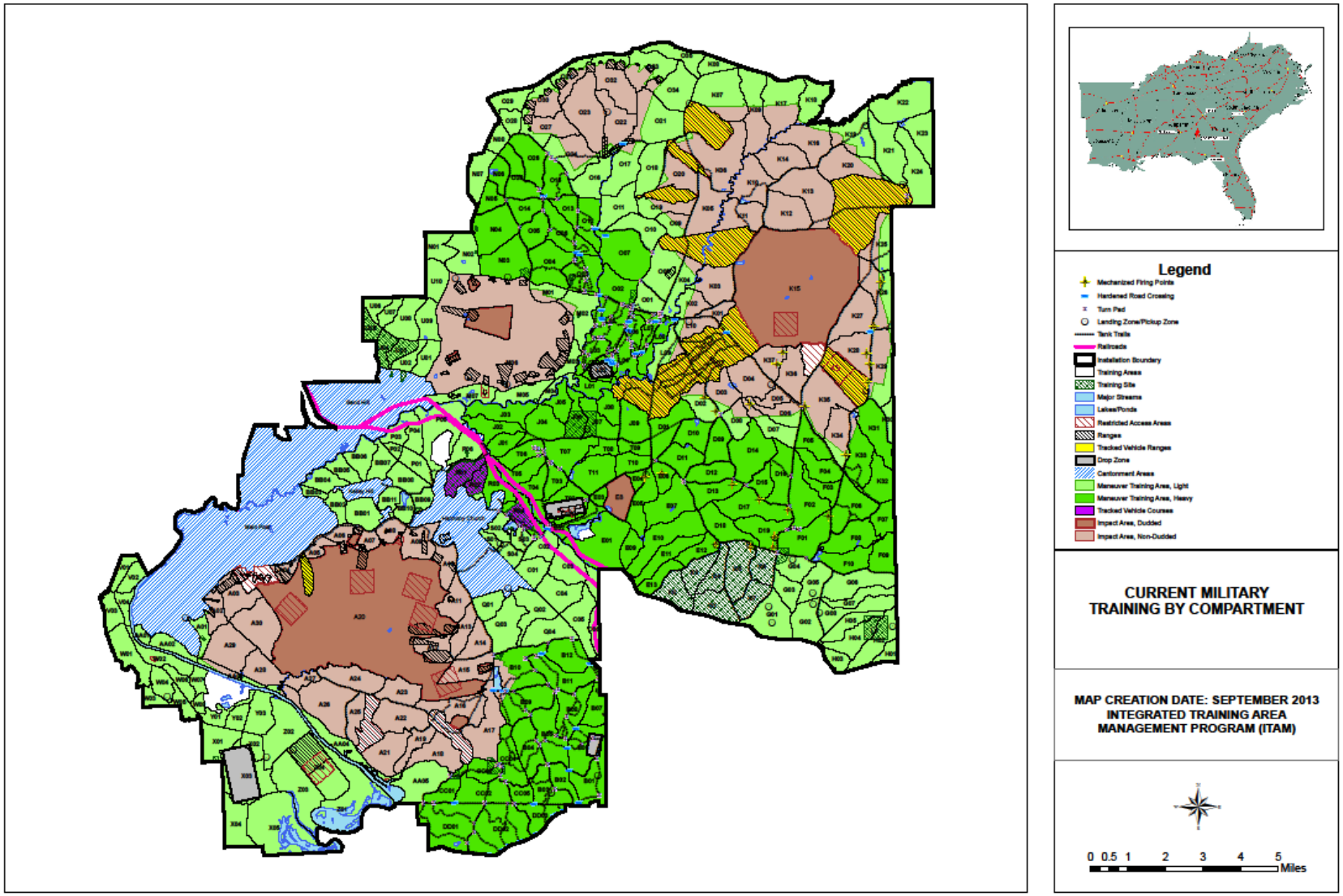


Figure 3.2 Fort Benning Training Land Use



3.5.4 Drop Zones and Landing Zones

Fort Benning supports a wide range of training; for example, Airborne and air assault training are conducted here. To support Airborne and air assault training operations, drop zones and landing zones must be maintained to provide a place for parachutists and helicopters to land. These zones are cleared of trees and other vertical hazards to allow for the safe landing of troops and equipment.

3.5.5 Dudded and Non-Dudded Impact Areas

Fort Benning conducts extensive live-fire training activities. The two types of land use areas that receive live-fire ordnance are dudded and non-dudded impact areas. At Fort Benning, dudded and non-dudded impact areas are concentrated in three locations on the Installation: the Kilo Range Complex in the northeast corner of the Installation in the vicinity of the K-15 impact area, the Alpha Range Complex in the southern portion of the Installation in the vicinity of the A-20 impact area, and a smaller area in the Malone Range Complex in the western part of the Installation (USACE 2007).

A dudded impact area is an area having designated boundaries within which all dud-producing ordnance will detonate or impact (DA 2004). This area may include vehicle bodies that serve as targets for artillery/mortar direct and indirect fire. Dudded impact areas containing unexploded ordnance may not be used for maneuver. Access to dudded impact areas is restricted to mission essential activities and coordinated with the controlling range office prior to entry.

Non-dudded impact areas are an area having designated boundaries within which ordnance that does not produce duds will impact. This area is composed mostly of safety fans or SDZs for small arms ranges. These impact areas may be used for maneuver when the small arms complex is not being utilized (DA 2004).

3.5.6 Cantonment Areas

Lands that are not used for operational training at Fort Benning are used to support cantonment functions. The cantonment areas at Fort Benning have been developed into a wide variety of land uses that comprise the elements necessary for a complete urban-style community. There are four cantonment areas within the Installation boundaries: Main Post, Sand Hill, Kelley Hill and Harmony Church.

Main Post is the largest cantonment area, located adjacent to South Columbus, and is the primary activity center for the Installation. The Main Post contains the Post Headquarters, the Infantry School, the Airborne School, the Western Hemisphere Institute for Security Cooperation, Cuartels barracks complex, and various military unit headquarters, warehouses, general instruction buildings, training areas, and Lawson Army Airfield. Other support facilities include the commissary, Post Exchange, Family housing, and Martin Army Community Hospital, as well as an 860 room hotel.

The Sand Hill cantonment area supports the Basic Combat Training and One Station Unit Training, as well as barracks, dining facilities, medical clinics, family housing, recreational areas, classrooms, and several training areas including obstacle and bayonet courses.

The Kelley Hill cantonment area is the current home to the 3rd Armored Brigade Combat Team 3rd Infantry Division (3-3rd ABCT), with its' associated barracks, training facilities, motor pools,

as well as the Crescenz Consolidated Equipment Pool, and includes medical clinics and recreational areas.

The Harmony Church Cantonment Area hosts the Ranger Training Brigade, the Armor Center and School, Armor vehicle driving and recovery training courses, the Warrior Training Center, two large simulation centers, the 81st Regional Readiness Command Equipment Concentration Site, and includes various recreational areas, barracks, and medical facilities.

3.6 INTEGRATING ENVIRONMENTAL STEWARDSHIP WITH THE MILITARY MISSION

3.6.1 Selected Legal Requirements

In addressing environmental considerations in relation to the military mission at Fort Benning, there are a number of statutes, Acts, executive orders, and Army, Federal, and state regulations that provide guidance on environmental and natural resource management. A detailed list, (although not inclusive of all legal requirements), can be found in Appendix C2. Below is a summation of some of the more significant legal drivers that Fort Benning complies with. Other specific legal requirements and guidance are discussed in Chapter 5 per each natural resource management program.

Sikes Act—The Sikes Act provides the primary legal driving force behind the development of the INRMP. The Act authorizes wildlife and natural resource conservation programs that remain "consistent with the use of military installations to ensure the preparedness of the Armed Forces." The Act also mandates no net loss of the cability of the Installation lands to support the military mission. First enacted in 1960, the Act was ammended in 2011 to include state owned facilities that are used for national defense (e.g. National Guard), and is currently proposed to be ammended to expand the cases in which Federal and state matching funds could be used for conservation efforts.

Endangered Species Act. The Endangered Species Act (ESA) imposes five requirements on the Army: (1) conserve listed species, (2) do not jeopardize listed species, (3) consult and confer with the U.S. Fish and Wildlife Service prior to taking any actions that may affect listed species, (4) conduct biological assessments when necessary or required, and (5) do not “take” listed fish and wildlife species or remove or destroy listed plant species without prior authorization. Per Army regulation, Fort Benning prepares and implements an ESMP/C for each species that is listed or proposed for listing on the ESA; Fort Benning consults with the USFWS on each of these plans.

Biological Opinion of the U.S. Fish and Wildlife Service, pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543), for the review of the Endangered Species Management Plan (ESMP) for Fort Benning (2002) (a.k.a. RCW ESMP BO of 2002). This biological opinion approved Fort Benning’s specific management plan for RCWs and allowed Fort Benning to utilize the 1996 Army RCW Management Guidelines.

Biological Opinion of the U.S. Fish and Wildlife Service, pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543), for the review of the construction, operation, and maintenance of a proposed Digital Multi-Purpose Range Complex (DMPRC) located in Chattahoochee and Muscogee Counties, Georgia and its effects on the red-cockaded woodpecker (RCW, *Picoides borealis*) (a.k.a. DMPRC BO of 2004). This biological opinion is based on the Army’s biological assessment and provides

reasonable and prudent measures for endangered species management and the management of their habitat in implementing the DMPRC.

Biological Opinion of the U.S. Fish and Wildlife Service, pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543), for the review of the construction, operation, and maintenance of proposed transformation actions, which include Base Realignment and Closure, Global Defense Posture and Realignment, Army Modular Force and other stationing actions, and the expected effects on the federally endangered red-cockaded woodpecker (RCW, *Picoides borealis*) and federally endangered relict trillium (*Trillium reliquum*) (a.k.a. BRAC BO of 2007). This biological opinion is based on the Army's BRAC biological assessment and provides reasonable and prudent measures for endangered species management and the management of their habitat for implementation of BRAC actions on Fort Benning.

Biological Opinion of the U.S. Fish and Wildlife Service, pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543), for the construction, operation and maintenance of proposed Maneuver Center of Excellence (MCoE) actions, which include Base Realignment and Closure, Army Modular Force, Global Defense Posture and Realignment, Grow the Army, Global War on Terrorism, and Army Power Projection Platform and the expected effects on the federally-endangered red-cockaded woodpecker (RCW, *Picoides borealis*) and federally-endangered relict trillium (*Trillium reliquum*) (a.k.a. MCoE BO of 2009). This biological opinion is based upon the Army's Final MCoE Biological Assessment, as well as Addendum 1 and Addendum 2 to the Final Biological Assessment. The MCoE BO provides reasonable and prudent alternatives for endangered species management and the management of their habitat for implementation of BRAC projects and training because there were substantial changes from the analysis in the BRAC BO of 2007.

The 2003 RCW Recovery Plan. In the 2003 RCW Recovery Plan, the USFWS established guidelines, protocols and policies for the management, monitoring and recovery of the RCW. The Recovery Plan established a recovery goal and designated Fort Benning as a Primary Core Recovery Population. Since approval of the Recovery Plan, the USFWS has issued additional guidance on the determination of Incidental Take and the information required in Biological Assessments. Additional guidance and clarifications distributed by USFWS since the Recovery Plan address the use of the USFWS RCW Foraging Habitat Matrix software (Matrix) for foraging habitat analyses (FHAs) (USFWS 2006a) and protocols for monitoring the effect of traffic on nesting RCWs (USFWS 2006b).

Management Guidelines for the Red-cockaded Woodpecker on Army Installations (1 May 2007). The Army revised the guidelines is to provide updated, standard management guidance to Army installations for developing endangered species management components (ESMCs) for the RCW as part of an installation's INRMP. Terminology was revised from endangered species management "plans" to "components" to reflect that endangered species management on installations is an integral component of natural resource management activities on Army installations. These guidelines establish the baseline standards for Army installations in managing the RCW and its habitat. Installation RCW ESMCs supplement these guidelines with detailed measures to meet installation-specific RCW conservation needs and unique military mission needs. Fort Benning's 2013 RCW ESMC is intended to officially move from the 1996 Guidelines to the most current 2007 Guidelines.

The National Environmental Policy Act of 1969. NEPA established national policies and goals for the protection of the environment. The essential purpose of NEPA is to ensure that environmental factors are weighted equally when compared to other factors in the decision making process undertaken by federal agencies. The act establishes the national environmental policy, including a multidisciplinary approach to considering environmental effects in federal government agency decision making.

Army Regulation 200-1, Environmental Protection and Enhancement (13 December 2007). This regulation implements Federal, state, and local environmental laws and DoD policies for the conservation, management, and restoration of land and natural resources. This regulation should be used in conjunction with the Army NEPA Regulation at 32 Code of Federal Regulation (CFR) Part 651 (32 CFR 651).

Department of Defense Instruction 4715.03 Natural Resources Conservation Program. The purpose of DoDI 4715.03 is to provide procedures for DoD components and installations for developing, implementing, and evaluating effective natural resources management programs.

Migratory Bird Treaty Act. This Act implements various treaties and conventions between the US and Canada, Japan, Mexico, and former Soviet Union for the protection of migratory birds. On July 31, 2006, a Memorandum of Understanding (MOU) was finalized between DoD and USFWS identifying measures to enhance migratory bird conservation on US military installations. Consistent with this MOU, Fort Benning manages and conserves migratory bird species through its INRMP and considers effects to migratory birds in any proposed action via the Fort Benning Form FB 144-R NEPA process.

Clean Water Act. The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under the CWA, it is unlawful to discharge any pollutant from a point source into navigable waters without a permit as administered by the United States Environmental Protection Agency (EPA) discharge control program known as the National Pollutant Elimination System (NPDES). The CWA also has regulatory requirements for the protection of wetlands, treatment of wastewater, municipal and industrial stormwater, and identifying impaired surface waters from non-point sources of pollutants (e.g. sedimentation, runoff, etc.), through the Total Maximum Daily Loads (TMDL) program.

3.6.2 Potential Impacts of Military Use of Training Lands

The potential impact of training on Fort Benning is considerable. Heavy vehicle traffic can drastically change the face of a landscape. Vehicles disturb the land by ripping up soil and contributing to erosion that further destroys the training areas. If the training lands are not maintained where heavy forces train, the end result will be barren areas that will poorly support meaningful training. In comparison, the other forms of training on the Installation have little effect on training lands; however, if drop zones and landing zones (among other training areas) do not have their vegetative covers maintained, over time the effectiveness of these areas for training will also degrade.

3.6.3 Impact of Environmental Compliance on Military Use of Training Lands

Environmental compliance requirements can impact military training to include endangered species, noise, surface waters, cultural, and other resources. The overall impact of compliance on vehicle training is substantial. For example, the forest is frequently too dense to permit off-road travel. As a result, the use of mission lands by vehicle training is affected greatly by

compliance requirements. Conversely, environmental compliance has less impact on dismounted training.

3.6.4 Fort Benning's Mission and Maintenance of the Longleaf Ecosystem

Proper management of the longleaf ecosystem is very beneficial to military training, both mounted and dismounted. A forest managed for old growth characteristics will have an open, park-like setting which allows vehicles adequate room to maneuver between them. Because it is a constantly evolving arrangement of different stages of development, the landscape changes over time and forces changes in where the vehicles actually drive, thus spreading out the impacts to the land.

3.6.5 Role of the Integrated Training Area Management Program

Integrated Training Area Management (ITAM) program sustains the Army's field maneuver training areas by integrating Senior Commander (SC) training needs and Army Force Generation requirements for operational tenant units by conducting terrain capability assessments following intense training events (such as platoon level operations). ITAM is based on the integration of training requirements, land conditions, training and testing facilities, and environmental management requirements for the installation's tenant and transient units and activities. ITAM ensures the home station training environment supports Unified Land Operations by repairing maneuver damage and creating a realistic training land base (Land Rehabilitation and Maintenance). The ITAM manager monitors maneuver training load requirements and land carrying capacity. This results in proactive land management that avoids non-compliance with environmental law that can stop training (Training Requirements Integration and Geographic Information System). The program provides capability to monitor and assess maneuver impact and increase training load capacity under normal and surge conditions (Range and Training Land Assessment). Additionally, it provides Soldier awareness that reinforces techniques to avoid damage (Sustainable Range Awareness).

The purpose of the ITAM plan is to identify the scope and requirements of the Fort Benning ITAM program in support of the Fort Benning prioritized SC training needs. This plan is required by AR 350-19, and is used by the Fort Benning ITAM staff to plan and monitor execution of ITAM actions. The plan will demonstrate how these actions actively support SC training needs. The plan drives the installation annual requirements submittal, and will be updated annually. An annual report on the execution of this plan will be prepared to identify specific actions and resource obligations. The goals and objectives of the ITAM plan are implemented by an Annual Workplan, which is included in this INRMP as part the Land Management Plan found in the RCW ESMC.

3.6.6 Impacts of Construction Activities

In addition to training, construction activities have the potential to cause soil erosion and sedimentation without implementation of erosion control measures and BMPs as outlined in Federal and state laws, as well as Installation guidelines. Land disturbing activities can accelerate natural erosion processes by exposing erodible soils to precipitation and surface runoff. Fort Benning and its contractors must comply with Clean Water Act (CWA) and National Pollution Discharge Elimination System (NPDES) regulations for all construction activities. Projects are reviewed through the Fort Benning NEPA process with submittal of a Form FB 144-R (Request for Environmental Analysis) to ensure CWA, NPDES, and Endangered Species Act (ESA) requirements are in place prior to any land disturbing activities. All required permits would be obtained and all appropriate site-specific management practices and existing mitigation

measures would be implemented to offset potential impacts form land disturbing activities associated with construction. Land disturbances and soil erosion will be monitored to ensure compliance with applicable regulations.

3.6.7 ACHIEVING NO NET LOSS

Section 670a(b)(1)(I) of The Sikes Act states "Consistent with the use of military installations to ensure the preparedness of the Armed Forces, each integrated natural resources management plan prepared where appropriate and applicable, provide for no net loss in the capability of military installation lands to support the military mission of the installation". It is incumbent on Fort Benning's Environmental Management Division (EMD), especially Conservation Branch (CB) and Land Management Branch (LMB), to make every effort to support the training mission, minimizes adverse impacts on mission readiness and documents this approach in the INRMP and Red-cockaded Woodpecker Endangered Species Management Component (RCW ESMC).

Fort Benning environmental staff adheres to laws and regulations to ensure compliance and avoid regulator actions that could stop or delay training or military construction. Ensuring compliance also protects Fort Benning staff from legal actions including civil and criminal charges. Fort Benning currently provides several 3rd parties a quarterly report of Armor School training activities regarding the Army Reconnaissance Course (ARC) migration to a new location without RCWs. This was part of an agreement to keep them informed and prevent a law suit that could have stopped MCoE construction and still has potential to impact training if these third parties decide to file a law suit.

Fort Benning's goal is to ensure our management and monitoring activities do not interfere with training. Staff works flexible schedules, weekends, and even holidays to work around training activities. For example, wildlife technicians enter the Malone and Oscar Range Complexes at first light to monitor RCWs, but must be out before 0800 from 1 May – 30 September and before 0900 from 1 October – 30 April. These times have been coordinated with Range Division. EMD staff constantly coordinates with RD to schedule or adjust monitoring and management activities to work around training as best we can and which also minimizes any unauthorized entry which could cause a safety violation and could stop training on up to 15 ranges. An access plan has been developed to streamline and document access protocols. This access plan is included as an attachment to the RCW ESMC in Appendix E.

A key factor in achieving no net loss is to implement an ecosystem management approach. The goal is to maintain biodiversity and ensure long term sustainability of the natural resources on the landscape so they will be available for future training needs. Reestablishing the long leaf pine ecosystem is at the heart of Benning's natural resources management program. Long leaf pines can live for hundreds of years, have a deep tap root which protects them from drought, wind throw, and root damage from off road vehicle maneuvering. Long leaf pines are also capable of growing in poor soils and are well adapted to an environment with frequent wildfires. The long leaf pine ecosystem is a key factor in maintaining a realistic training environment.

The soil conservation program has coordinated hundreds of soil erosion projects over thousands of acres during the last 15 years with the goal to prevent, control, and rehabilitate eroded areas. Fort Benning's highly erodible soils are prone to gully and ravine formation, some approaching up to 40 feet in depth. Severe erosion not only prevents or impedes vehicle maneuvering across the Installation, but also present a significant safety hazard to personnel. The Soil Conservation Program, in concert with Range Division's ITAM Program, are both essential in sustaining the training base acreage.

In keeping with the US Government's goal of no net loss of wetlands and to adhere to the CWA, Fort Benning conducts delineations of wetlands and streams before construction projects begin to determine impacts and compensatory mitigation requirements. Wetland and stream credits are purchased from local mitigation banks. Projects are completed under the nationwide Permits, Regional Permits, and Individual Permits issued by the US Army Corps of Engineers (USACE). Completing these activities helps to prevent delays or stoppage of construction.

Proactive management of threatened and endangered species and species at risk by EMD will likely prevent additional training restrictions in the future. Currently Fort Benning is under the 1996 Management Guidelines for the RCW on Army Installations. When the INRMP and RCW ESMC are approved, Benning will be able to use the 2007 Management Guidelines which will allow a reduction in training restrictions in some RCW clusters. The number of RCW clusters identified for reduction in training restrictions will be dependent upon the criteria included in the 2007 RCW Management guidelines, such as the number of potential breeding groups on the Installation and the overall growth of the RCW population (DA 2007b).

In addition, Fort Benning is requesting a reduction in the RCW population goal from 421 to 382 clusters. Conservation Branch staff is working closely with USFWS to get relief of the 88 taken clusters due to RCW habitat loss and harassment as a result of BRAC/MCoE construction and training activities. It is anticipated that most of these taken clusters will be able to count towards Benning's recovery goal when consultation with USFWS is complete. All of these actions will increase training flexibility and speed recovery of the RCW.

The RCW ESMC contains language to allow for programmatic incidental takes (IT) of cavity trees, RCWs, and/or clusters in certain situations. These ITs include IT for up to 4 RCW groups within the K15 Impact Area; IT for 8 RCW groups within the A20 Impact Area due to hazardous conditions; IT for up to 5 RCW cluster cavity trees and 3 RCWs per year resulting from training wildfires and prescribed fire management activities; IT for up to 3 RCW clusters that may bud or pioneer new territories into habitat downrange of live fire where IT has potential to occur; and IT for 15 RCW groups that are currently designated as Supplemental Recruitment Sites which will be converted to Unprotected Clusters. This programmatic IT action would streamline consultation with USFWS if an adverse impact occurred and would greatly lessen the likelihood of stoppage of training or construction.

All these measures described above will help support the no net loss of training land capability requirement and ensure mission readiness.

3.7 PROPOSED FUTURE TRAINING AT FORT BENNING

Currently, the Army is determining how to best reach Army Force Realignment by the year 2017. Announced decisions may result in the restructuring of the 3-3 ABCT from an Armored Brigade to an Infantry Brigade Combat Team (IBCT). Should such action occur, impacts to training lands would be re-evaluated as there are many differences in equipment and training missions between an ABCT and an IBCT. The transition from an ABCT to an IBCT would greatly reduce the use of heavy mechanized and tracked vehicles for maneuver, in exchange for lighter wheeled vehicles that would be used for logistical support of Infantry units. This transition would also result in an increase in dismounted and light maneuver training, as well as an increase in the use of small arms ranges.

Any major changes to the training environment in the future that may affect implementation of the operational plans for natural resources management on Fort Benning would require this

INRMP to be revised in accordance with DoD Instruction 4715.03, Natural Resources Conservation Program.

CHAPTER 4 MANAGEMENT INTENT

This chapter identifies desired future conditions (DFC) for Fort Benning's conservation targets and broadly discusses management programs to support DFC attainment. The DFCs presented here are intended to serve as benchmarks for assessing progress toward accomplishing specific goals and objectives identified in Chapter 5.

4.1 DESIRED FUTURE CONDITIONS

DFCs are necessary to natural resources management because they provide resource managers with target conditions and long-term goals for ecosystem management. DFCs attempt to "envision all aspects of an ecosystem in the future, including human organizations and needs, in measurable terms" (Leslie et al. 1996). They can be formulated for ecosystems, communities, or populations (typically of conservation interest), and they describe natural or attainable ranges of variation in abundance, structure, composition, function, and heterogeneity (Sutter et al. 2001). DFCs should have a spatial setting or landscape context, meaning that they should be identifiable on the ground with an associated size and configuration. Perhaps most importantly, they should be achievable in the context of human land use. On Fort Benning, DFCs should be developed at a minimum to be compatible with the MCoE mission, natural resourse management needs and environmental compliance requirements. Ultimately, when DFCs are achieved and maintained, they should advance and promote the MCoE mission by alleviating environmental compliance issues.

Fort Benning's 2001-2005 INRMP expressed the need to organize DFCs around a central theme and cited Installation ecological integrity as that theme. Ecological integrity continues to be the overarching organizational theme, and Installation-scale DFCs remain relevant. These include such things as: (1) native species richness and biodiversity across the Installation are maintained over time; (2) viability of all threatened and endangered species and species of conservation concern is assured; (3) upland areas are dominated by high-quality longleaf pine communities that grade downslope into rich hardwood slope and bottomland communities; (4) riparian areas, wetlands, ephemeral ponds, and streams are characterized by intact ecological processes and hydrologic function; (5) point and non-point source pollution is minimal or absent; and (6) invasive species and disturbance impacts do not pose a threat to ecological integrity.

While it is important to retain broad-scale DFCs such as these for the Installation as a whole, it is useful for management purposes to describe long-term goals in the context of individual conservation targets. Conservation targets should represent a subset of terrestrial and aquatic ecosystems, communities and species that, if preserved, will maintain a large portion of overall biodiversity and conservation value of a given area (The Nature Conservancy 2003). Conservation targets provide an organizational framework for planning and developing long-term management goals and strategies. Furthermore, through monitoring, they enable an efficient means of tracking progress toward desired future conditions.

Presented here are DFCs for selected Fort Benning conservation targets. The longleaf pine conservation target serves as an anchor, since much of the biodiversity on Fort Benning is associated with the longleaf system and because land management efforts to promote protected species are focused here. Unlike many other communities and habitats associated

with the southeastern Fall Line and Coastal Plain, the longleaf pine ecosystem creates a keystone condition that influences the processes and development associated with other adjacent habitats on the landscape. Namely, the propensity for fire, and the fire prone condition, within the ecosystem is extended into other habitats. This has led to the consideration that the longleaf pine ecosystem defines the landscape matrix, and collectively includes small inclusions of other habitat types (e.g. post oak-blackjack oak woodland). Natural boundaries of other habitats with the longleaf pine ecosystem tend to be defined by an amalgamated relationship between inherent species resource requirements with changes in fuel characteristics. Typically, fire movement at the xeric transition becomes influenced by limited fuel amounts and patchy distribution patterns, while fire movement into hydric areas becomes influenced by soil and fuel moisture and differences in flammability constants of the fuel types. The end result is that fuels accumulate at both ends of the longleaf pine matrix and result in less frequent, but more destructive fires in these other habitats.

The above description is meant to provide landscape context for the DFCs presented below. In addition to upland longleaf and associated communities, this section also presents DFCs for slope and bottomland communities, as well as stream and riverine communities. Individual species of management interest also are highlighted. Currently, DFCs for all conservation targets are stated largely in qualitative terms because reference conditions or conditions for continued viability for many conservation targets are not always known. Empirical data for reference conditions may become available through monitoring; future work should use this data to develop more quantitative DFCs. Desired future conditions for conservation targets are as follows.

4.1.1 System-Level ConservationTargets

4.1.1.1 Longleaf Pine Uplands

Current Ecological Groups: Longleaf Pine Loamhills, Longleaf Pine Sandhills, Plantations, Successional Upland Deciduous or Mixed Forest.

Desired Future Condition: Longleaf pine is the dominant upland pine species and is found across a range of upland soil and topographic conditions. Longleaf pine stands have an open architecture and multi-aged distribution, with many trees 200 plus years old, a few shrubs, a sparse midstory of mixed hardwoods, a sparse to abundant understory dominated by mixed grasses and forbs (the composition and relative abundance of which reflect variation in soils and topography), and a few standing dead trees (snags). Longleaf pine stands are regenerated naturally and are manipulated by using uneven-aged silvicultural system with single-tree selection prescriptions. Landscape-level native species richness and evenness are maintained over time, and invasive species, disease, and disturbance impacts are minimal. All documented plant associations of conservation concern (The Nature Conservancy and NatureServe 2003a) are present and are assured continued viability. Species currently of conservation concern such as the red-cockaded woodpecker (RCW; *Picoides borealis*), gopher tortoise (*Gopherus polyphemus*), Bachman's sparrow (*Aimophila aestivalis*), eastern diamondback rattlesnake (*Crotalus adamanteus*), southern fox squirrel (*Sciurus niger niger)*, and gopher frog (*Rana capito*) are found where habitat is suitable. Population sizes and age structures are such that population viability is assured and populations are not declining on a consistent basis.

In total, longleaf pine is present in forests that occupy 51,477 upland acres (based on the 2013 forest inventory database), and grade downslope into mixed hardwood-pine communities. Upland-slope ecotones are dynamic and are determined by fire frequency and edaphic conditions rather than anthropogenic disturbance. Upland fire regime is variable in return

interval (1-3 years), intensity, season of burn, and ignition pattern. Fire and forest management are practiced with the goal of maintaining healthy, uneven-aged longleaf pine stands. Stands exhibit compositional variation, stability, and resilience to light anthropogenic or natural disturbance, and they provide sustainable settings for military training.

4.1.1.2 Sandhill Barrens

Current Ecological Group: Extreme xeric sites within the Longleaf Pine Sandhills.

Desired Future Condition: Sandhill barren communities occur in ecologically appropriate areas, namely on ridges and hilltops with deep, unconsolidated sands (A-horizons in excess of 80 cm). Ecological processes such as nutrient cycling and decomposition are slow and seasonally variable. Plant community composition is dominated by fire-tolerant species that are adapted to prolonged drought. The canopy and sub-canopy consists of scattered occurrences of longleaf pine and a broken sub-canopy dominated by what are collectively known as scrub oaks (primarily turkey oak and bluejack oak). Mature, flat-topped longleaf pine trees can be present. Between patches of scrub oaks, ground-layer vegetation consists primarily of patchy herbaceous cover intermixed with low shrubs such as blueberry (*Vaccinium* spp.). Bare ground is also present. Woody soft and hard mast species are present to support wildlife populations, as is a diverse assemblage of insect communities. Associated species of conservation concern are present, including gopher tortoise (*Gopherus polyphemus*), woody goldenrod (*Chrysoma pauciflosculosa*), pickering's dawnflower/morning glory (*Stylisma pickeringii*), and sandhill bean (*Phaseolus polystachios* var. *sinuatus*).

4.1.1.3 Seepage Bogs and Depressional Wetlands

Current Ecological Groups: Herbaceous and Shrub Bogs, Gum/Oak Ponds, Seasonal Depression Ponds

Desired Future Condition: Seepage bogs are usually relatively small areas that are located within other more broad ecological group(s), (i.e. longleaf pine uplands, hardwood uplands, hardwood bottomlands, etc.), where groundwater seeps to the surface. Vegetation structure and composition reflect local edaphic and topographic characteristics and fire regime, but bogs are generally open with a sparse shrub component. Soils are either continually saturated or near-saturated throughout the year. Species richness is high and several rare species or species of conservation concern are present, including the sweet pitcherplant (*Sarracenia rubra*), Southern butterwort (*Pinguicula primuliflora*), and shortleaf sneezeweed (*Helenium brevifolium*). Plant associations unique to this system also are present. The *Arundinaria gigantea* ssp. *tecta* shrubland association, which is globally ranked as critically imperiled (G1), occurs in good condition on at least three sites on the Installation. Hydrologic function is intact; bogs are also surrounded and buffered by intact communities. Upslope soil disturbance is not present or is managed so that bog sedimentation is minimal and does not threaten bog viability. Invasive plant species and exotic animals are controlled so that their ecological impact is negligible.

In addition to seepage bogs, depressional wetlands also are present within the upland landscape where landscape features and edaphic conditions allow for the collection of rainwater on a seasonal basis. These areas differ from seepage bogs in that they are isolated from groundwater influences. Both wooded and herbaceous ponds are present. Wooded ponds hold water for many months of the year and therefore experience fire infrequently; herbaceous ponds, on the other hand, are maintained by frequent fire in the surrounding uplands. Woody plant encroachment does not threaten the viability of herbaceous ponds. Site hydrology is intact and not altered by anthropogenic drainage features. Ponds are buffered by surrounding intact systems, and ecotones are determined by fire frequency and edaphic factors, rather than by

firebreaks or roads. Ponds provide ample breeding area for amphibians. Barriers to travel do not inhibit the use of ponds by amphibians and other animals whose habitat also includes adjacent uplands. Sedimentation, invasive plant species, and disturbance from feral hogs do not represent significant viability threats.

4.1.1.4 Upland and Slope Hardwoods

Current Ecological Groups: Dry-Mesic Hardwood and Mixed Hardwood-Pine Forests, Mesic Hardwood Forests.

Desired Future Condition: Hardwood and mixed hardwood-pine communities are found on side-slopes and steep ravines that grade upslope into upland longleaf pine forests and downslope into mesic hardwood bottoms. They also may extend into upland areas, where natural features of the upland landscape create fire shelters. Local species composition reflects edaphic characteristics and topographic position (slope and aspect). Species present are generally late-successional; several high-quality oak-hickory communities are present. Sufficient mast is present for wildlife, including game populations. Rare understory plant species such as relict trillium (*Trillium reliquum*), croomia (*Croomia pauciflora*), Flyr's nemesis (*Brickellia cordifolia*), and bottlebrush buckeye (*Aesculus parviflora*) are present. Fire return interval has a stochastic component introduced by varying prescribed burning conditions and timing in adjacent uplands. Forests are uneven-aged; harvesting is not normally practiced or harvesting practices are designed to mimic natural disturbance features of these forests and done to promote desirable species. Viability threats such as soil erosion, invasive species, disease, and habitat disturbance are either not present or are at least manageable so that ecosystem integrity is not compromised.

4.1.1.5 Fall Line Streams and Bottoms

Current Ecological Groups: Flowing Water, Small Stream Swamps and Wooded Seepage Bogs, Stream Floodplains.

Desired Future Condition: Riparian communities are intact and composed of diverse, high quality hardwood and hardwood-pine vegetation associations containing the full historic complement of native species. All documented plant associations of conservation concern within the above ecological groups are represented (The Nature Conservancy and NatureServe 2003a). Hydrologic function and processes are preserved. Riparian areas provide a buffer from upslope disturbances and restrict or reduce movement of soil and water-soluble chemical compounds into aquatic systems. They also provide connectivity with adjacent habitat types for movement of wildlife along drainage corridors. Stream banks are stabilized, and fluctuation in stream morphology reflects natural changes rather than anthropogenic disturbance. Rates of sedimentation are similar to that currently documented for reference streams. Riparian areas experience periodic flooding; they also experience fire, but only rarely. Military training in stream bottoms is light. Stream crossings for roads and vehicle trails are hardened and do not contribute to stream sedimentation. Water quality is not impaired by non-point source or point source pollution. Native in-stream animal and plant populations reflect reference or non-impaired conditions. Several rare fish, mussels, and reptiles are present, including bluestripe shiner (*Cyprinella callitaenia*), Barbour's map turtle (*Graptymys barbouri*), and Alligator snapping turtle (*Macroclemys temminckii*). Biodiversity and character associated with Piedmont, Coastal Plain and intermediate streams are all present. Exotic and invasive species are controlled to the extent that their ecological impact is negligible.

4.1.1.6 River Floodplain and Backwaters

Current Ecological Group: River Floodplains and Cypress-Tupelo Swamps.

Desired Future Condition: DFCs for floodplain forests and backwater and swamp habitat along the Chattahoochee River are very similar to that described above for Fall Line streams and bottoms. River sloughs and backwater areas provide habitat for important wildlife species, including the wood stork (*Mycteria americana*). Other species of conservation concern are present, including bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), American alligator (*Alligator mississippiensis*), and Georgia rockcress (*Arabis georgiana*). All vegetation associations of conservation concern documented within this area are present. Exotic and invasive species, particularly feral hog (*Sus scrofa*), are controlled to the extent that their ecological impact is negligible. Populations of giant cutgrass (*Zizaniopsis miliacea*), a native but somewhat invasive species, are controlled to provide open water habitat for wood stork and other water fowl. All other disturbance and pollution are controlled so as not to compromise hydrologic function or water quality.

4.1.2 Species-Level Conservation Targets

Based on Federal and Army specific requirements the species' listed below require active management to reach a DFC. Working towards and achieving the specific DFC for these species is fundamental to ensuring no net loss of current or future military operations. Management of other protected species on the Installation is strictly limited to monitoring and protection. Currently there are no Federal or Army requirements to manage towards a DFC for the American alligator, Bald Eagle, or wood stork. Management of the Georgia Rockcress currently consists of population monitoring and protection of habitat, but may require more intensive efforts dependant upon its Federal listing and/or Army requirements in the future, and will be included in future updates to Fort Benning's INRMP as needed.

4.1.2.1 Red-Cockaded Woodpecker

Desired Future Condition: The Fort Benning recovery goal of at least 351 RCW breeding groups has been met and the population is recovered. The population on Fort Benning is genetically diverse and evenly distributed across the landscape. Potential breeding groups are also present on lands adjacent to or in the vicinity of Fort Benning, and genetic exchange occurs across the Installation boundary. Local extirpations are buffered by recolonization from nearby populations. Most or all suitable upland longleaf pine habitat on Fort Benning is occupied by RCWs at a level that fluctuates naturally around the carrying capacity of the habitat. Management for continued maintenance of the RCW population does not impact military training activities.

4.1.2.2 Gopher Tortoise

Desired Future Condition: Gopher tortoise populations on Fort Benning are stable and at or near carrying capacity for the habitat in which they are found. Populations are healthy, not declining, and are not threatened by disease or parasites. Active burrows are well distributed across suitable soils; tortoise densities equal to or greater than 0.4 tortoises per hectare. Current on-post burrow density by soil type is currently being evaluated. Some burrows occur near isolated ephemeral, upland ponds and provide refugia for commensal species such as gopher frogs. Management for continued viability of the gopher tortoise population does not impact military training activities. Numerous populations in the vicinity of Fort Benning are present and their viability and protection are assured via off-Post conservation efforts.

4.1.2.3 Relict Trillium

Desired Future Condition: The relict trillium has reached range-wide recovery status and is delisted by the USFWS. Fort Benning populations are large and spatially distributed in a way that ensures their continued viability and resilience to moderate disturbance. Invasive plant species are absent or not present in sufficient numbers to negatively affect trillium population size or health. Exotic animals (primarily feral hogs) and native herbivorous animal populations likewise do not pose a threat to continued trillium viability. Several populations off-post are under conservation protection.

4.1.3 Activities to Support Attainment of Desired Future Conditions

All programs within natural resources management will be aligned to attain the DFCfor conservation targets. On Fort Benning, this means aligning management strategies and activities across Branches within EMD, and with military training needs and objectives. Forest management, prescribed fire, soil conservation, control of invasive species, ecological monitoring, and off-Post conservation efforts all will be directed at achieving DFCs. Some specifics include:

- Forest management in upland longleaf stands will use Stoddard-Neel techniques to create and maintain uneven-aged stand structures (Neel et. al. 2010). The Stoddard-Neel techniques will be modified when necessary to comply with management requirements for the RCW, (i.e. RCW matrix requirements for basal area of 10 inch stems present.) Least destructive harvesting methods will be used whenever possible.

- Prescribed fire will be used to improve upland longleaf pine habitat condition, reduce the establishment of invasive species, and reduce forest pests. Wildfire risk will be reduced, and visibility for military ground maneuvers will be improved.

- Natural erosion processes will be monitored and Best Management Practices (BMPs) will be implemented as appropriate. Soil erosion associated with unimproved roads will be managed through physical road restructuring, contouring, and vegetation management. Erosion associated with improved roads will be reduced through the establishment of proper erosion control structures and direct seeding of exposed soil along road cuts and drainage ditches. Heavily disturbed areas will be periodically seeded to maintain vegetation cover. Where possible, a native species mix will be used with the goal of establishing a complex root profile to increase resistance to soil movement. Silt fencing and other NPDES BMPs will be employed at construction sites to eliminate or reduce sedimentation.

- Invasive species will be discouraged and/or eliminated through direct removal and reduced opportunities for establishment and expansion. In upland areas, spot treatment with approved herbicides will be used to control invasives. Mechanical treatments and wetland-approved herbicides will be used to control aquatic invasive species. Mechanical removal is preferred in areas with excessive amounts of biomass to avoid excessive biological oxygen demands that can starve aquatic organisms of oxygen.

- Wildlife management areas—food plots, dove fields, etc.—will continue to be managed to provide food and cover for desired game and non-game species. A network of mature bottomland-slope-upland hardwood and mixed hardwood-pine forests will be maintained to provide corridors for wildlife movement and diverse sources of soft and hard mast. Some early successional habitat types will also be maintained to promote habitat diversity for wildlife and as insurance against mature forest catastrophe, such as broad-scale natural

disturbance or disease. Interconnectivity among wildlife habitat will be maintained to improve plant seed dispersion and gene flow.

- Fort Benning's CB annually monitors fish and game population size and health. Healthy game species populations are necessary for ecosystem and recreational needs. Monitoring information will be used for harvest planning, maximizing recreational use and reducing safety risk associated with animal-vehicle collisions.
- Stream habitat and water quality are determined by land use. The Watershed Program provides for the science-based consideration of the effects of land use descisions on the surface water system. The Program maintains the expertise and documentation necessary to asses and minimize impacts to stream hydrology and biota in order to achieve the most stable and productive conditions possible. The long-term goal is to mimic pre-development hydrology so that the stream channels attain a natural morphometry with sufficient base flow to support the biological community.

- An integrated monitoring program will directly assess progress toward DFCs. Such a monitoring program will be cost-effective, efficient, robust, flexible, compliant with regulatory concerns, and relevant to training and land management actions. These monitoring activities will be based on accepted ecological monitoring standards and relevant research.

- Systematic tracking of conditions will be conducted through the use of geographic information systems (GIS). Integrated, ecology-based models will be used to assess condition in areas with little or no available baseline information. Under a common platform, these models will focus on watershed dynamics, forest dynamics that accommodate harvesting, and scale-dependent habitat suitability for various species.

- Off-Post conservation efforts will be guided to support attainment of DFCs on-Post and also to advance regional conservation efforts. Off-Post conservation strategies will identify opportunities for creating conservation corridors to link Fort Benning protected species populations (such as RCW) with other regional populations.

4.2 MANAGEMENT GOALS AND OBJECTIVES

The management goals and objectives identified in Chapter 5 define the broad, overall natural and cultural resources management direction for Fort Benning. In the context of this plan, goals are defined as the general target or end result desired through integrated resource management. Objectives are the steps required to accomplish or work toward achieving desired goals. Some objectives have quantifiable outcomes, but in all instances, implementing objectives contributes to the accomplishment of management goals. Together, management goals and objectives provide management direction and the basis for deriving specific management guidelines. As new management issues arise, goals and objectives will need to be reevaluated as part of an adaptive management approach where new information leads to appropriate changes in management direction.

Management goals can be achieved by identifying objectives and tasks that are most pertinent to each program area. Some of these tasks will become projects, which can be defined as an activity that has a definable product, a time line, and a cost associated with it and, that when completed, will assist in meeting a management task or objective. A consolidated list of projects is contained in Chapter 6 Table 6.1. However, accomplishment of a particular objective often will lead to the accomplishment of multiple goals.

CHAPTER 5 OPERATIONAL PLANS BY PROGRAM AREA

5.1 SOIL CONSERVATION PROGRAM

Reduction of erosion and sedimentation through soil conservation is necessary to improve the productivity of the land for endangered species and to maintain sustainable training lands.

5.1.1 Goal and Plan Purpose for Soil Conservation

Fort Benning's goal is to maintain compliance with all applicable state and Federal laws and Biological Opinions that have erosion control requirements and water quality standards as well as maintaining compliance with the Georgia Erosion and Sedimentation Act of 1975 (GESA).

There are multiple tasks which must be accomplished to meet the overall objective of the Soil Conservation Program (SCP). The overall objective is to reduce and mitigate erosion and sedimentation on Fort Benning. This can be accomplished by rehabilitating eroded areas with in-house manpower and equipment or via external contracts. Every effort should be made to use native plant species when establishing permanent vegetation on the sites. Annuals can be used for initial stabilization.

5.1.2 Policy and Guidance for Soil Conservation

In addition to the various DoD, Army, Federal regulations, and USFWS issued BOs discussed in section 3.5.1, the Fort Benning soil conservation program also adheres to the following policy and guidance documents:

Georgia Erosion and Sedimentation Act of 1975 (amended 2007). This Georgia law regulates land-disturbing activity, which is defined as "any activity which may result in soil erosion from water or wind and the movement of sediments into state water or onto lands within the state, including, but not limited to, clearing, dredging, grading, excavating, transporting, and filling of land". Applicants for land disturbing permits must demonstrate that they have Erosion and Sedimentation Control Plans (ESPCP) that meet BMPs for the particular application. The law also mandates stream buffer protection; for most streams, a 25 foot buffer is required.

Georgia Water Quality Control Act. The Georgia Water Quality Control Act works in conjunction with the CWA to deal with waste water discharge, site selection, and wetlands mitigation requirements. In Georgia, stormwater discharges associated with such construction activities are regulated by a general permit. The General Permit also specifies that BMPs to prevent or reduce pollution, must be properly implemented for all construction activities. In addition, the General Permit specifies that discharges shall not cause violations of water quality standards.

Manual for Erosion and Sediment Control in Georgia. Prepared by the Georgia Soil and Water Conservation Commission (GSWCC), the purpose of this manual is to

improve and protect Georgia's urban soil and water resources by reducing the amount of erosion from urban development sites.

Alabama Water Pollution Control Act. The purpose of the act is to protect and conserve the waters of the state against water pollution. It is the duty of Alabama Department of Conservation and Natural Resources to control pollution in the waters of the state, and it has the power to investigate, perform studies, and propose remedial measures for abatement of pollution.

National Pollution Discharge Elimination System. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. NPDES requirements for Georgia and Alabama are discussed in Sections 5.1.3.1.2 and 5.1.3.1.3 respectively.

5.1.3 Program Activities for Soil Conservation

Conservation planning assistance for Units and other organizations can be initiated through the Fort Benning NEPA process with submittal of a Form FB 144-R (Request for Environmental Analysis). Projects are reviewed to ensure CWA, NPDES, and ESA requirements are in place prior to any land disturbing activities. If the action qualifies for a Categorical Exclusion (CAT-X) per the screening criteria in the Army NEPA Regulation, then a Record of Environmental Consideration (REC) is prepared and the project can proceed. If not, further study of the proposal is required by preparation of an environmental assessment or an environmental impact statement. In any case, the NEPA program is the vehicle for the EMD to assist requestors in compliance with soil conservation compliance and to provide other advice specific to the proposal.

Historically, McKenna Drop Zone has been one of the largest areas of erosion and sedimentation on Fort Benning. Although the site is largely stabilized, monitoring will continue on this site. The erosion issues with McKenna DZ and their impact to RCW's were one of the primary concerns USFWS addressed in issuing the 1994 JBO. The 2002 ESMP BO included a Reasonable and Prudent Measure to "Repair existing and prevent future soil erosion that threatens individual cavity trees and the integrity of the cluster". The 2007 BRAC BO and 2009 MCoE BO reinforced this continued requirement. As a result, erosion control in RCW habitat has been, and continues to be a priority for Fort Benning. Fort Benning's Conservation Branch (CB) has primary responsibility for erosion control in these areas.

Borrow areas on Post generate another sediment source which requires installation of BMP's to control erosion on Fort Benning. Any time an existing borrow is utilized, contractors must install temporary BMP's and once all required material has been excavated they are required to stabilize the site. When no longer required or viable, borrow areas will be closed by constructing rock dams at the surface water outlets and establishing permanent vegetation.

Military training also has the potential to create erosion issues. Typically these issues are a result of maneuver training however that is not the only possible source. ITAM has primary responsibility for monitoring, reporting, and rehabilitating erosion resulting

from military training. The CB works collaboratively with ITAM to address erosion issues in RCW habitat that result from military training.

In addition to training, construction activities have the potential to cause soil erosion and sedimentation without implementation of erosion control measures and BMPs as outlined in Federal and state laws, as well as Installation guidelines. Land disturbing activities can accelerate natural erosion processes by exposing erodible soils to precipitation and surface runoff. Fort Benning and its contractors must comply with the CWA and NPDES regulations for construction activities involving land disturbances. Land disturbances and soil erosion will be monitored to ensure compliance with applicable regulations.
Road and trail maintenance can result in erosion issues as well. Responsibility for maintenance of existing roads trails lies with LMB, ITAM, and the BASOPS contractor for DPW. Specific requirements are included in the Land Management Plan as an attachment to the RCW ESMC in Appendix E1.

In 2012 an erosion inventory was completed which identified existing eroded areas throughout the Installation. Individual erosion sites were scored and ranked based on severity and location. A cumulative score was then calculated for each of the 28 watershed management units encompassed within the boundaries of Fort Benning. Primary focus of erosion control efforts will center on rehabilitating the most severely eroded sites in the highest ranking WMU's. However, work may also be conducted in other areas where erosion and sedimentation problems are identified.

The CB will also coordinate projects of mutual benefit with the ITAM program Coordinator. One recently completed project focused on the installation of Seibert Stakes to delineate buffer boundaries in the Good Hope Maneuver Training Area (GHMTA) to mark areas as off limits for off road maneuver training. These boundaries are a proactive approach intended to mitigate potential erosion and sedimentation issues.

Engineers, inspectors and project managers at Fort Benning should take advantage of opportunities for training from the GSWCC and other organizations. BMPs should conform to engineering standards and specifications. Currently 25% of previously constructed permanent practices are inspected each year by Conservation Branch to identify any required maintenance.

5.1.3.1 Compliance-Related Activities for Soil Conservation

5.1.3.1.1 Clean Water Act

Sediment due to construction is regulated by the CWA but implemented by the states, as discussed in the following sections. Wetlands are Federally regulated and have separate requirements, although some may overlap NPDES requirements. Under the Clean Water Act, Section 404, a wetlands permit will be required when soil disturbing activities like construction occur in a jurisdictional wetland or streambank. A delineation of the wetland and streams is required for the permit. The impacts to wetlands and

streams must be assessed and worksheets completed to determine the number of wetland and stream credits required or other mitigation requirements. The Soil Conservationist submits the wetland permit application to USACE Regulatory Division for coverage under a Nationwide, Regional or Individual Permit. Currently the preferred method of mitigation according to USACE is to purchase mitigation credits from an approved mitigation bank. There are a couple of mitigation banks in the local service area.

5.1.3.1.2 The Clean Water Act Process in Georgia

The Federal Clean Water Act, the Georgia Water Quality Control Act and GESA regulate the discharge of pollutants, including sediment, into surface waters. For construction projects, the Georgia Environmental Protection Division (EPD) primarily administers these laws through NPDES General Permits GAR100001-3. The Army provides oversight and monitoring to assure that the requirements of these laws and permits are met by contractors or tenants on Post. The NRCS must also get a NPDES permit to conduct rehabilitation projects.

If a proposed construction project will be covered under a NPDES General Permit, the construction proponent or contractor Permitee will have a design professional produce an Erosion, Sedimentation, and Pollution Control Plan (ESPCP). The ESPCP describes the measures to be taken during construction to minimize erosion and contain sediments within the limits of the construction through the implementation of NPDES BMPs. EMD provides a GGSWCC Level II Certified Plan Reviewer to review the ESPCP prior to submittal to EPD.

Typically, the Permitee applies to EPD for coverage under the General Permit by submittal of a NOI and then becomes responsible for compliance with the conditions of the permit. The permit conditions require the Permitee to implement the ESPCP and monitor the BMPs for proper installation, maintenance and performance. Fort Benning EMD provides GSWCC certified Level 1B Inspectors to assure conformity with the ESPCP and to monitor the effectiveness of the BMPs.

Regulators can inspect any project covered under permit to verify that the permit conditions and documentation requirements are met. The permit requires that Army (usually Fort Benning EMD) notifies the permit grantor of any failures to meet permit requirements, such as failures of BMPs to stop soil movement. Serious failures to meet requirements or substantial movement of sediment beyond the construction limits may result in compliance actions, such as a stop work order on construction projects or other than corrective actions.

When construction is completed, the temporary NPDES BMPs are removed and the disturbed area re-vegetated or otherwise stabilized. The Permitee will then submit a NOT to EPD of coverage under the permit. When EMD and EPD determine that the site has met the permit requirements for vegetative cover and stabilization, the NOT is approved by EPD and the Permitee is relieved of the requirements of the permit.

The NPDES General Permit system controls erosion and sedimentation associated with construction activities. There are other requirements of NPDES, such as the regulation of discharge from industrial facilities and storm water management.

5.1.3.1.3 National Pollution Discharge Elimination System in Alabama

In Alabama, a general NPDES permit is required from the ADCNR if more than one acre is disturbed. As with Georgia, submittal on an NOI and a construction best management practices plan (CBMPP) is required showing the details of the placement of erosion control measures. Once the permit is issued the Permitee becomes responsible for compliance with the conditions of the permit. The permit conditions require the Permitee to implement the CBMPP and monitor the BMPs for proper installation, maintenance and performance. Fort Benning EMD provides inspectors to assure conformity with the CBMPP and to monitor the effectiveness of the BMPs. The Permitee is required to conduct turbidity monitoring and report the results to ADCNR.

5.1.3.1.4 Biological Opinion for the Red-Cockaded Woodpecker

Biological Opinions from the USFWS over the last several years dictated certain actions required to protect the RCW, including controlling soil erosion to avoid negative impacts to RCWs and their habitat. The CB soil conservation program focuses on erosion control in RCW habitat, specifically erosion that threatens individual cavity trees and the integrity of the cluster. The map in Figure 5.1.1 shows future and existing RCW habitat. Section 3.6 of this INRMP provides a summation of USFWS BOs issued to Fort Benning.

5.1.3.1.5 Erosion Inventories

In compliance with the requirements of the 2002, 2007, and 2009 BOs to repair and prevent erosion, a survey was conducted from March 2011 to November 2012 to identify and record the locations of erosion and sedimentation. Approximately 80k acres of current and future potential RCW habitat on Fort Benning was surveyed. The survey was not conducted in cantonment areas or UXO dudded impact areas. Orthophotos and a map developed by the Construction Engineering Research Laboratory depicting areas of possible erosion were used to initially identify suspected erosion areas. Over 900 sites were identified across the Installation. During the initial ground truthing visit to each site a determination was made as to whether erosion was occurring or not. Over 500 sites were identified as erosion areas requiring some degree of remediation.

After each site was located a score was assigned to the site based on whether erosion was slight, moderate or severe. After rating the individual sites, the next step was to prioritize the sites as they relate to their importance with respect to protecting RCW habitat. To rank the sites, Fort Benning EMD assigned each site a RCW-importance score based on its proximity to a cavity tree, whether it was in existing habitat or not, and whether the eroded area is associated with previously installed NPDES BMPs. Other TES and species of concern on Fort Benning all require habitat protection from soil conservation program activities. Details on soils conservation management

activities specific to TES can be found in their respective ESMCs in Appendix E. A map showing the locations of eroded areas is in Figure 5.1.2.

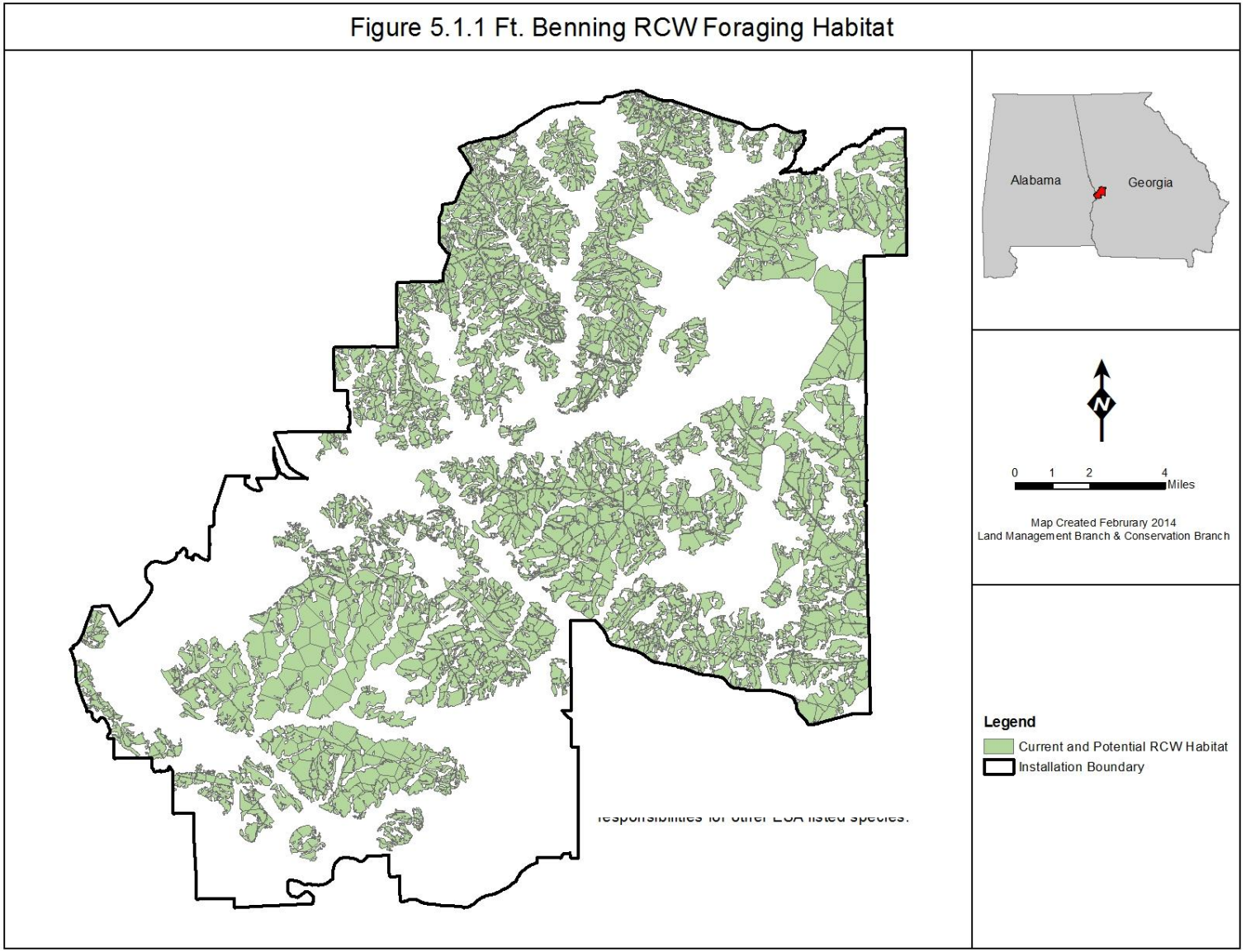
After the individual sites were scored a determination was made to focus efforts based on the severity of erosion in each WMUs on Fort Benning. Scores for each site were added together to determine an overall score for each WMU. Each score was then normalized based on total WMU acreage so the largest WMU would not necessarily get the highest score. Table 5.1.1 shows the prioritized list of WMUs. In addition to CB erosion inventories, ITAM also keeps track of erosion issues and prioritizes their projects accordingly.

5.1.3.2 Borrow Areas

Borrow areas are areas where soil material is excavated and used as fill at another location. Currently there are 13 existing borrow areas on the Installation, of which 8 are active and are depicted in Figure 5.1.3. They range in size from 0.7 acres to 9.0 acres and supply fill dirt for berm construction and maintenance, road construction and repair and miscellaneous building and training projects. Most active borrow areas (i.e. areas that have been excavated in the past year), have sediment retention structures, however, the inactive areas generally do not. Borrow areas considered as inactive still have suitable fill material that could be excavated, but have not been used within the past year, or been defined as abandoned.

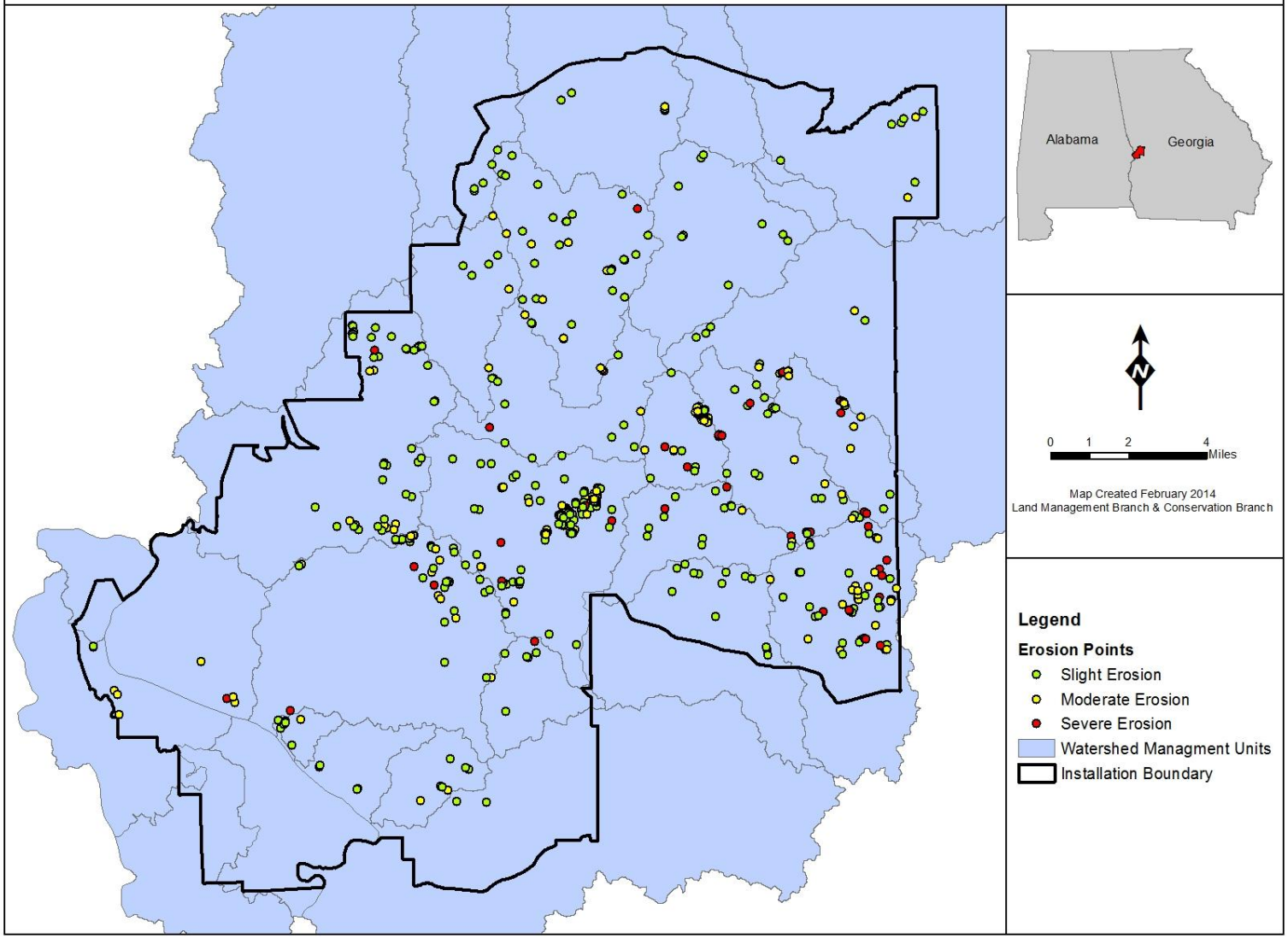
Proponents must submit a Form FB 144-R to draw from an existing borrow area and the user may be required to repair an existing structure or construct a new BMP. Because supplies of fill material in most of the borrow areas are nearly exhausted, many of the sites will soon need restoration. To meet future demand for fill material, off-Post borrow areas should be used or new on-Post borrow areas will be needed. Site selection, operation, and closure requirements are discussed below. A surface mining permit is required in Georgia to use a borrow area. In Alabama, a NPDES permit required to use a borrow area if the borrow area is not already permitted. Proponents should coordinate with EMD for specific advice on obtaining those permits.

Figure 5.1.1 Ft. Benning RCW Foraging Habitat



1

Figure 5.1.2 Erosion Points Within RCW Habitat & WMUs



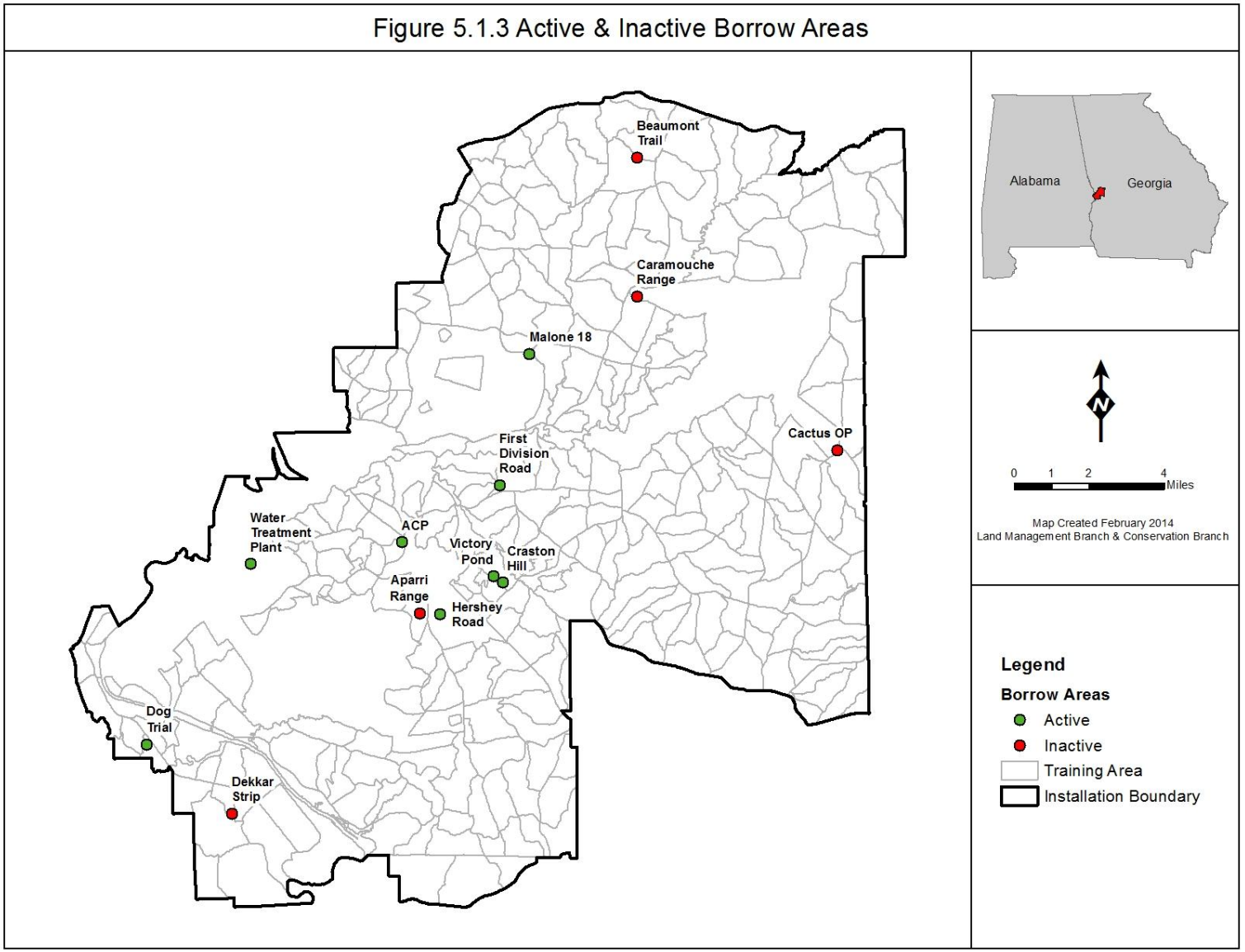
1

Table 5.1.1 Watershed Management Unit Ranking Based on Normalized Cumulative Score/100 Acres as of 2013

WMU	ACRES	TOTAL SITES FOR EACH FIELD SCORE			TOTAL POINTS/WMU	TOTAL SCORE/WMU	ACRES PER EROSION POINT	SCORE/ 100 ACRES
		1	2	3				
16	8,604	35	23	21	79	851	109	9.891
14	4,071	4	11	7	22	323	185	7.934
11*	3,146	6	17	3	32	234	98	7.438
19	13,344	74	27	5	106	862	126	6.46
12	6,157	21	8	6	35	275	176	4.466
8	10,552	31	9	2	42	346	251	3.279
17	5,147	12	2	1	15	114	343	2.215
5	15,437	40	8	1	49	326	315	2.112
22	21,080	33	9	3	45	381	468	1.807
18	4,756	14	3	0	17	81	280	1.703
21	2,828	5	2	0	7	38	404	1.344
15	10,478	6	3	5	14	135	748	1.288
9	7,566	12	3	1	16	85	473	1.123
6	5,585	4	2	0	6	60	931	1.074
4	1,872	2	1	0	3	18	624	0.962
27	3,349	2	3	0	5	32	670	0.956
20	3,321	4	1	1	6	25	554	0.753
24	8,379	0	3	1	4	49	2,095	0.585
1	7,896	5	2	0	7	38	1,128	0.481
10	10,663	10	0	0	10	46	1,066	0.431
3	7,804	4	1	0	5	26	1,561	0.333
25	8,836	2	0	0	2	8	4,418	0.091
	TOTALS	**329**	**141**	**57**	**527**			

**WMU 11 – Significant amount of acreage was historically maneuver area and is considered future habitat. Determination yet to be made if areas will continue to be utilized as maneuver area.*

Figure 5.1.3 Active & Inactive Borrow Areas



1

5.1.3.2.1 Borrow Area Site Selection

Proponents for a new borrow area should collaborate with the Soil Conservationist to identify potential sites for long-term soil excavation. Once an appropriate site has been selected, NEPA evaluation is performed, starting with the proponent submitting a Form FB 144-R to EMD for approval. During the review process, potential conflicts with natural and cultural resources or other proposed land uses will be considered and, if those issues cannot be reconciled, additional NEPA analysis may be required.

5.1.3.2.2 Operation of Borrow Areas

Prior to opening new borrow areas, an ESPCP must be developed and submitted with a Form FB 144-R for DPW EMD review and approval. Erosion control measures presented in the ESPCP should be implemented before excavation begins on either an active or inactive site. In existing borrow areas, maintenance of existing structures may be all that is required. Finally, to ensure that vegetation can be established, the user should leave the slopes inside the borrow area no steeper than 3:1.

5.1.3.2.3 Closure of Borrow Areas

Once fill material supplies become depleted, the borrow area will be closed and a gate, berm or sign will be erected to prevent vehicles from entering the area. The reclamation process will include construction or maintenance of a rock filter dam or sediment basin, grading of slopes to a minimum of 3:1 and grading of the borrow area's bottom to ensure drainage toward the outlet. Borrow areas that are not used within six months should be vegetated to reduce erosion of slopes and to reduce sediment accumulation at the outlet. Longleaf pines will be planted for complete restoration. Note that the timing of closures will depend on the availability of funds and environmental factors that may prohibit certain activity, such as its proximity to RCW habitat.

5.1.4 Methods

The *Manual for Erosion and Sediment Control in Georgia* (Georgia Soil and Water Conservation Commission, 2000) describes the BMPs available for use on Fort Benning. These BMP's will be adhered to as required for construction, repair, or maintenance of erosion control practices.

Fort Benning EMD policy requires development of a basic ESPCP and that BMPs be installed to control erosion in an effort to avoid sediment overload within the watershed. Informal monitoring is performed immediately after projects are completed and annually to evaluate project effectiveness. This proactive approach exceeds Federal and state requirements but is fundamental to ensuring all land disturbing activities related to rehabilitation of eroded areas minimize offsite transport of sediment.

5.1.4.1 Coordination of Soil Conservation Related Work

Several organizations on the Installation implement soil conservation practices, including ITAM, USACE, Engineering Division, DPW, Land Management Branch, BASOPS Contractor, construction contractors, and CB. In some cases, ITAM and CB projects may be located in the same watershed and implementation of both projects is

required to reduce erosion. The USFWS requires informal consultation to review and comment on erosion control plans for projects occurring in RCW habitat.

Fort Benning CB may host periodic Land Management Plan meetings among ITAM, BASOPS Contractor, LMB and the CB. The purpose of the meeting will be to facilitate communication between the organizations and improve efficiencies.

Areas where construction of BMPs will take place must be scheduled in advance with Range Control to ensure the area is not being used for training. In the case of road closure or work on roads and trails, coordination with ITAM and the BASOPS Contractor will be required. Projects that require assistance from the NRCS go through an ITAM or CB point of contact. The NRCS and the USACE hire contractors to implement CB erosion control plans.

5.1.5 Administration

5.1.5.1 Funding

Funding for the construction of erosion control practices in current and potential future RCW foraging areas is requested annually by CB in the Garrison's Environmental Requirement Build (GERB). Currently, CB requests and receives approximately $300K per year. Funding for training related erosion control practices is requested ITAM. Annual funding request is typically $3M. Rarely is that full request realized and frequently amounts to $0. Funding for road and trail maintenance is requested annually by LMB in the GERB. Currently LMB requests and receives approximately $175K per year. Additionally, DPW requests $600K per year for the BASOPS contract (Sustainment, Restoration, and Modernization funding) to conduct erosion control and road and trail maintenance. Additional information on funding for soil conservation activities can be found in the Land Management Plan in the RCW ESMC.

5.1.5.2 Personnel and Equipment

The Soil Conservationist and a Soil Conservation Technician currently run the Soil Conservation Program in the CB. The soil conservation technician to constructs BMPs and performs maintenance on BMPs. Wildlife technicians may be available on a limited basis to operate equipment for the establishment of grasses. Equipment available includes farm tractors and agricultural implements located at the Conservation Branch. ITAM staffing is dependent upon funding and projects identified in the ITAM work plan (included in the Land Management Plan in Appendix E1 as an attachment to the RCW ESMC). BASOPS contract staffing is sufficient to facilitate the necessary workload for the available funding.

5.1.6 Initiatives

Erosion control in the GHMTA requires collaborative effort from all entities involved. EMD staff will provide technical advice to ITAM and BASOPS contractor to ensure training requirements are facilitated in compliance with regulatory requirements. Portions of GHMTA are disturbed on a nearly continuous basis by the Armor School

and other units requiring off-road heavy maneuver training. Soil disturbance from heavy mechanized off-road maneuvering will be in the designated “maneuver boxes” in the GHMTA.

Previous sections have described coordination efforts to identify higher priority watersheds for erosion control efforts across all of the Installation. Rehabilitation of the sites will be concentrated in the higher priority watersheds. This does not mean that reclamation efforts will not take place in the lower priority watersheds, only that initially, efforts will be concentrated in the higher priority watersheds.

Working with the BASOPS Contractors to construct erosion control BMPs is another initiative for the Soil Conservation Program. A portion of the funds received will be given to the BASOPS Contractor to construct BMPs in high priority WMUs. The Soil Conservation Technician will coordinate work with the Contractor and provide quality control of constructed BMPs. The Soil Conservation Program may also receive some assistance from other personnel in the Conservation Branch for the completion of small projects. The typical erosion control BMPs include rock check dams, hay bale check dams, diversions, terraces, sediment basins, placement of gravel on trails, and installation of silt fencing and erosion control blankets. Temporary and permanent vegetation including native species will be established in all disturbed areas.

In the future, there will continue to be an emphasis on projects of mutual benefit between the ITAM Program and the SCP. By combining resources, areas can be rehabilitated in ways that achieve training as well as conservation goals. An example of this cooperation was a project constructed at Rowan Hill. The area is used for mechanized training, and it is surrounded by RCW habitat. Mechanized training at the top of the hill causes erosion and sediment deposition in the habitat below. Rehabilitation included construction of sediment basins and establishment of longleaf pine. Other areas were stabilized and berms constructed to support training. As a result, training lands were improved and endangered species habitat was protected. There may be opportunities in the future for projects of mutual benefit.

Fort Benning CB will be responsible for rehabilitation of RCW habitat including maneuver areas.
Over 500 eroded areas in RCW habitat are need of rehabilitation have been identified. Funding will continue to be requested via the GERB process, for the foreseeable future, to continue facilitating stabilization of those areas.

5.2 FOREST MANAGEMENT PROGRAM

The DoD utilizes over 25 million acres across the U.S. for training and preparing Soldiers to protect our country. The management of forests on these lands is critical to provide optimum and sustained training opportunities. Fort Benning has over 135,000 acres of manageable forestland (sum of forested acres minus inaccessible areas such as restricted access areas and UXO dudded areas).

Similar to much of the Southeast, the landscape at Fort Benning has been significantly altered due to historical land use practices to include agriculture and fire suppression. However, as a result of the military mission and land use practices, the forest resource presently in place at Fort Benning can be recognized as a very unique ecosystem. It is important from a local and regional context that has not only supported the US Army Infantry School for several decades, but now additionally supports the US Army Armor School, and several Federally threatened and endangered species (TES) as well. Fort Benning's LMB of EMD is responsible for management of the forests and natural resources across the Installation landscape in support of military training, sustainable training lands, and ecological stewardship. Management is achieved through many elements, including but not limited to timber harvesting, prescribed burning, wildfire suppression, longleaf pine reforestation, and TES habitat improvement and restoration.

5.2.1 Forest Management Plan Purpose and Program Objectives

5.2.1.1 Plan Purpose

The purpose of this forest management plan is to provide guidance and direction in consonance with Federal and state laws and current Army regulations and directives for maintenance of woodlands and unimproved grounds on the Fort Benning Military Installation. AR 200-1, which governs all natural resources management on Army lands incorporates DoD policy and states "[DoD will] promote biodiversity and ecosystem sustainability on Army lands and waters consistent with the mission and INRMP objectives." This plan will incorporate Army guidance in providing an ecosystem based forest management maintenance schedule along with identifying required resources needed to carry out the identified forest management activities. Adherence to Federal and state laws and DoD policy will be achieved while prescribing and implementing sound silvicultural practices that perpetuate a healthy ecosystem and support Fort Benning's mission.

5.2.1.2 Goals and Objectives

The overall goal of the forest management program is to provide optimal military training lands now and in the future while sustaining native plant and animal biological diversity. Forests and natural resources are actively managed to sustain a usable training environment while supporting numerous legal requirements for endangered species habitat management. Management plans and activities are coordinated with the Directorate of Plans, Training, Mobilization, and Security (DPTMS) and training units to maximize training usability, complement training needs, and minimize training disruptions. Feedback from DPTMS and training units while activities are occurring, and after completion to ensure all objectives are met. The program, which is based on

orderly and scientific management of the Installation woodlands, will promote an ecosystem based forest management system as its ideal management philosophy and integrates both the mission and the conservation of natural resource values such as wildlife habitats, recreation opportunities, forest resources, plant diversity, watershed integrity, and aesthetics. Each goal has associated objectives, some with direct implications on the forest management program. By no means are these goals listed the only ones that concern the forest management program, but they are identified specifically because they have the most applicability to the development of this plan.

- Maintain a realistic training environment, in accordance with an ecosystem approach, by managing for the sustainability of the Installation's natural resources.

- Restore and maintain a variety of ecosystems, with an emphasis on the longleaf pine ecosystem, to support native biological diversity and the ecological processes that sustain it.

- Utilize the RCW Foraging Matrix to ensure suitable RCW foraging habitat is maintained for each existing RCW cluster and to ensure future habitat will be in place to meet the needs of a recovered population at Fort Benning. This is a valuable tool for maintaining existing mature longleaf pine stands. However, the RCW Foraging Matrix presents management challenges, in particular, converting offsite pine stands to longleaf pine stands.

- Manage hardwoods using an ecosystem approach: conserve upland hardwoods where they are ecologically appropriate and contribute to overall biological diversity; conversely, control upland hardwoods where they are detrimental to management goals and objectives, including restoration of the longleaf pine ecosystem.

- Use forest management as part of an adaptive management approach that focuses on the ecological integrity of the landscape as its primary end state.

- Provide multiple-use opportunities.

- Meet planning level survey requirements and natural resource management data needs by continuing to inventory the forest and natural resources of Fort Benning.

- Continue to develop and maintain a thorough data collection and processing system that provides efficient data storage, retrieval, sharing, analysis, and presentation to support the USFWS RCW Foraging Matrix regulatory requirements, forest health monitoring requirements, and to facilitate fully informed management decisions.

- Comply with all applicable Federal and state environmental laws and regulations relevant to natural resources management, as well as applicable EOs.

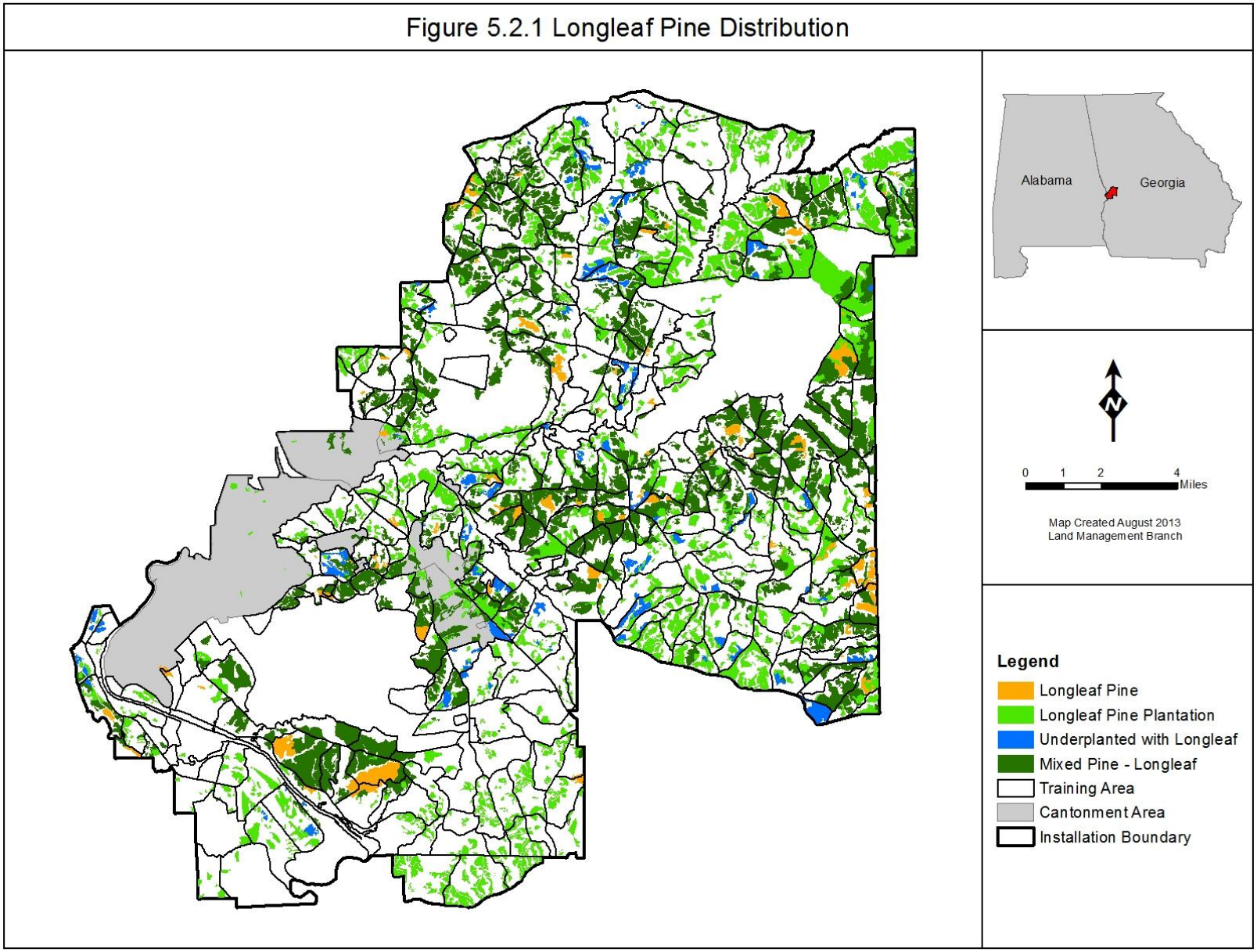
A major focus of the forest management program is to reestablish the composition, structure, and function of the longleaf pine ecosystem in a way that resembles its

historic occurrence to support sustainable military training, provide habitat for the RCW to reach population recovery goals, and to maintain biological diversity. Longleaf pine is much better suited than loblolly (*P. taeda*) or shortleaf (*P. echinata*) pine (other naturally occurring pine species) to sustain a healthy, long-term training area that meets the Army's needs. Longleaf pine may live to be 500 years or older (Landers and Boyer 1999). They are less susceptible to southeastern problematic insects (southern pine beetle and Ips beetle) and diseases (littleleaf disease and fusiform rust), and they are more tolerant of frequent fire, all of which support a sustainable, healthy training landscape. Additionally, longleaf pine occurred naturally across the entire Installation (as indicated in many historical documents and evident by the many remnant longleaf pines) and played a major role in the function of the natural ecosystem processes (Frost 2009). For these reasons, the decision has been made to manage the Fort Benning Military Installation in a manner that restores the longleaf pine ecosystem and its associated fauna and flora.

Reaching the above milestone will require many years of balancing silvicultural techniques with military training requirements and other potentially impacting activities. Appropriately monitoring forest changes and assessing management successes and challenges is paramount to the successful natural resource management process in order to anticipate, adapt, and proactively manage the forested landscape. Currently, there are approximately 51,478 acres of forestland that contain a longleaf pine component on the Installation, which includes 2,798 acres of longleaf pine dominated stands, 21,607 acres of longleaf pine plantations, 2,713 acres of longleaf pine underplant stands (non-longleaf pine dominated overstory and underplanted with longleaf), and 24,360 acres of mixed pine with longleaf (at least 25% longleaf occurrence) (Figure 5.2.1). Although significant improvements have been made towards longleaf ecosystem restoration, the continued balancing of longleaf restoration efforts while supporting military training needs, proactively addressing and improving forest health in an aging forest, and satisfying regulatory requirements of TES will continue to be a challenge for the forest management program in the critical years to come.

Long-term sustainability of the RCW population, however, will rely on the restoration and establishment of longleaf pine. Because of the absence of mature longleaf pine due to historical land use practices, artificial regeneration will be key to the re-establishment of the longleaf ecosystem over the short term. Reforested longleaf stands will need to be strategically placed across the landscape and timed over the next 50 years to minimize impacts to military training, listed species, and other natural resource values. Where mature longleaf pine is already present in sufficient numbers, complete conversion and reforestation will not be necessary. In these stands, silvicultural methods that promote natural regeneration of longleaf pine will be the preferred method of restoration. Methods to favor existing longleaf pine and promote natural regeneration will be used in longleaf pine stands and mixed pine stands that include some longleaf. The only longleaf pine targeted for harvest by forest management actions are those trees that are overcrowded by other longleaf pine and those that are in poor health.

Figure 5.2.1 Longleaf Pine Distribution



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5.2.2 Forest Management Policy and Guidance

A major focus of the forest management program is to reestablish the composition, structure, and function of the longleaf pine ecosystem to support sustainable military training and to provide habitat for the RCW to reach population recovery goals. Other TES and species of concern on Fort Benning all require habitat protection from forest management activities to include prescribed burning and timber harvesting. Details on forest management activities specific to TES can be found in their respective ESMCs in Appendix E.

In addition to the various DoD, Army, Federal regulations, and BOs listed in section 3.5.1, the Fort Benning forest management program also adheres to the following policy and guidance documents:

Alabama's Best Management Practices for Forestry. Alabama's Best Management Practices for Forestry is a document revised in 2007 by the Alabama Forestry Commission to suggest recommendations to help Alabama's forestry community maintain and protect the physical, chemical and biological integrity of waters of the state as required by the Federal Water Pollution Control Act, the Alabama Water Pollution Control Act, the CWA, the Water Quality Act, and the Coastal Zone Management Act.

Georgia's Best Management Practices for Forestry. Georgia's Best Management Practices for Forestry is a document revised in 2009 by the Georgia Environmental Protection Division, Georgia Forestry Commission (GFC), and Georgia Forestry Association to inform those involved with silvicultural operations about practices required to minimize nonpoint source pollution.

Title 10, U.S. Code 2665, The Military Construction Act of 1978. The Military Construction Act of 1978 originated as part of the Defense Appropriations Act of 1961, which allowed military departments to retain receipts from forest product sales. Title 10, USC, section 2665 (e) was amended in 1982 to return 25% of net profit from installation forest product sales to the states where the installations are located. The law was again amended in 1984 to increase the entitlements to the states from 25% to 40%.

5.2.3 Glossary of Terms for Forest Management Activities

Definitions of technical terms used in this plan are included in Appendix I2. Although many of the definitions have been taken directly from The Dictionary of Forestry (Helms 1998); a number of the definitions have been constructed to define the term's actual intent as used in the Fort Benning Forest Management Program.

5.2.4 Forest Management Program Activities

Fort Benning's LMB is responsible for forest inventory, timber marking, timber sale preparation and administration, reforestation, kudzu eradication, forest insect and disease control, and natural resources data management. Approximately 135,000 acres are currently under LMB oversight and will be covered under this forest management plan. Of the 182,464 acre Installation, approximately 135,097 acres are managed as

forestland, 15,612 acres have restricted access (dudded impact areas), 28,934 acres are unforested, and 2,767 acres are comprised of water in the form of ponds, creeks, swamps, and the Chattahoochee River. The land classification and distribution is shown in Table 5.2.1. A detailed summation of the forest types classified on Fort Benning in Appendix B1 (Table B.1.1).

Table 5.2.1 Land Classification and Distribution

Area Classification	Acres	Percent
Pine	74,143	41%
Pine-Hardwood	5,925	3%
Hardwood	55,029	30%
Forested Restricted Access	15,612	9%
Forested Unmanaged	54	0
Unforested	28,934	16%
Water	2,767	2%
TOTAL	182,464	100%

It is anticipated that with continued prescribed burning, timber thinning, and forest regeneration practices more acres will shift to pine or pine/hardwood stands because of the reforestation of open areas and the conversion of upland hardwood stands (to include scrub oak) and mixed hardwood/pine stands.

5.2.4.1 Forest Inventory

A modified version of the U.S. Forest Service (USFS) forest classification system (Forest Service Southern Region 1988) is used to inventory and classify the forest stands on the Installation. The system has been altered somewhat to better describe the forests located at Fort Benning. The forest stand inventory will be conducted for each management unit on at least a ten-year basis to comply with the 2007 *Management Guidelines for the Red-Cockaded Woodpecker on Army Installations*. Approximately 8,000 acres of pine stands will be inventoried annually. The forest inventory schedule for the next 5 years is indicated in Table B.1.2 as presented in Appendix B.1. However, changes in the schedule could occur due to management needs.

Data are collected using a systematic point sampling. Sample points are allocated using the following rules: In natural pine and pine-hardwood stands one point per acre is allocated up to a maximum of 20 points per stand regardless of stand size. In pine plantations one point per acre is allocated up to a maximum of 10 plots per stand regardless of stand size. Samples are taken using fixed 1/100th acre plots, fixed 1/10th acre plots, and variable radius 10 Basal Area Factor prism plots depending on the data being collected. Groundcover data is collected using 1/100th acre plots. Data collected using 1/10th acre plots includes hardwood mid-story condition, longleaf pine

regeneration density, snag presence, forest type, and pre-merchantability presence. Overstory data including tree species, diameter at breast height (dbh), total height, product class, crown vigor, and disease/insect damage is collected using variable radius 10 Basal Area Factor prism plots.

Forest inventory data are used by LMB to develop silvicultural prescriptions. These recommendations are coordinated with natural resource professionals using an interdisciplinary team approach. The team is derived of a small group of foresters and wildlife biologists from Fort Benning's LMB and CB. The team addresses the military mission needs, regulatory requirements and Installation and local community forest ecosystem and natural resource management needs. Final silvicultural recommendations are made after considering input from the military training mission and the interdisciplinary team. These recommendations are written into a formal document that is approved by the LMB Chief or LMB Chief's representative. The silvicultural prescription is forwarded to the USFWS for review and concurrence prior to implementing timber management activities. NEPA documentation and coordination and scheduling are completed to minimize interference with training or other land uses.

Pine forest age classes play not only an important role in the recovery of the RCW, but also forest and training lands sustainability. Due to land use practices prior to the establishment of Camp Benning in 1918 and land acquisition in 1942, a significant amount of mature loblolly pine and shortleaf pine occur on Fort Benning. A potential concern for Fort Benning is if the landscape can support and maintain a sustainable amount of healthy pine trees over 60 years of age (potential RCW cavity trees). Unfortunately, the health of loblolly and shortleaf pine stands, particularly on the upland sites, declines significantly after 50 years of age. The nutrient deficient, eroded soils prevalent on Fort Benning affect the health and vigor of the loblolly and shortleaf pine. As a result, these stands have increased mortality as insect and disease occurrence, i.e. littleleaf disease, bark beetles, etc., increases as tree health and vigor decreases. Existing loblolly and shortleaf pine stands will be nurtured as long as possible to meet RCW habitat requirements in the short-term. Eventually, the reestablished longleaf pine will sustainably support the nesting requirements of the RCW, but until that time the existing loblolly and shortleaf pine stands will be relied upon to fill this need. These forest types and age classes will be altered considerably as older loblolly and shortleaf stands are affected by insect and disease problems and natural senescence, and as different silvicultural techniques are used to promote the re-establishment of the longleaf pine ecosystem.

Due to current USFWS endangered species regulations for RCW, challenges exist for managing the forest landscape, maintaining a sustainable military training landscape, and accomplishing longleaf ecosystem restoration goals. Of the total Fort Benning RCW clusters that can be safely and actively managed with timber harvesting and artificial longleaf pine restoration (306 total), 51% of the RCW clusters are considered suitable as measured against the USFWS Revised Standard for Managed Stability criteria for Fort Benning (FBRSMS).

In deficient RCW clusters, forest management, to include uneven aged management and longleaf pine restoration, is significantly limited within a ½ mile of the RCW cluster center (up to 502 acres per cluster). Within a deficient RCW partition, tree diameter limit harvests are mandatory. No pine trees ≥10 in. dbh can be harvested regardless of tree health, pine species, or tree density. According to the USFWS 2003 recovery plan, if a ≥10 in. dbh pine tree is harvested in a deficit cluster, the timber harvest action will result in an incidental take. As Fort Benning continues habitat restoration to convert off-site, unhealthy loblolly pine for transition to a longleaf pine-dominated forest, forest management practices will adhere to the USFWS revised Fort Benning Standard for Managed Stability (SMS) of acceptable basal area range of greater than or equal to 30 ft^2/acre for pines ≥10 inches dbh within all (current and future) active and inactive RCW cluster ½ mile partitions.

5.2.4.2 Timber Marking

Timber marking is conducted with the long-term goal of creating uneven-aged longleaf pine stands where appropriate. Without always having the longleaf component in place, however marking is altered accordingly depending on prescription recommendations. The major goals are to reduce the hardwood component within pine stands and to reduce the off-site loblolly, shortleaf, and slash pine component in those stands in which longleaf pine is determined to be better suited to the local environmental conditions.

Timber marking in mature longleaf stands or mixed longleaf/loblolly/shortleaf stands is completed using the single tree selection method. The objective is to reduce the loblolly and shortleaf component while favoring the longleaf component, which will promote natural regeneration of longleaf pine.

Timber marking is conducted in loblolly and shortleaf stands to the extent that when thinned, longleaf pine seedlings can be planted under a healthy, under-stocked stand so that the stand will be converted overtime to a stand with a major longleaf pine component. Where mature longleaf pine is established, thinning is used as a long-term maintenance tool. Single tree selection is used to remove poor quality, overcrowded, suppressed, or diseased trees to create the openings required to promote natural regeneration and also to create an uneven-aged stand structure.

However, timber marking and forest management actions within deficient RCW clusters are limited to silviculture actions that can only improve foraging habitat within the cluster by removing pine stems <10 dbh and/or removing hardwood stems, even if forest stands are overstocked with 10 to 14 in. dbh pine trees or overall tree health is diminishing. Typically, these allowable silviculture actions remove younger, healthy trees while leaving older trees with significantly declining and/or poor health. These requirements and resultant allowable timber harvest promote even aged management and hinder timber harvests that promote tree health, natural longleaf pine recruitment, and reforestation to longleaf pine.

If diminishing tree health is a concern within a deficient RCW partition, an allowable forest management alternative is passive forest management. Natural senescence of

the overstory and natural succession of the understory will set the timing and be the determining factor for timber marking and forest management restoration actions such as mechanical vegetation removal, hand felling, and/or chemical site preparation and longleaf pine underplanting feasibility and successful establishment. The passive forest management alternative allows the natural senescence of the overstory pine trees to reduce the overstory pine basal area to a feasible underplanting density where longleaf pine underplanting efforts can be successful and adequate stocking of longleaf pine trees can be successful.

Additionally, silviculture actions that can occur within deficient RCW clusters, such as harvesting pine stems <10 dbh and/or removing hardwood stems, are typically accomplished with non-conventional methods in specialty markets due to low volume of harvest material, logging feasibility, and/or market availability. More often than not, these silviculture actions can only be accomplished with pre-commercial thinning (hand crews) and/or herbicide application and can become very expensive. Depending on the method(s) chosen, fire intensity during wildfires or prescribed burning typically increases and initially can be stressful or detrimental to the overstory pines due to the increased amount of available fuel and combustible material left and/or cured within a stand.

Conversely, RCW partitions that meet the FBRSMS, timber marking and forest management is allowed more flexibility (however, flexibility is still contingent upon $\geq$10 in. dbh pine basal are and acres above the FBRSMS minimum requirements). When RCW partitions meet the FBRSMS, timber marking and forest management can be geared toward promoting tree health and successfully re-introducing longleaf pine to off-site pine dominated stands, rather than managing the forest strictly by tree diameter limits. This type of forest management allows the health of the forest to dictate which trees will be selected for timber harvest. When forest health warrants removing overstory pine basal area to feasible underplanting densities, successful re-establishment of longleaf pine becomes less challenging. Typically, these stands are still maintained by fire, have not become dominated by hardwoods vegetation, have a herbaceous understory component, and have not been overseeded with natural pine regeneration of undesirable species. In RCW partitions that meet the FBRSMS, conventional timber harvest methods can be used in a stand prior to longleaf underplanting and much of the natural pine regeneration and hardwood vegetation will be reduced or eliminated (fuel reduction), which allows for less intense site preparation burns and decreased stress on the residual pine overstory.

5.2.4.3 Timber Harvest

Harvesting of standing timber is an integral and active part of the overall forest and natural resource management program at Fort Benning. The LMB reviews about 32 training compartments annually for proposed forest management actions on stand improvement needs through silvicultural actions that include herbicide applications for vegetation control, thinning and conversion of off-site shortleaf pine, slash pine, loblolly pine and upland hardwood stands to longleaf pine. Additional areas are harvested through the use of salvage contracts in a continual effort to salvage damaged, diseased, dying, or insect-infested timber throughout the Installation. These salvage contracts are

also used for quick response of tree removal needed to support construction, range maintenance, ITAM, and other miscellaneous projects. Additionally, salvage contracts are used for other emergency actions, such as in response to storm damage.

LMB personnel will maintain the flexibility to manage accordingly, on a case by case basis, in response to severity, extent, and location of storm damage and catastrophic events. All timber salvage operations in response to catastrophic storm events will adhere to BMPs for Forestry as well as the following general guidelines:

a.) All storm damaged areas will be delineated and reviewed under the normal NEPA process.
b.) Only standing trees will be marked for salvage with timber marking paint.
c.) Salvage operations occurring outside the 200 foot RCW cluster boundary will only be salvaged under the guidance/approval of a LMB forester.
d.) Salvage operations occurring within the 200 foot RCW cluster boundary will only be salvaged under the guidance/approval of a RCW wildlife biologist.
e.) Salvage occurring within the 200 foot RCW cluster boundary during nesting season (March – July) will be allowed only with the approval of the USFWS and the oversight of a RCW wildlife biologist present on site during the salvage operations.

5.2.4.3.1 Timber Sale and Administration

The LMBLMB manages timber sales with in-house personnel with support from the Mission and Installation Contracting Command (MICC) and the Directorate of Resource Management (DRM). Once the Installation makes the timber available, the MICC will solicit for bids for each timber sale, appraisal of timber under advertisement to establish the minimum acceptable bid and contract administration will be completed by the LMB. Contract administration includes timber harvest coordination with Range Operations and field inspection of harvesting operations once the contract award is complete. The LMB will also be responsible for the collection of timber receipts and transfers of monies to the DoD timber account with assistance from the Fort Benning DRM.

5.2.4.3.2 Contract Specifications

Contract specifications are written for each individual timber sale based on the information provided from the LMB to MICC. These specifications include:

- Identification of trees designated for harvest
- Merchantability specifications for each product based on local mill requirements
- Residual damage restrictions
- Harvest area boundary identifications
- Restrictions for protected or sensitive areas
- Special requirements for harvesting in areas with listed or otherwise protected species

- Soil disturbing restrictions

The method of logging and the type of equipment to be used is also specified in efforts to best meet the silvicultural goals and special concerns of the Installation including archeological sites, species of conservation concern, soil sensitivity, and military training requirements. On average ninety percent of timber sales are marked by LMB forestry technicians for removal; however, harvest operator selection of trees for removal based on contract selection criteria has proven effective in the thinning of some fairly uniform stands of timber. Criteria for operator select harvesting is the same as used for marking timber sales: longleaf pine will be favored for leave trees, diseased and dying trees will be removed, and basal area will be left at 30-70 square feet to the acre. Most contracts are targeted for completion within eighteen (18) months of bid opening. This contract duration includes the time period from 31 March to 31 July during which time harvesting is not allowed in certain areas due to nesting activity in RCW clusters. Contract specifications also mandate the use of Georgia's Best Management Practices for Forestry (GFC 2009) that include specifications for road construction, wetland protection, and erosion control measures. Water quality is a primary concern with all land disturbing activities and especially when impacting large areas as our timber harvests do. At no time will timber harvest activities compromise water quality protection. If specifications over and above that required by state BMPs are determined to be needed, then more restrictive contract specifications will be implemented.

5.2.4.3.3 Forest Products

Many forest products are merchandised from the timber removed from the Installation. These products include pine sawtimber, pine chip-n-saw, pine pulpwood, pine wood chips, hardwood sawtimber, hardwood pulpwood, and hardwood chips. Firewood is sold for personal use as a service to both military and civilians. Pine straw is a rapidly growing market in the Southeast and is a potential income producer. Pine straw sales have been considered, but other than providing additional income no other benefits to this practice are apparent. The negative aspects of pine straw raking outweigh the monetary benefit and have not been pursued for a number of reasons. Pine straw provides the fuel needed to carry fires during prescribed burning activities, contains valuable nutrients that are returned to the soil during prescribed burning, helps control erosion when left in place.

5.2.4.3.4 Money Collections and Security Measures

Timber is sold by the unit price (per ton) or lump sum, depending on the nature of the timber sale and potential complications arising from metal contamination, military training, insects and disease. Solicitations for bids are sent to prospective buyers and the timber is sold to the highest bidder. A performance bond is collected from the successful bidder to help ensure contract compliance. Any penalties due to contract shortfalls are deducted from the performance bond. At completion of the contract, any remaining bond money is returned to the purchaser. LMB personnel perform timber security on the unit price sales through frequent inspections of the haul trucks. They inspect for proper authorizations including a load specific Government security coupon

with complete information as to the contract, product, and date/time leaving the woods. The scales used by the contractor to weigh timber products must be periodically checked for accuracy by state officials and be state certified. Every load of wood that is carried to a mill is scaled and a copy of the weight is printed on a ticket. These tickets are returned along with the Government security coupon to a locked Government drop box issued to each logging operation. Coupons and tickets are collected regularly by LMB personnel from the lock boxes to ensure loads of timber have been properly documented by the purchaser and monies are collected in advance accordingly.

5.2.4.3.5 Metal Contamination

Metal contamination from military small arms or artillery fire continues to challenge the marketing of timber on the Installation. Metal detectors are used in conjunction with historical range firing maps to screen each timber availability for metal contamination. If significant contamination is found in a portion of a sale area during the pre-sale inspection, the affected area is deleted from the sale and advertised under a separate metal contaminated timber sale advertisement. If metal is encountered after timber has been sold, the contract is negotiated to eliminate the requirement for harvesting contaminated trees or the price is offset for the contaminated timber. Only one mill in the area accepts metal contaminated timber and only at a much reduced stumpage price of one-third to two-thirds full market value. Other mills have been hesitant to bid on non-contaminated sales because of unexpected encounters with metal contamination over the years. Pre-sale investigation procedures, which not only screen for contamination, but also physically verify the primary source of contamination through felling trees and chopping out the contaminant, seems to be the most effective proactive approach to regain customers who have not actively bid on Fort Benning timber in many years.

5.2.4.3.6 Planned Timber Harvest

The annual timber harvest will be a combination of thinning and regeneration harvest of approximately 1,000 acres. The timber harvest will be conducted in an average of 26 compartments each year with timber harvest in a total of 129 compartments for this five-year plan, see Table B.1.3 located in Appendix B.1. The timber harvest will be reviewed by Fort Benning CB personnel during the timber prescription process. Each forest management prescription will be approved by the Chiefs of LMB and CB, and then forwarded to USFWS for concurrence. Next, all program managers will review each timber harvest through the NEPA process (Form FB 144-R). Once the NEPA process is complete, then RCW surveys will be conducted to verify no change has occurred since the USFWS. Each year the total volume of timber harvested will vary. However, LMB plans the annual volume harvested for this plan to follow the volumes as described in Table B.1.4 located in Appendix B.1.

5.2.4.3.7 Timber Harvest Inspections

LMB personnel conduct inspections not only to ensure strict adherence to contract specifications and to correct any logging problems encountered, but also to educate and train loggers in proper logging techniques. These checks are completed to head off any

major problems and to keep timber marking technicians updated on problems the loggers may have with marking techniques. A final inspection is conducted after completion of the timber harvest to identify any additional damages and to close out the sale area. If damages or violations are found, the contractor will have to correct the damage if possible or pay a monetary penalty. Inspections are also conducted to evaluate whether silvicultural objectives were met.

5.2.4.4 Reforestation

The overall intent of reforestation on Fort Benning is to re-establish the longleaf pine ecosystem. Natural regeneration will be used to the maximum extent possible, but artificial regeneration will be required where a longleaf seed source is not available.

5.2.4.4.1 Cone Survey

A longleaf pine cone survey is completed annually in conjunction with the USFS, Southern Experiment Station in Auburn, Alabama. Selected mature longleaf pine stands are surveyed each year during the spring. Random trees are checked for numbers of strobili, conelets, and cones. This information provides an indication of what the Installation's longleaf pine seed crop was during the past year, what it will be in the current year, and what can be expected the following year. This information is useful for planning purposes to schedule site preparation burns, postpone prescribed burns, and schedule cone collections.

5.2.4.4.2 Tree Planting

Currently, contractors are used for site preparation and tree planting. Contracted site preparation involves herbicide applications to reduce competition and facilitate the planting of the seedlings. Tree planting is typically accomplished by hand. Containerized longleaf pines are planted on all longleaf pine designated areas.

Assessing and scheduling areas for reforestation is done by first considering areas deficient in RCW foraging habitat. Additionally, non-stocked areas receive a higher priority over sparsely stocked areas or areas adequately stocked with an off-site tree species. Reforestation in sparsely stocked areas and areas stocked with off-site tree species are prioritized based on the location and amount of existing longleaf pine in the area and the silvicultural operations and timing necessary to appropriately restore longleaf pine to these sites. Reforestation is consolidated on a region or military training compartment basis. All areas scheduled for reforestation that are in close proximity to high priority areas are included in the same annual schedule as the high priority area when feasible. Grouping areas improves efficiencies by reducing administration, site preparation, and tree planting costs and, as a result, enables more longleaf pine reforestation acres annually.

5.2.4.4.3 Seedling Survival Checks

Survival surveys of planted pine seedlings are conducted one year and three years after the seedlings have been planted. The surveys are completed during the dormant

season when competing vegetation has dropped foliage and the pine seedlings are more visible. This allows for more accurate and efficient seedling survival surveys. About 80-90% of natural mortality occurs during the first growing season, which makes the one-year checks most important. The three-year checks are to ensure the trees are healthy and have not been damaged by military training activities, fire, or other detrimental occurrences that may require replanting. After three years the trees are more visible, further resistant to fire, and free to grow and compete naturally. In longleaf pine plantations, survival of about 300 to 600 trees per acre on average is acceptable. Each area is evaluated independently to determine acceptable levels of survival based on site index, land use, and competing vegetation.

5.2.4.5 Insect and Disease Control

The major forest insect and disease problems on the Installation are pine bark beetles (*Dendroctonus spp.* and *Ips spp*.), fusiform rust (caused by a fungus *Cronartium quercuum* (Berk.) Miyabe ex shirai f. sp. *fusiforme*), and littleleaf disease (caused by a soil fungus *Phytophthora cinnamomi*). Minor insect and disease problems include annosus root rot (*Fomes annosus*), brown spot (*Scirrhia acicola*), Nantucket pine tip moth (*Rhyacionia frustrana*), and pine webworm (*Tetralopha robustella*).

5.2.4.5.1 Southern Pine Beetle

The southern pine beetle (SPB) is by far the most destructive insect because of its quick kill capability and rapid rate of spread. The SPB is a native bark beetle that periodically multiplies in vast numbers and is capable of major destructive attacks on stressed southern pines, mainly loblolly and shortleaf pine. Southern pine beetles are capable of killing thousands of acres of pine trees in a single year. As a result, their infestations place RCW foraging and nesting habitat at risk. Epidemic populations normally occur on a cyclical basis with the only significant outbreak occurring in 2002, consisting of 81 spots that killed 118 acres of pine. 2008 was the only other year with recorded beetle activity with seven recorded spots destroying one and a half acres. Beetle detection begins in the spring, as temperatures rise, by LMB forestry technicians who are on the lookout for signs of beetle infestations (that is groups of fading or red-topped trees, popcorn shaped pitch tubes on boles of the trees, and sawdust at the tree base) while conducting normal daily activities. Once reports of spots begin to increase an aerial detection flight is scheduled through DPTMS. A military helicopter is manned with LMB forestry technicians who detect and map SPB outbreaks. These outbreaks or spots are ground checked by the technicians and suppression activities are recommended for each spot. Aerial reconnaissance is continued monthly until suppression activities have the epidemic under control.

The primary and most effective method of control is timber removal. Each spot is flagged (to include all infected trees and a tree-length buffer) using pink “TIMBER HARVEST BOUNDARY” flagging and is harvested as soon as possible by a commercial salvage logging operation. On completion of harvesting, LMB personnel check the spot for suppression to determine if further action is required. Other means of suppression include 1) push, pile, and burn, 2) cut and leave, and 3) chemical

applications when trees are non-merchantable or inaccessible. Chemical applications have only been used on rare occasions in the past, mainly as research projects managed by University of Georgia Forest Pest Lab personnel. Chemical control is not a viable option for most southern pine beetle infestations. If there is an unusual southern pine beetle situation that requires chemical treatment, the chemical will most likely be a carbaryl, bifenthrin, or permethrin product labeled for southern pine beetle prevention and/or control (Sevin, Onyx, Astro, Dragnet, Permethrin Pro or Permethrin Plus C). All chemical treatments will be applied under the supervision of or by a DoD certified pesticide applicator and in accordance with Fort Benning's Integrated Pest Management Plan.

Research indicates that SPB occurrences are directly related to forest conditions and stand health. Good forest management practices that maintain healthy pine stands are the most economical and timely means of control.

5.2.4.5.2 Ips Beetles and Black Turpentine Beetles

Ips beetles (*Ips spp*.) and black turpentine beetles (*Dendroctonus terebrans*) are pine bark beetles, but are less damaging than southern pine beetles because they usually do not kill large numbers of trees in one spot. Both of these pine bark beetles attack injured or stressed trees. As stressed and diseased loblolly and shortleaf pine are replaced with longleaf pine, attacks by these two species should not be a significant factor for Fort Benning's forest health.

5.2.4.5.3 Littleleaf Disease

Littleleaf disease is another major cause of pine mortality on the Installation, but does not receive as much recognition as the SPB because it provides a slower death, is not as visible, and is less concentrated. Littleleaf disease, which primarily affects shortleaf pine, is caused by a soil fungus that restricts fine hair root growth. Littleleaf disease also affects loblolly pine, but to a lesser extent. It rarely affects pine trees younger than 20 years old and becomes increasingly severe in older stands. A typical tree dies within six years after becoming infected though some trees may survive up to 15 years. It is also common for southern pine beetles to attack littleleaf infected trees because these trees are under stress and susceptible to attack. Littleleaf disease is evident throughout the Installation and is handled on a case by case basis. The areas where littleleaf disease is a major problem are reforested as soon as possible with longleaf pine seedlings. In other areas of the Installation where the fungus is not as prevalent, such as longleaf pine stands, which are not affected by the fungus, and loblolly stands in higher quality soil areas, the timber is managed in place as long as possible.

5.2.4.5.4 Fusiform Rust

Fusiform rust is caused by a fungus *Cronartium quercuum* (Berk.) Miyabe ex shirai f. sp. *fusiforme* that affects mainly loblolly and slash pine on Fort Benning. The fungus produces spores that finalize on pine trees creating stem and branch galls that cause death, breakage, or reduce lumber quality. The fungus does not spread directly from pine to pine. It has a life cycle that makes use of alternate hosts such as water oak

(*Quercus nigra*) and willow oak (*Q. phellos*). The basidiospores produced on the oak host during cool, humid weather in the spring are carried by the wind and infect pines primarily through tender stem tissue. Control of the fungus is accomplished by thinning diseased trees and reducing oak populations in and around the affected pine stands. It's best if thinning occurs during the summer months (May through August) because conditions are less for spore production and germination. If the fungus is evident on more than 50% of the stems within a stand it is controlled by timber harvest if possible. The area is reforested with longleaf pine if necessary and where appropriate.

5.2.4.5.5 Other Insects and Diseases

Other insects and diseases that are found on the Installation are less detrimental. Damages caused by these insects and diseases are acceptable as a natural process. Brown spot (caused by *Scirrhia acicola*) is the main disease affecting longleaf pine. It can be controlled by prescribed burning at an early tree age. Nantucket pine tip moth (*Rhyacionia frustrana*) and pine webworm (*Tetralopha robustella*) are found mainly in young loblolly pine plantations. These pests will be less problematic in the future with the increased reforestation of longleaf pine. Annosus root rot, which is caused by *Heterobasidion annosum* Fr. Bref. is found primarily in thinned stands on well-drained, deep sandy soils. Because of the minimal amount of destruction caused by these insects and diseases, very little emphasis is placed on their control.

5.2.4.6 Champion Tree Program

Fort Benning's Champion Tree Program is an informal way of maintaining records of unique trees on the Installation while providing a competitive interest among LMB personnel in the field. Both Alabama and Georgia have champion tree programs, as well as the organization American Forests (who maintain a National Register of Big Trees). Fort Benning personnel have maintained an informal list of champion trees since 1985, but they had never verified or officially measured any of the trees. In 1997 and again in 2010 Fort Benning updated the list and began measuring and documenting locations of trees discovered. Field personnel record the tree measurements crown spread (feet), height (feet), and circumference (inches) from large trees discovered on the Installation. A record of these trees is maintained by the LMB. Trees that exceed state records are submitted to Georgia or Alabama for verification as State Champions. All nominations that seem to be eligible will be forwarded by the corresponding state to the National Register of Big Trees. To date Fort Benning has one Georgia Champion along with a couple of pending Georgia state submissions. A list of Fort Benning Champion Trees is provided in Table B.1.5 in Appendix B.1.

5.2.5 Research

As a DoD military installation, research is generally unauthorized for Fort Benning employees. Monitoring of forest management actions and data collection, however, are permissible. Other than southern pine beetle trapping, seedling survival checks, kudzu eradication monitoring, and timber harvest inspection, no other monitoring is done by LMB. Three other major monitoring requirements such as longleaf pine growth and yield, long-term forest health and development, and uneven-aged management are on

hold until a vacant forester position can to be filled to handle the increasing monitoring requirements. Also, other outside groups, including the Longleaf Alliance, USFS, and Strategic Environmental Research and Development Program (SERDP) have received permission to conduct forest related research on Fort Benning.

5.2.6 Data Management

All natural resources data including GIS data layers, Microsoft Access databases, Microsoft Excel spreadsheets, and other data formats are stored on a network server that is managed by the Network Enterprise Center (NEC). The NEC ensures that the data on the server is available and is backed up on a regular basis. Storing the data on a network server allows the data to be accessed and shared by EMD personnel for planning and collaboration purposes. Individual program managers are responsible for updating their data as required, and security measures are in place to ensure that the data can only be modified by the appropriate personnel.

5.2.7 Agricultural Outlease

The Land Management Branch is responsible for all agricultural outleases on Fort Benning. Prime areas identified for an agricultural outlease are open training areas that have to be maintained on a regular basis, such as landing zones and drop zones. Maintenance of these areas can be costly to the government, but by outleasing the areas could be maintained free of charge while also potentially producing revenue. To date, only one agricultural outlease has been granted on Fort Benning at Lawson Army Airfield, which consisted of a 600 acre area of Bermuda grass. The outlease proved impractical due to access restrictions at the airfield and was terminated. There are no plans at the present time to initiate other outleases anywhere on the Installation. However, if the agricultural outlease program is reinitiated in the future, the grantee will be required to adhere to all Federal, State, and Army Regulations, as well as all provisions and requirements of this INRMP.

5.2.8 Urban Forestry

All urban forestry work done in the cantonment area of Fort Benning has been completed by the Base Operations (BASOPS) contractor in the Operations and Maintenance Division of the Directorate of Public Works (DPW). The program mainly consists of reactive work as a result of storm damage or unhealthy and unsafe tree conditions. Proactive work to maintain the urban forest in a healthy state by providing regular maintenance is performed every year at a scale that is directly related to available funding.

The Army Family Housing, through the Residential Communities Initiative (RCI), has established a public-private partnership to provide privatized housing to the Soldiers residing at Fort Benning. The RCI contractor manages the urban forest within the boundaries of housing areas leased to them. The RCI contractor works with the DPW Operations and Maintenance Division to properly manage the urban forest resources under their supervision.

There are two street tree inventory and management plans. One is for the historical district of Fort Benning that is utilized primarily by the BASOPS contractor. The other street tree inventory and management plan is for the leased property RCI contractor The Cultural Resources Program in the Environmental Programs Management Branch of EMD manages the historic street tree data. Fort Benning's LMB provides technical assistance on urban forestry and tree management issues. Street tree inventories include information such as species, size, and condition.

5.2.9 Forest Management Administration

5.2.9.1 Funding

Funding requirements have increased considerably since the mid-1990s. Forest management costs have been impacted mainly by a required increase in staffing, increase in contract services, and the replacement of worn out vehicles to accomplish the requirements in the BOs. Maintaining a larger staff and newer vehicles has enabled the program to increase workloads and to conduct forest stand improvements more rapidly in support of RCW habitat objectives.

Funding to operate the Forest Management Program as a whole comes from a variety of sources. Sources include Environmental Conservation Funds, Forestry Reimbursable Funds from timber harvest proceeds, USFS Emergency Pest Suppression Funds, and DoD Forestry Reserve Account Funds.

During the next five years the operational budget of the forest management program should remain constant except for annual adjustments for inflation. Staffing is almost up to the required level identified in BOs. This staffing is also expected to meet the implementation requirements of the INRMP. Only a few positions remain to be filled and vehicles are at a high level of operation, as most of the fleet has been replaced over the past five years. It is expected that reforestation costs will at least remain constant and possibly decrease as the required number of acres reforested annually decreases. The estimated annual budget for the Land Management Branch, including personnel and equipment costs, for FY14 through FY18 is found in Table B.1.6 in Appendix B.1.

5.2.10 Initiatives

Forest management initiatives for the period 2014 through 2018 include:

- Continue ecosystem management approach while following regulatory requirements for pine stands with emphasis on forest health and passively manage lowland and bottomland hardwood stands.
- Reestablish the longleaf pine ecosystem by removing off site loblolly pine, shortleaf pine, slash pine, and upland hardwoods from historical longleaf pine sites.
- Increase under-planting longleaf pine in heavily thinned loblolly and shortleaf pine stands to establish longleaf pine regeneration in order to support military training needs, proactively address and improve forest health in an aging forest, satisfy regulatory requirements of TES, and promote longleaf restoration.

- Increase the use of fuelwood chip contracts and explore potential clean chip contracts. Clean chips are used as pulp for making paper.
- Maintain healthy off-site loblolly forests as long as possible before reforesting to longleaf pine in deficit RCW clusters.

5.3 PRESCRIBED BURNING PROGRAM

5.3.1 Prescribed Burning Program Purpose and Objectives

5.3.1.1 Purpose

Fort Benning's LMB is responsible for fire detection, fire suppression, prescribed burning, and firebreak maintenance. This plan focuses on prescribed burning, although the implementation and accomplishment of this plan depends on the implementation of firebreak maintenance. Firebreaks provide access for burning operations and serve as boundaries between burn units. The goals of prescribed burns are to provide an ideal training environment, to control the hardwood competition and to reduce fuel loads in order to promote the establishment and promulgation of the longleaf pine ecosystem.

5.3.1.2 Program Objectives

The prescribed burn program is required to burn at least 90,000 acres of pine habitat every three years as required by the USFWS BOs. The objective is to burn approximately 30,000 acres per year while minimizing any impacts to the training mission and air quality. Additionally, the ESMP BO (2002) states that, "if less than 24,000 acres is burned, in each of two consecutive years, Fort Benning shall reinitiate consultation with the Service". The updated RCW ESMC in Appendix E1 also contains this provision. The DPTMS and LMB have worked together to develop, revise and update the Fort Benning military training area boundaries that are not only conducive and appropriate for the military training mission needs, but are also conducive and appropriate for the prescribed burn program. Natural features such as rivers, creeks, and drains and existing man-made boundaries such as roads, trails, and firebreaks take advantage of and are utilized for training area and prescribed burn unit boundary designations. The size of each burn unit considers adequate training area needs and smoke management requirements. These training areas boundaries are more or less consistent with the designated burn units. As of August 2010, there are 300 training areas designated on Fort Benning. Burn units range in size from 200 to 600 acres with the average at 275 acres. Records indicate that burning is conducted on approximately 50 days per year; including weekends and holidays.

5.3.2 Glossary of Terms for Prescribed Burning Management Activities

There are many terms associated with fire management and prescribed burning. These definitions were taken from the manuals/books of "A Guide for Prescribed Fire in Southern Forests", "Georgia's Best Management Practices for Forestry", "Introduction to Prescribed Fire in Southern Ecosystems", and "The Dictionary of Forestry" and can be found in Appendix I2.

5.3.3 Training and Staffing

Fort Benning's LMB staff are the only personnel dedicated primarily to prescribed burning and wildfire detection and suppression activities. All burning activities are completed by LMB personnel and with assistance from Fort Benning CB personnel. All prescribed burners and crew leaders (burn bosses) receive formal training in prescribed burning. The following coursework is required:

- WILDLAND FIREFIGHTERS COURSE S-130 / S-190 – (prescribed burners and crew leaders)
- GEORGIA AND ALABAMA FORESTRY COMMISSION PRESCRIBED BURN MANAGER CERTIFICATION PROGRAM - (crew leaders only)

5.3.4 Burn Rotation

Prescribed fire is used primarily for the benefit of fire-dependent species, plant communities and ecosystems, but is also beneficial to many other forest communities and ecosystems that typically require a much longer fire return interval. The prescribed burn rotation goal is to treat all RCW Habitat Management Units (HMU) with prescribed fire at least every three years in accordance with the 2007 *Management Guidelines for the Red-cockaded Woodpecker on Army Installations* (U. S. Department of the Army 2007b), and where feasible, in a manner that creates a mosaic pattern across the landscape that benefits and supports seasonal and life history requirements of non-game and game species. A landscape level approach is used accomplish burn management goals and mimic natural ecosystem processes. Natural features such as rivers, creeks, and drains and existing man-made boundaries such as roads, trails, and firebreaks take advantage of and are utilized for training area and prescribed burn unit boundary designations and dictate the size of burn units. Additionally, burn return intervals for each burn unit are dependent on the forest type, forest litter (available fuel), ground cover vegetation, the extent of hardwood encroachment, and the ability to control hardwood encroachment. For example, in burn units dominated with mixed stands of loblolly and shortleaf pine burn intervals of up to three years may be used to allow for adequate build up of available fuel to carry fire. On the other hand, if the forest type is predominantly longleaf pine or a mixture of longleaf and loblolly pine the interval may be decreased to two years because these tree species produce more litter or pine straw (fine fuel or one-hour time lag fuel) to carry the fire making them more compatible with a shorter burn rotation. Burn units that are susceptible to an increased occurrence of wildfires due to the military training mission may be placed on a one or two year fire return interval for proactive wildfire containment, asset protection, and smoke management objectives.

5.3.5 Burn Season -- Location and Prioritization of Burn Units

Prescribed burning of the understory is conducted during the dormant and growing seasons. The primary burn season occurs from mid-December through August, but prescribed burning can occur year-round dependent upon management objectives.

Burning is coordinated with LMB and CB program managers. The location of burn units (Figure 5.3.1) is identified and prioritized based on USFWS requirements to include factors below:

1. 2007 Army RCW Guidelines (and the priorities therein for RCW HMU's).
2. Fire-related management needs of other listed species.
3. Burn unit (forest stand) management objectives related to the restoration or maintenance of ecological integrity.
4. Timing of timber marking and soil conservation projects (these should be planned around the burn schedule).
5. Fire-related management needs of local game species.

Prioritization and the identification of burn units is necessary due to scheduling conflicts with training, since some compartments are more inaccessible than others. Prioritization and timing of burns will also depend on long range forecasts. For example, if climatologists forecast a La Niña weather pattern it should be the goal to complete all scheduled burning early in the burning season prior to the development of drought conditions and a high drought index when burning could have detrimental effects on management objectives.
Within HMU's the burning priority is given to active RCW clusters. All clusters (active and inactive) will be kept clear of a dense midstory with the optimal goal of achieving and maintaining open, park-like stands of upland southern pine species. Other suitable habitat within HMU's, such as, foraging and replacement stands are maintained by prescribed burning sufficient enough to control hardwood growth, ground fuel buildup, and eliminate dense midstory. Prescribed burning is normally the most effective means of midstory control and is recommended as the best means of maintaining a healthy ecosystem. The goal is to conduct prescribed burning at least every three years in forest stands that contain a component of longleaf, loblolly, slash, or shortleaf pine.

Burning is conducted in accordance with applicable Federal, state, and local air quality laws and regulations. Where midstory control is required, burning is conducted in the growing season since the full benefits of fire are not achieved from dormant season burns. Winter burns are used to reduce high fuel loads prior to implementing growing season burns. The required precautions must be taken to protect cavity trees from fire damage during burning operations (U. S. Department of the Army, 2007b). Dormant season burning is used in young plantations to reduce fuel loads (hazard reduction burning) and in stands requiring the protection of natural or artificial reproduction. Dormant season burning can also be used periodically in stands where hardwoods are not a problem and the ground cover consists of grasses and herbaceous vegetation (maintenance stage).

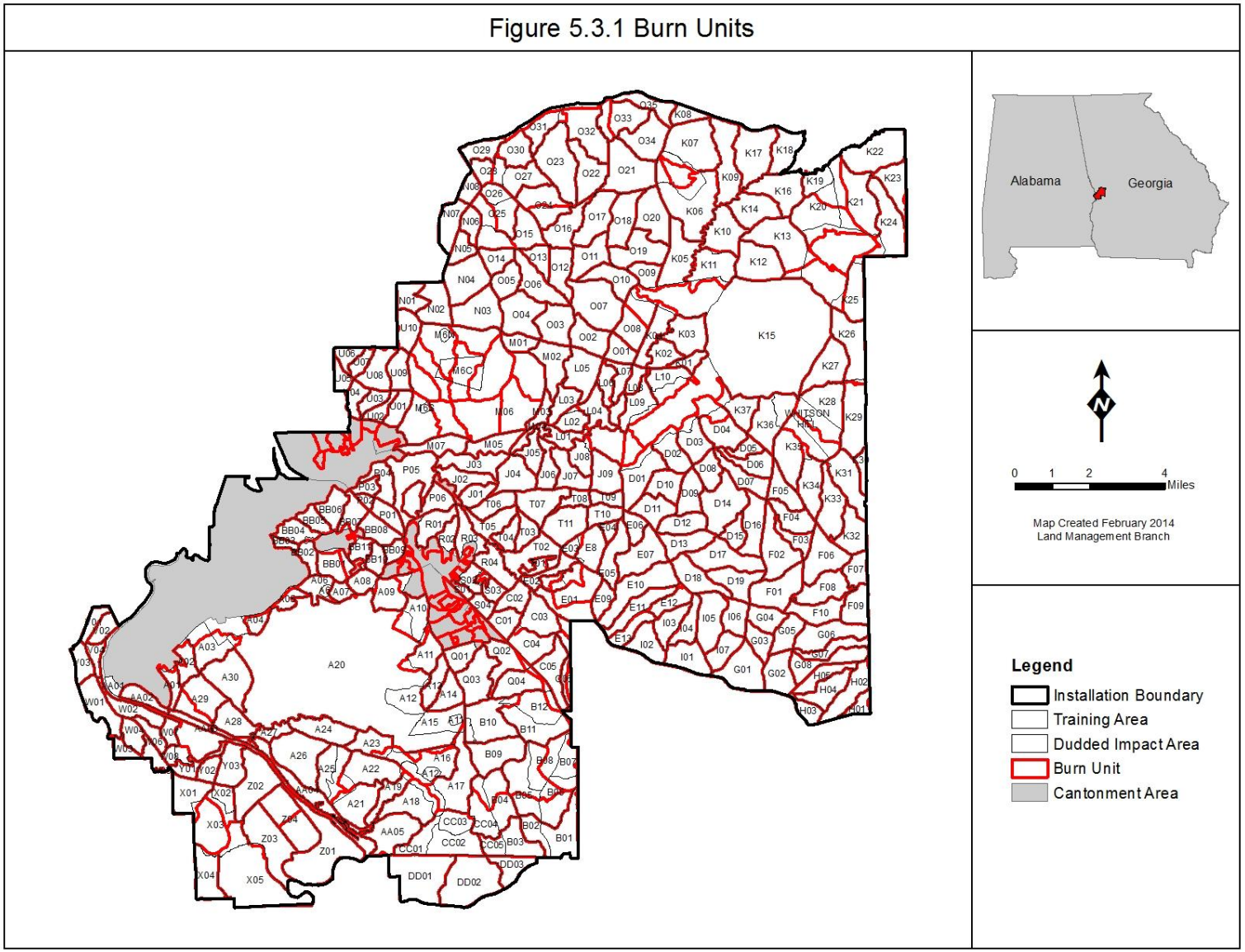
Site preparation burns are used during the growing season to take advantage of high ambient temperatures required to burn logging slash and drum-chopped vegetation in regeneration cuts. Site preparation burns are also used in the late growing season on

areas treated with herbicides to prepare the sites for tree planting. The purpose of all site preparation burning is to prepare areas for the planting of pine seedlings. Dormant season burning is used on relict trillium sites from January to mid-February prior to emergence of the plant.

Growing season burning for hardwood control and fire-dependent species versus dormant season burning for game species will require cooperation between the RCW biologist, TES biologist, and the Game and Sportfish biologist. The key point to consider in the coordination process is prioritization because it is logistically impossible to treat all areas with fire during one season, whether it be the dormant or growing season. There must be a combination of both dormant and growing season burns to accomplish natural resource management goals.

Prescribed fires promote grasses, legumes, and various annuals that provide insects for juvenile birds and seeds for adults. Although some nests will be lost to fire during growing season burns, quail and turkey will re-nest depending on how late it is in nesting season. This will spread the hatching dates for both species (Stivers 1998).

Figure 5.3.1 Burn Units



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5.3.6 Burn Area Size

Fort Benning's LMB considers the effects of growing season fire on game species, such as deer, turkey, and quail, only after burning priorities have been met for RCW HMU's and other TES habitat. The size of burn areas on Fort Benning ranges from 5 acres in the cantonment areas to 200-600 acres in training areas, with 275 acres being the average in training areas. The size of the burn areas depends on the location of man-made and natural firebreaks, such as roads, trails, creeks, and hardwood drains. The adaptive use of fire based on management objectives and prioritization will result in a more random method of burning, unlike the current method of a 3 year rigid burn rotation where the same compartments or areas are burned every 3 years. This method of burning will provide a mosaic of burned and unburned areas which will maximize "edge effect" promoting a large and varied wildlife population (Waldrop and Goodrick, 2012).

Actual burn area size is dictated by existing man-made and natural firebreaks. New firebreaks will not be plowed specifically to limit burn area size or to protect hardwood drainages and scrub oak communities. It would be logistically impossible to plow this many firebreaks while adhering to BMPs. In addition, the potential for erosion would be substantial. Another point to consider when contemplating the use of firebreaks is damage to the ecotone where TES, such as relict trillium occur. Therefore, the benefits of reducing burn area size, or excluding a hardwood drain and/or scrub oak community, would be more than offset by the soil disturbance and damage to the ecotone, as well as, the costs incurred by plowing firebreaks and correcting the subsequent soil erosion. On the other hand, firebreaks may be used during fire suppression to protect TES or unique ecological areas (UEAs).

The burn pattern that is created on the landscape will be dictated by the prioritization criteria in Section 5.3.5. In general it will take on a mosaic appearance with a diverse group of successional stages. Under ideal fire weather and smoke dispersion conditions, adjacent burn units and compartments may be burned during the dormant season. In order to accomplish this, smoke management guidelines (Mobley, 1990, revised 1996, revised by Hanby 2003) for the

Smoke Dispersion Index (SDI) must be very good (61-100) to excellent (>100). The prescribed weather parameters for wind direction, humidity, surface wind speed, mixing height, and transport wind speed must be met as well. In addition, adjacent burn units may be burned on consecutive days if there are only several compartments open for burning and the weather (primarily wind direction) dictates burning in these compartments, or, if the compartment is located on the Installation boundary and requires favorable prevailing winds that occur when a cold front or high pressure system is present. This will keep the smoke on the Installation and away from populated smoke sensitive areas located adjacent to the Installation.

In addition, burning may occur in adjacent compartments when an RCW cluster or a stand with the same forest type exists on both sides of the compartment boundary. This

will also be the case when there is no existing man-made or natural firebreak on the compartment boundary and the firebreak is located in the adjacent compartment.

5.3.7 Coordination with Natural Resource Management Personnel

Three months prior to the start of the burn season, Fort Benning's LMB begins the coordination process for the upcoming fiscal year's prescribed burns. Coordination takes place with the following LMB and CB personnel: RCW biologist (cluster locations, hardwood control locations, RCW database, GPS cavity map; TES biologist (location of threatened and endangered species and timing of burns [season]); LMB forester (locations of marked timber and timber harvest operations); reforestation technician; soil conservationist (location of watershed restoration projects); fish and wildlife team leader (location and protection of wildlife openings, such as sawtooth oaks).

In addition to post burn evaluations by forestry technicians, the RCW technicians will conduct monitoring in RCW clusters for hardwood encroachment. Fort Benning's LMB will provide information on such things as a bumper longleaf pine seed crop and the timing of a seed bed preparation burn. This information will help prioritize the timing of prescribed burning with respect to winter, spring, and summer. For example, if a bumper seed crop is anticipated, LMB would conduct a summer burn prior to seed fall in October. This removes the litter layer and exposes the mineral soil which facilitates germination of longleaf pine seeds.

In order to prioritize burning the following information will be necessary from the following program areas during the coordination process:

1. **Red-cockaded Woodpecker -** Those burn units managed under the 2007 Army guidelines in the order of HMU components specified in the guidelines, location of clusters on photos and photo copies, RCW listing, and GIS map showing cavity tree location and status. (Note: clusters within the same burn unit need to be scheduled for burning at the same time to eliminate plowing of firebreaks).

2. **Threatened and Endangered Species -** Those burn units containing other TES that may have conflicting responses to burning that favors the RCW (such as relict trillium, woody goldenrod, pickering's morning glory, and bald eagle), location of species on aerial photo and orthophoto, and specific months to burn these sites.

3. **Forest Management** - The overall stand management (restoration/maintenance) objectives related to ecological integrity and the location of timber harvesting/marking areas.

4. **Soil Conservation -** Location of watershed restoration projects and approximate month these areas will be stabilized (must plan and schedule these projects around burning schedule).

5. **Fish and Game Management** - Specific game species needs, location of sawtooth oak and other wildlife plots where fire must be excluded, and specific month these areas will be secured by disking.

5.3.8 General Procedure and Policy

The Fort Benning Prescribed Burning Operational Plan provides the day-to-day procedural guidance for the implementation of the Standard Operating Procedure (SOP) in Appendix B.2.1. The SOP will be adhered to by all LMB/CB staff participating in prescribed burning activities to ensure that quality burning is accomplished and that personnel conduct burning in a safe and efficient manner.

Fire is applied by ground crews using drip torches or all terrain vehicle (ATV) operators using burn units mounted on ATV's. The crew leader designates the burn area, firing technique, ignition/firing pattern, and the sequence of line firing. Burn units are defined by existing roads, fire breaks, drains, creeks and other man-made and natural features. Construction of new firebreaks is required where there are no artificial or natural firebreaks between burn units. This situation is the exception which minimizes the potential for erosion. When firebreaks are required erosion control practices are used in accordance with Georgia's BMP's for forestry. Back, flank, head, strip-head and/or spot fires are applied in a variety of sequences, according to burn objectives, topography, forest type, stand condition class, fuel loads (1 to 4 years) and fire weather conditions (Waldrop and Goodrick, 2012).

5.3.9 Planning and Documentation

Photographic documentation is made of the effects of fire on the vertical arrangement of understory hardwoods. A 1:25,000 scale burn map is maintained annually to show burned areas, areas to be burned, and the spatial relationship between burn areas. Prior to the burning season a prioritized list of compartments is compiled based on the management objectives and criteria in Section 5.3.5. Prescribed burns that occur in RCW clusters will be entered in the RCW database. Each prescribed burn is digitized on the GIS system. A detailed table and summary is prepared annually summarizing all prescribed burning for the fiscal year. Refer to Appendix B.2.2 for documents and forms discussed in this section that will be completed and filed on each burn.

The burn plan contains all information related to the burn unit (physical characteristics, TES , wildlife areas, and burn location), personnel, weather parameters, assets to protect, hazards, location of firebreaks, Keetch-Byram Drought Index (KBDI), SDI, ozone forecast, and evaluation of the burn appears on this form.

The KBDI is used as an indicator of drought conditions and soil moisture or the potential for 1000+ hour time lag fuels to ignite and smolder causing smoke problems. The KBDI is utilized to avoid burning during drought conditions when delayed mortality and smoke may be a problem, especially during July and August. The KBDI is considered in any decision to suspend burning during severe drought. The daily KBDI can be obtained from the GFC or the Fort Benning LMB weather station. KBDI values are updated daily.

The Burn Plan Form also shows the preferred weather parameters to follow prior to conducting a prescribed burn. It is essential to follow these parameters in order to meet management objectives. The weather parameters as they appear on the Burn Form are as follows:

Preferred	
SFC Wind / Direction	6-18 MPH
Air Temperature	(40-70 Winter, 60-85 Spring, 75-95 Summer)
Relative Humidity	20-60%
Fuel Moisture	1 HR.= 6.5-15%
Days Since Rain	1 - 10 DAYS
Transport Wind	> 9 MPH
Mixing Height	> 1650 FT
KBDI	< 500

On the day of the scheduled burn the burn boss ensures that all of the appropriate individuals, units, and agencies are contacted prior to proceeding with the burn. The list is given to the lead forester for review. It is then given to LMB chief and the LMB dispatcher. LMB sends a burn notification email each morning before a prescribed burn. The email contains the training compartment locations of the burn, wind direction, projected smoke impacts, and a map displaying the general location of the burn on Fort Benning. This email is sent to various units/agencies on Fort Benning, local county and city governments, and each state's forestry commission. The GFC and AFC are also notified by phone each morning of the burn to make sure they are aware of that day's prescribed burning activities.

Before proceeding with the scheduled burn the fire weather forecast is obtained from the GFC. The fire weather forecast is reviewed for preferred weather parameters, drought index, SDI, fog potential, and ozone levels. The burn boss ensures that basic fire weather components are measured and recorded during the peak fire weather for the day (between 1200-1400 hours). Measurements are taken with a belt weather kit and recorded on the fire weather information form.

The prescribed burning unit map shows the location of the prescribed burn area and all assets within to include RCW tree locations, phone boxes, buildings, utility poles, cemeteries, railroad tracks, longleaf pine plantations, sawtooth oak plantings, etc. This map shows the location of each cavity tree within the RCW cluster, facilitating the location and protection of each cavity tree during the burning process.

The smoke management screening form is used in conjunction with the smoke screening impact map, identifies the smoke impact distance and smoke sensitive areas within 5 to 10 chains, downwind, and down drainage of the burn area. The smoke impact distance is based on the SDI, size of burn, and firing technique. The smoke screening impact map shows smoke sensitive areas, smoke impact areas, and smoke impact distances for different smoke dispersion indices and wind directions. An example is in Appendix B.2.2.

Fort Benning complies with the Alabama and Georgia Smoke Management Plans. The smoke management plan's purposes are to implement the EPA's policy to minimize the public health and environmental impacts of smoke intrusion into populated areas from fires that are managed to benefit resources of the environment. LMB also reports prescribed burning events on an annual basis with ADCNR and GAEPD and case by case for exceptional events such as wildfires.

5.3.10 Post-Burn Evaluation and Monitoring

Forestry technicians conduct an initial evaluation of burn results within 24 hours of the prescribed burn. The findings of this evaluation are documented on the Burn Plan Form in Appendix B.2.2. This evaluation includes a determination of the amount/extent of crown scorch, adverse smoke problems, spotting problems, action taken, fire behavior, mop up required, objectives met, and erosion potential.

5.4 WILDFIRE MANAGEMENT PROGRAM

5.4.1 Wildfire Management Program Objective

The purpose of this plan is to provide guidance and direction in the prevention, detection and suppression of wildfires occurring on the woodlands and ranges of the Fort Benning Military Installation while managing for the sustainability and ecological integrity of the Installation's natural resources. Wildfires are fires that occur which are not planned or intentionally set to achieve a desired goal/objective. Fire suppression is necessary to protect lives, property, and natural resources from wildfires that occur on Fort Benning lands. Fire suppression is also necessary to contain and control wildfires within Fort Benning's boundaries, protecting adjacent lands and assets.

5.4.2 History

Wildfires, whether started by natural causes (lightning strikes) or training exercises (ordnance induced), have been an integral part of Fort Benning's history and have helped shape the current ecosystem and landscape. The current prescribed burning rotation of 3 years (implemented in FY95) has significantly reduced the threat of wildfires and reduced their occurrences and severity. Figure 5.4.1 depicts this significant trend.

During the 1930's observation towers were erected and manned by range guards to observe training exercises and detect wildfires. During the 1950's the primary emphasis of Fort Benning's Natural Resources Management Branch, later known as LMB, was fire suppression. The staff consisted of 2 foresters and 3 fire control personnel. The staff later grew in size to include 8 technicians. Crews suppressed approximately 300-500 fires a year. Prescribed burning began in the mid-1950's, with some areas being burned annually and others being burned on a three-year rotation.

Early suppression equipment consisted of hand tools, backpack pumps, 55 gallon water drums mounted on 4x4 trucks, and a weapons carrier (large jeep) mounted with a homemade plow. Wheeled tractors were later used with fireplows mounted on 3 point

hitches. The mobility and accessibility of these plows was limited. These tractor–plow units were replaced by JD-350 crawler tractors with fireplow attachments.

5.4.3 Staffing

The current workforce in Fort Benning's LMB consists of 17 personnel, with 12 assigned in a primary wildfire suppression role and serving in an "on call" status. Each member of LMB is the primary responder to a fire, with duties including initial size-up, assessment, method of attack, and suppression technique. Wildfire detection is the responsibility of the dispatcher. In the absence of the dispatcher, members of LMB rotate in performing dispatcher duties. Members of the Fort Benning's CB provide assistance on an as needed basis, with six personnel serving with "on call" status.

The Fort Benning Fire Department has additional resources that can be called upon. The fire department provides support in suppressing fires that occur on roads and highways. Support is also provided on woodland fires located in the cantonment areas and grass or woodland fires located on ranges.

According to MCoE Reg. No. 350-19 Chapter 5-21 Range and Terrain Regulations, all military personnel present at the fire scene will be available for assistance in the suppression of that wildfire. Military personnel should begin initial suppression activities on training fires that occur in their area of operation. Frequently, military units suppress training fires prior to the arrival of LMB personnel.

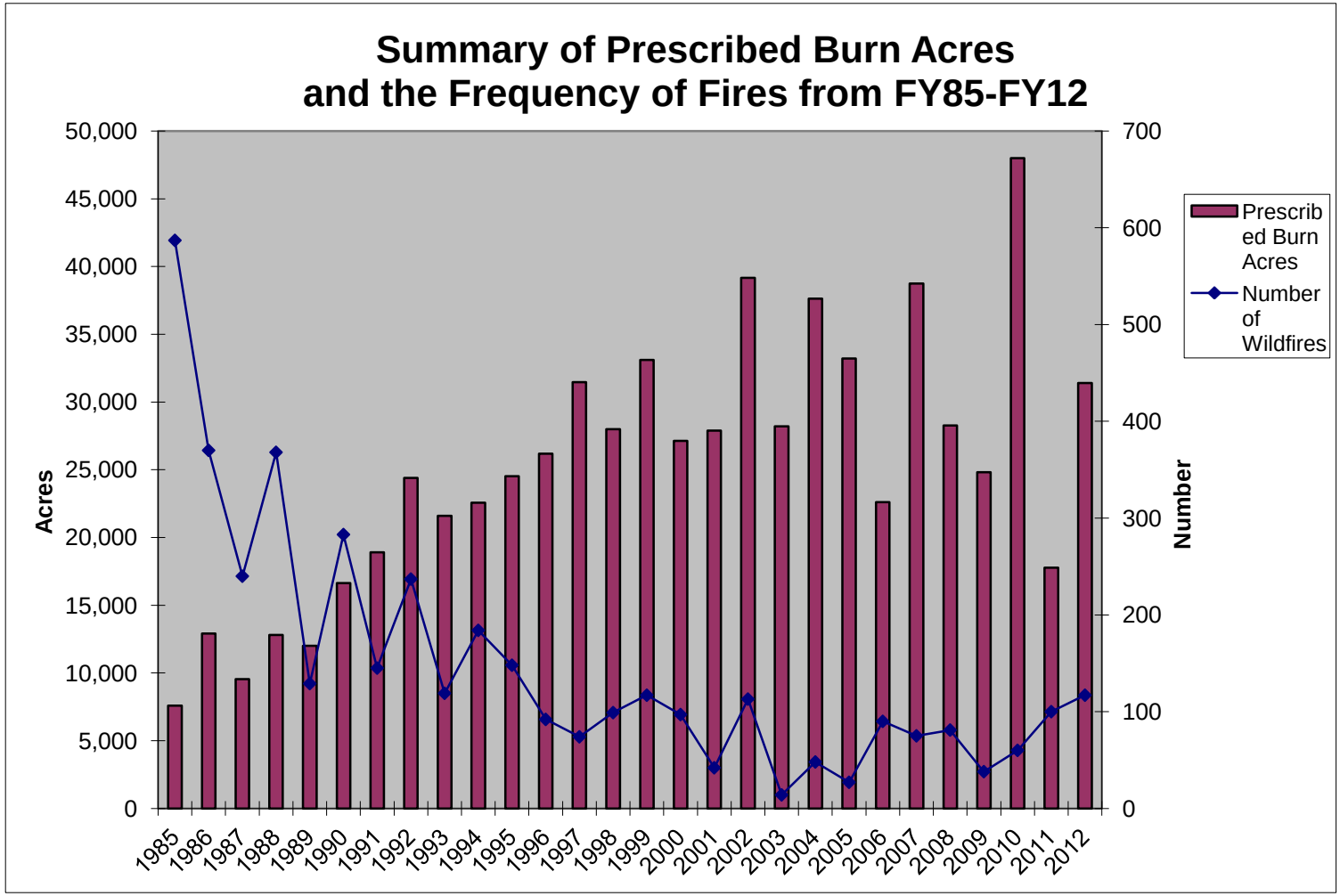


Figure 5.4.1. Summary of prescribed burn acres and the frequency of wildfires from FY1985 – FY2012.

5.4.4 Equipment

A variety of equipment is required to efficiently detect and suppress wildfires. New technology should be tested and proven as needed to ensure that wildfires are suppressed efficiently and safely.

5.4.4.1 Fire Detection Equipment

There are currently two fire towers that are available for fire detection. The primary tower is located in the Natural Resources motor pool located at First Division Road and Highway 27/280. This tower is equipped with an Osborne Fire Finder (alidade) and a 1:50,000 map of Fort Benning. A contractual agreement exists between DPW/LMB and the GFC on the manning of the GFC Chattahoochee Tower. Fires are located in cooperation with the GFC fire tower using the triangulation method. A map showing the location of the fire towers is located in Figure 5.4.2.

5.4.4.2. Fire Suppression Equipment

The primary fire suppression unit consists of a crawler tractor with 6-way blade and tiltbed truck. The current fleet consists of 3 tiltbed trucks and 4 crawler tractors. Additional vehicles available for fire suppression include the following: 4 - 4x4 brush trucks with water pump (300 Gallons), 11 - 4x4 pickups, 3 - 140H motor graders, 1 - D-6 crawler tractor, 1 D-7 crawler tractor and 1 – 10 T tractor with a 35 T trailer.

5.4.5 General Procedures and Policy

Wildfire management includes locating wildfires from fire towers, coordinating fire suppression activities, and dispatching personnel and equipment to the fire scene. The fire suppression function is synonymous with fire fighting and includes containing, controlling, and mopping up wildfires. Fire suppression is accomplished through the combined efforts of vigilant fire detection and rapid response of a well-equipped fire-fighting team. A detailed Standard Operating Procedure for wildfire detection and suppression activities is included in Appendix B3.

5.4.5.1 Fire Danger Rating

Wildfires occur in direct correlation with the fire danger rating and the intensity and type of military training. The fire danger rating is computed from weather conditions, such as humidity, wind speed, and rainfall. The fire danger rating consists of 5 categories with category 1 being low and category 5 being extreme fire weather. The fire danger rating table can be found in the MCoE Regulation 350-19.

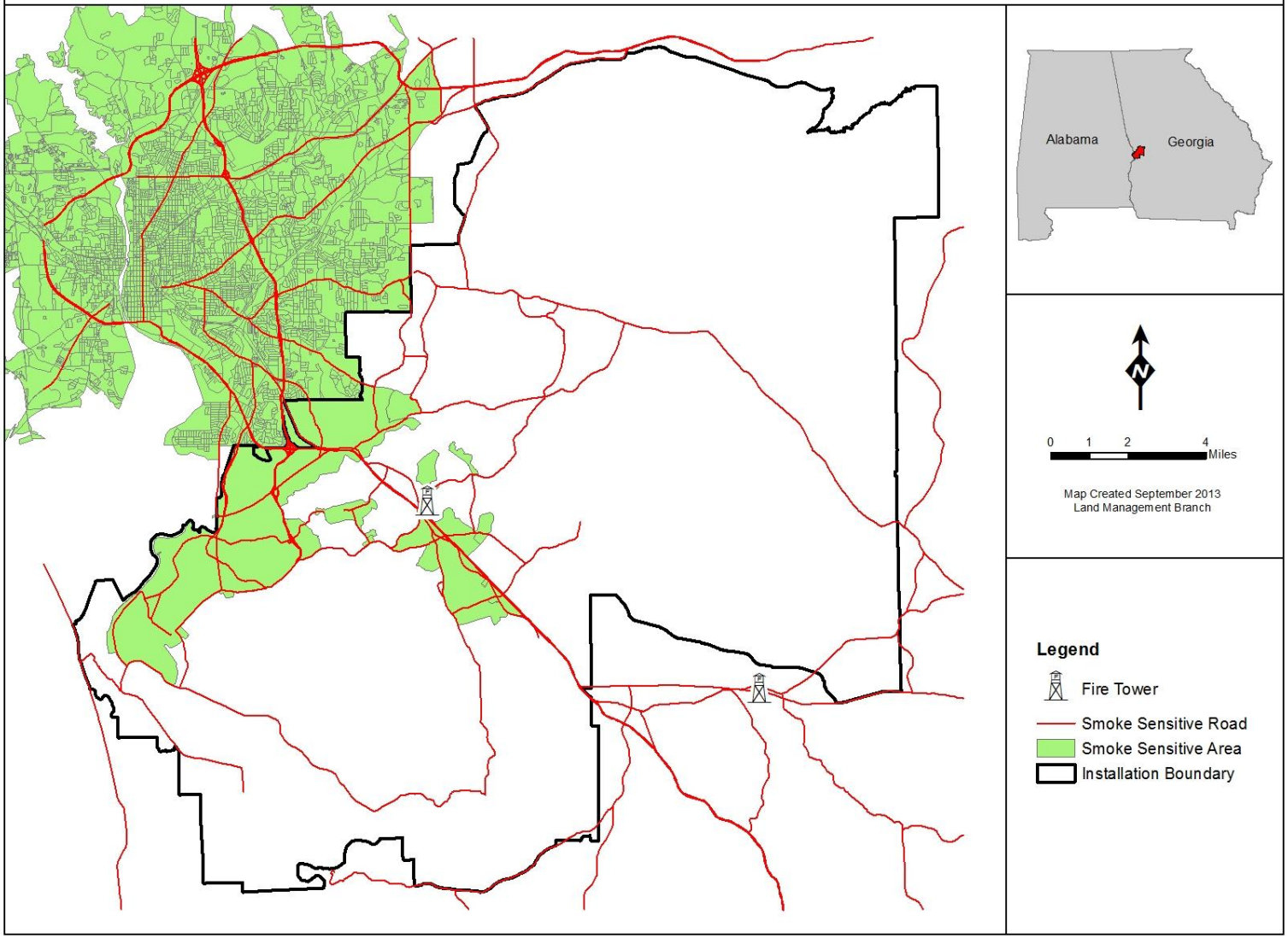
The fire danger rating is used to plan manning activities for detection and suppression. The Fire Danger Rating is calculated at 1300 hours EST because this is when peak fire weather occurs. On class 1, 2, and 3 days normal operations such as prescribed burning, trail maintenance, and equipment maintenance can be conducted. On class 4 and 5 days all LMB personnel are on alert for fire suppression activities. Normal operations may cease at lunch time and a stand-by crew is designated for the afternoon. The dispatcher will ensure that MCoE regulation 350-19, Chapter 5-21

Range and Terrain Regulations is followed concerning the proper notification and coordination of the Fire Danger Rating with Range Control Division. Notification will occur when the fire danger rating reaches a category 4 or 5. Range Control will then notify units in the field to suspend the use of pyrotechnics/incendiary devices.

5.4.5.2 Fire Detection

Early detection is essential for the safe and effective suppression of wildfires. Manning of the fire tower will be based on the Fire Danger Rating. On Class 1 and 2 days, spot checks from the main fire tower will be performed for the detection of wildfires. On Class 3, 4, and 5 days the main tower is manned from 1200 to 1600 hours during the week. On class 3 days the tower is manned on weekends as needed. On class 4 and 5 days the GFC mans the Chattahoochee fire

Figure 5.4.2 Smoke Sensitive Areas and Fire Towers



tower on weekends and holidays from 1200 to 1600 hours as required by the contractual agreement. If wildfire occurrences are extremely high, LMB personnel will also man the main fire tower on weekends and holidays. If manpower is a problem, spot checks can be performed from these towers, instead of manning them. The dispatcher maintains communications with Fort Benning LMB personnel, range control, and the GFC. The fire detection log located in the main tower is completed each time the tower is manned, and the time and location of all detected smokes are recorded in the log book. The dispatcher will follow the Fire Tower SOP.

5.4.5.3 Wildfire Safety

First and foremost, all fires will be fought SAFELY. The ten Standard Firefighting Orders are to be followed:

1. Keep informed on fire weather conditions and forecast.
2. Know what your fire is doing at all times.
3. Base all actions on current and expected behavior of fire.
4. Have escape routes for everyone and make them known.
5. Post lookouts when there is possible danger.
6. Be alert, keep calm, think clearly, act decisively.
7. Maintain prompt communication with your crew, your boss, and adjoining forces.
8. Give clear instructions and be sure they are understood.
9. Maintain control of your personnel at all times.
10. Fight fire aggressively, but provide for safety first.

All equipment is inspected thoroughly on a weekly basis, and daily for operational readiness. Any defects are addressed immediately. Equipment is fixed promptly or dead-lined. All personnel involved in fire suppression duties receive formal and informal training in basic wildland firefighting. During duty hours, all Fort Benning LMB personnel are prepared to respond to any wildfire.

Fort Benning has the following additional safety requirements not associated with normal fire suppression activities:

Duds: Unexploded ordnance (UXO) may be found across the Installation, and even outside of designated dud / impact areas. If duds are encountered they are marked and reported to Range Control and the Explosive Ordnance Disposal Company (EOD). EOD personnel will confirm the status of the dud and take appropriate action.

Dudded, Restricted Access, and Down Range Areas: Wildfires in dudded impact and restricted access areas will be allowed to burn, but are monitored and contained within the firebreaks or the existing roads that surround them. Wildfires that threaten troops on the firing line, equipment, and range buildings are suppressed. Permanent firebreaks are maintained to prevent fires from burning out of the impact and range areas and encroaching on range firing positions. Before entering a range area to suppress a wildfire, approval is obtained from range control. Personnel must wait for range control

to put units on check fire before entering. Personnel must notify range control after suppressing the fire and clearing the range so firing may resume. Fires occurring in the A-20 impact area have their own set of procedures, due to the terms and conditions stated in the MCoE BO. Refer to the A-20 Wildfire Suppression Plan and the A-20 Wildfire SOP located in the RCW ESMC (Appendix E1), when fires are located in this area.

Barricades and Obstructions: Many different devices are used by the military to slow and impede the movement of the simulated enemy: concertina wire, barbed wire, pits, and wooden or steel barricades. Crews should be aware of these obstacles and reduce speed accordingly.

5.4.5.4 Fire Roster

Twelve members of Fort Benning's LMB serve in an "On Call" status on the fire roster. Perrsonnel from Fort Benning's CB, who have met training requirements and are willing to volunteer, are also placed on the fire roster. The purpose of this roster is to provide manning for fire suppression after regular duty hours, weekends, and holidays. Individuals who are "On Call" may be contacted at any time during this period by cellular phone. Cellular phones are provided to allow mobility. However, "On Call" personnel must respond within 45 minutes. Rosters are updated every four months and distributed to all organizations needing to communicate and coordinate wildfire information (LMB and CB personnel, Range Control, Military Police, Fire Department, E-911 and the GFC).

5.4.5.5 Initial Attack and Size-Up

All wildfires are checked on the ground after detection. Upon initial attack, the fire boss ensures the fire is fought safely and efficiently. The fire boss is responsible for all decisions made with respect to the fire, including whether to suppress it or let it burn. The fire boss decides where to attack, method of attack, equipment needed, additional resources needed, personnel that need to be notified, and mop-up action. The fire boss is also responsible for all paperwork required for the fire. During duty hours all LMB personnel are in a state of readiness.

5.4.5.5.1 Let Burn

A "Let Burn" policy will be followed when practical. "Let Burn" means fires are allowed to burn if no assets, personnel, RCW's, or smoke sensitive areas will be jeopardized by the fire. Smoke sensitive areas are highways, cantonment areas, populated areas, creek or railroad crossings on roads, hospitals, schools, etc. During the period from late August through October, delayed mortality must be considered prior to letting a fire burn, especially in and around RCW clusters. Delayed tree mortality can be directly correlated to the KBDI. Caution must be exercised when the KBDI exceeds 500. Fire intensity must also be considered. For example, if a fire is burning intensely (torching/crowning out) with the potential to damage the resource it should be suppressed. This policy will protect the resource and allow wildfires to burn naturally determining the characteristics of the ecosystem, landscape, and ecotones.

5.4.5.6 Areas of Special Consideration

RCW clusters, sensitive areas (gopher tortoises, and archeological sites), streamside management zones, and gullies, are treated with caution when firebreaks are installed. The goal is to avoid putting firebreaks in these areas. However, if firebreaks are required, NPDES and Forestry BMPs are utilized to minimize damage and erosion. All firebreaks will be installed using Georgia's Best Management Practices for Forestry.

5.4.5.7 RCW Clusters

Due to the sensitive nature of RCW clusters, additional fire suppression activities are needed. When a wildfire jeopardizes an RCW cluster, an RCW technician is notified, when available, to assess the threat and to prevent damage to that cluster.

5.4.5.8 Mop-Up

Mop-up is the action taken after the fire has been suppressed. Mop-up is conducted to prevent the fire from spreading or spotting across firebreaks or control lines. It is also done to reduce smoke hazards in or near smoke sensitive areas. Ordinarily, mop-up consists of two actions: (1) patrolling control lines and extinguishing those fuels with the potential to spot over a control line, and, (2) minimizing the residual smoke hazard resulting from the smoldering process. The following techniques will be used in the mop-up process:

- Start mop-up as soon as line construction and burnout are complete.
- Mop-up perimeter and entire area if accessible on small fires.
- Mop-up perimeter on large fires.
- Fell all burning snags or green trees (chainsaw or dozer) which could result in spotting across control lines.
- Patrol control lines looking for a spot over.
- Consider the potential for problems from green trees (hollow or cankers), snags, rotten logs, stumps, vines and fuel concentrations (slash piles and log decks) adjacent to control lines.
- Use dozers and pumper trucks in conjunction with hand tools if possible.
- In cases where access is limited due to rough terrain dozers will be utilized to cover stumps with dirt to stop the smoldering process and minimize smoke.

5.4.5.9 Fire Prevention

The major cause of wildfires at Fort Benning are incendiary training devices. Fire prevention consists of suspending the use of these devices during fire danger ratings 4 and 5. When a class 4 or 5 rating is reached, the dispatcher notifies range control, who in turn notifies training units to suspend the use of incendiary devices in accordance with MCoE Regulation 350-19 Chapter 5-21. In addition, each unit has a designated fire marshal to coordinate suppression activities when a training fire occurs. In all cases units are responsible for attempting to suppress fires caused by training activities.

5.4.5.10 Cantonment and Urban Interface Areas

Fires in these areas require special attention and awareness. Due to the close proximity of people and property to the Installation boundary extra care must be taken to ensure that the threats of fire and smoke hazards are minimized. The Fort Benning Fire Department is notified for firefighting assistance in cantonment or range areas. All wildfires in cantonment areas are suppressed to protect life, property, and to reduce smoke hazards with respect to health and motorist visibility. If a smoke hazard is anticipated in the cantonment area or on a highway, smoke signs with flashing lights are posted to alert motorists. If a wildfire threatens areas off the Installation or already has crossed the boundary, the Columbus Fire Department and/or the GFC are notified, depending on the location of the fire. Smoke-sensitive areas are illustrated in Figure 5.4.2.

5.4.5.11 Dangerous Areas and Conditions

Fighting wildfires is inherently hazardous and safety must be exercised in all actions. Steep slopes, gullies, wetlands, and darkness magnify the hazards of fighting wildfires. For this reason, whenever possible, all fires will be suppressed with a minimum of a two-person crew. All fires will be assessed before any attack is initiated. Extra caution is necessary to prevent the roll-over of dozers. Scouting the terrain and adjusting equipment speed reduces the threat of a roll-over hazard. In addition, steep terrain affects the fire's behavior, increasing the fire's rate of spread and intensity. For this reason fire crews must exercise caution and communicate when working uphill from a fire because it may be necessary to evacuate the area at a moment's notice.

Wetlands and bogs are also found throughout Fort Benning's landscape. Scouting the area for wetland characteristics such as, vegetation and black organic top soil, and using sound judgment lessens the risk of equipment becoming bogged down or stuck. Fighting fires at night is also hazardous due to reduced visibility. Limited visibility compounds firefighting efforts making steep slopes, gullies, wetlands, and obstacles (concertina wire, foxholes, bunkers, etc.) difficult to see. Extreme caution must be exercised when fighting fires in the dark. Proper equipment lighting, communications, scouting, and judgment are required to fight fires safely at night. Lights on equipment, especially dozers, must be checked for operability prior to leaving the motor pool at night.

5.4.5.12 Safe Operation of Equipment, Transports, and Dozers

Operation of equipment and vehicles represents the greatest threat for accidents and injury. All vehicles and equipment are thoroughly inspected daily prior to operation. Knowledge, experience, and training are necessary for the proper operation of equipment and vehicles. Prior to operating equipment and vehicles personnel must be properly tested and licensed. A class "B" commercial driver's license is required to operate equipment transport trucks. A class "A" commercial driver's license is required to operate the tractor trailer/low-boy.

5.4.5.13 Documentation

The Fire Boss will ensure fire cards are thoroughly and properly completed for all wildfires. Figure B.3.1 in Appendix B3 illustrates the information required for wildfire responses. The acreage for all wildfires will be estimated or walked with a GPS unit when necessary. All wildfires will be digitized in GIS and stored in a wildfire shapefile created for each fiscal year. This file will serve as the wildfire summary database and is updated after receipt of fire cards. The military police are notified when a wildfire results in property damage. Forestry personnel will meet with military police at the scene of the fire in order to complete a police report. In addition, when any assets are burned the Chief of EMD will be notified.

5.5 THREATENED, ENDANGERED, AND AT-RISK SPECIES

There are 97 plants and animals on Fort Benning considered species of conservation concern. Of these 97 species, three are listed under the Federal ESA, two are candidate species under the ESA, and 17 are State protected.

5.5.1 Goal

The goal of this plan is to protect and preserve Federally protected, and at-risk species on Fort Benning in an ecosystem context. This is accomplished by developing management plans, defining threats, evaluating impacts of projects, and monitoring species' status. Overall goals differ by species. Recovery of RCW and relict trillium populations on Fort Benning have been deemed critical to the recovery of these species. The bald eagle is Federally protected under the Eagle Protection Act, and management for this species primarily involves habitat protection and nest monitoring. The Federally endangered wood stork is a transient species on Fort Benning, occurring during post-breeding dispersal. The American alligator is listed as threatened due to its similarity of appearance to other crocodilians. State-listed species and species at risk are managed through protection and management of the habitat in which they exist. Species at risk are species classified as candidate species under the ESA and/or critically imperiled or imperiled on a global scale. Listing of any of these species pursuant to the ESA could have a significant impact on the military mission of one or many Army installations.

The primary objective is to move towards an integrated management strategy based on ecosystem management. Develop safeguards to ensure that management prescriptions meant to favor one species do not adversely affect other species of conservation concern or disrupt the ecological integrity of natural communities. For bald eagles, Fort Benning will manage where possible to increase habitat suitable for bald eagles by managing forest stands within 1.5 kilometers of the Chattahoochee River to create large dominant pine trees for nesting. Monitoring of nest site to determine nesting season/period and bird use of the area will also continue. Wood stork management will focus on increasing habitat suitability where possible for wood storks. Relict trillium management will focus on monitoring and protection of current locations.

5.5.2 Policy and Guidance

The ESA of 1973 is the predominant Federal statute governing the TES Program. Other Federal laws/regulations that relate to the TES Program include:

(1) 32 CFR Parts 650.1–650.13 applies to all Army properties, leases, and activities supported by Army funds. In general, these rules mandate compliance with Federal law and prescribe cooperation with state environmental authorities.

(2) National Environmental Policy Act of 1969 requires all Federal agencies to consider the environmental impact of proposed Federal undertakings, including any adverse impacts on threatened and endangered species.

(3) Bald Eagle and Golden Eagle Protection Act requires protection of bald and golden eagles.

(4) The Sikes Act, Public Law 99–561, Title 16, U.S. Code (USC) 670a–670f (as amended through 2011) requires installations to manage natural resources and to develop and implement, in cooperation with the USFWS and the state(s), an INRMP that provides for sustained multiple use and public access provided such access does not conflict with military land use, security requirements, safety, or ecosystem needs.

(5) The Fish and Wildlife Conservation Act of 1980, Public Law 96-366, Title 16 USC 2901 et seq., promotes state programs for the purpose of conserving, restoring, or otherwise benefiting nongame fish and wildlife, their habitats, and their uses.

Army regulations that apply include AR 200–1 (Environmental Protection and Enhancement, 13 December 2007), which states: “the goal of the Army is to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species.” AR 200–1 implements within the Army the requirements of the ESA. The regulation requires Endangered Species Management Components (ESMCs) for listed and proposed species and critical habitat, a 100 percent inventory of suitable habitat for listed and proposed species that may occur on the installation, and an initial thorough inventory of plants, fish, wildlife, and habitats on installation lands.

5.5.3 Program Activities

Table 5.5.1 lists all of the threatened, endangered, and state protected species based on their current status. Other species of conservation concern that are known to occur on Fort Benning are included in Appendix A2, Table A.2.1.

Brief summaries of the Federally protected species found at Fort Benning are provided in this section. For additional information on management of these Federally protected species, refer to the ESMCs of this INRMP in Appendix E.

5.5.3.1 American Alligator

Current Species Status: The American alligator (*Alligator mississippiensis*) is listed as threatened by the USFWS due to its similarity of appearance to other crocodilians. From a range-wide perspective, the alligator is presently considered to be biologically secure and is no longer protected under the ESA.

Habitat Requirements and Limiting Factors: Alligators prefer river systems, canals, lakes, swamps, bayous, and coastal marshes. Fort Benning is on the northern limit of the range for the American alligator, and there is a small, but stable population that can be found in most of the larger ponds on the Installation as well as the backwater areas of the Chattahoochee River around the River Bend area up to Uchee Creek.

Management Objectives: Management will be for the protection and enhancement of existing populations and their habitat on the Installation.

Conservation Goals: The conservation goal will be to maintain the existing populations found on Fort Benning and continue to monitor the population.

5.5.3.2 Bald Eagle

Current Species Status: The bald eagle (*Haliaeetus leucocephalus*) is protected under the Bald Eagle and Golden Eagle Protection Act. Two nesting pairs are known to occur on Fort Benning. The two nesting pairs are located in Training Compartments E-1 and AA-04. The southern population of the bald eagle nests primarily in the estuarine areas of the Atlantic and Gulf coasts from New Jersey to Texas and the lower Mississippi Valley. The southern population of the bald eagle can be found throughout the lower 48 states as migrating or over-wintering birds. The species is vulnerable to several activities on the Installation: low flying aircraft, timber harvest, human disturbance, and military training.

Habitat Requirements and Limiting Factors: Bald eagles prefer forested areas adjacent to large bodies of water, such as lakes, rivers, and reservoirs. Limiting factors include habitat destruction and degradation, environmental contaminants, and illegal shooting.

Management Objectives: Management will be for the protection and enhancement of existing populations on the Installation and expansion into unoccupied suitable habitat.

Conservation Goals: The goal will be to maintain at least the current level of nesting and foraging habitat through forest management and habitat protection and to increase the number of nesting pairs to two with each nest producing at least one fledgling.

Table 5.5.1 Threatened, Endangered, and State Protected Species

Scientific Name	Common Name	Status	State Occurrence
Federally Protected Species			
Haliaeetus leucocephalus	Bald eagle	FP	Georgia
Mycteria americana	Wood stork	E	Alabama/Georgia
Picoides borealis	Red-cockaded woodpecker	E	Georgia
Alligator mississippiensis	American alligator	T (S/A)	Alabama/Georgia
Trillium reliquum	Relict trillium	E	Georgia
Arabis georgiana	Georgia Rockcress	C	Alabama/Georgia
Gopherus polyphemus	Gopher tortoise	C	Alabama/Georgia
State Listed Species			
Columbina passerina	Ground dove	SP	Alabama/Georgia
Cyprinella callitaenia	Bluestripe shiner	T	Alabama/Georgia
Geomys pinetis	Southeastern pocket gopher	SP	Alabama/Georgia
Graptymys barbouri	Barbour's map turtle	T	Alabama/Georgia
Macroclemys temminckii	Alligator snapping turtle	T	Alabama/Georgia
Arabis georgiana	Georgia rockcress	T	Alabama/Georgia
Croomia pauciflora	Croomia	T	Alabama/Georgia
Myriophyllum laxum	Lax water-milfoil	T	Alabama/Georgia
Nestronia umbellula	Indian olive	T	Alabama/Georgia
Sarracenia rubra	Sweet pitcherplant	T	Alabama/Georgia
Stylisma pickeringii pickeringii	Pickering's morning-glory	T	Alabama/Georgia
Myotis austroriparius	Southeastern myotis	SP	Alabama/Georgia
Pituophis melanoleucus mugitus	Florida pine snake	SP	Alabama/Georgia
Heterodon simus	Southern hognose snake	SP	Alabama/Georgia
Brickellia cordifolia	Flyr's nemesis	T	Georgia
Sarracenia psittacina	Parrot pitcherplant	T	Georgia

[1]**Legend:** E = Endangered; T = Threatened; FP = Federally Protected; S/A = Due to Similar Appearance; SP = State Protected; C = Candidate for Federal Protection (Alabama no longer lists species as threatened or endangered. The state designates a species as SP if it is protected under state regulations)

5.5.3.3 Red-Cockaded Woodpecker

Current Species Status: Currently, there are 367 manageable RCW clusters at Fort Benning, 357 are active with 332 potential breeding groups and 10 are inactive as of 2013 breeding season data (Figure 5.5.1). To date, no RCW populations are known to occur outside of the immediate Installation boundary, although one active cluster is located on property belonging to the City of Columbus due to the land swap between Fort Benning and the City of Columbus in 2002. The nearest managed RCW population on public land is the Hitchiti Experimental Forest/Piedmont National Wildlife Refuge/Oconee National Forest population approximately 90 miles east-northeast of Columbus and is considered a secondary core population according to the 2003 Recovery Plan.

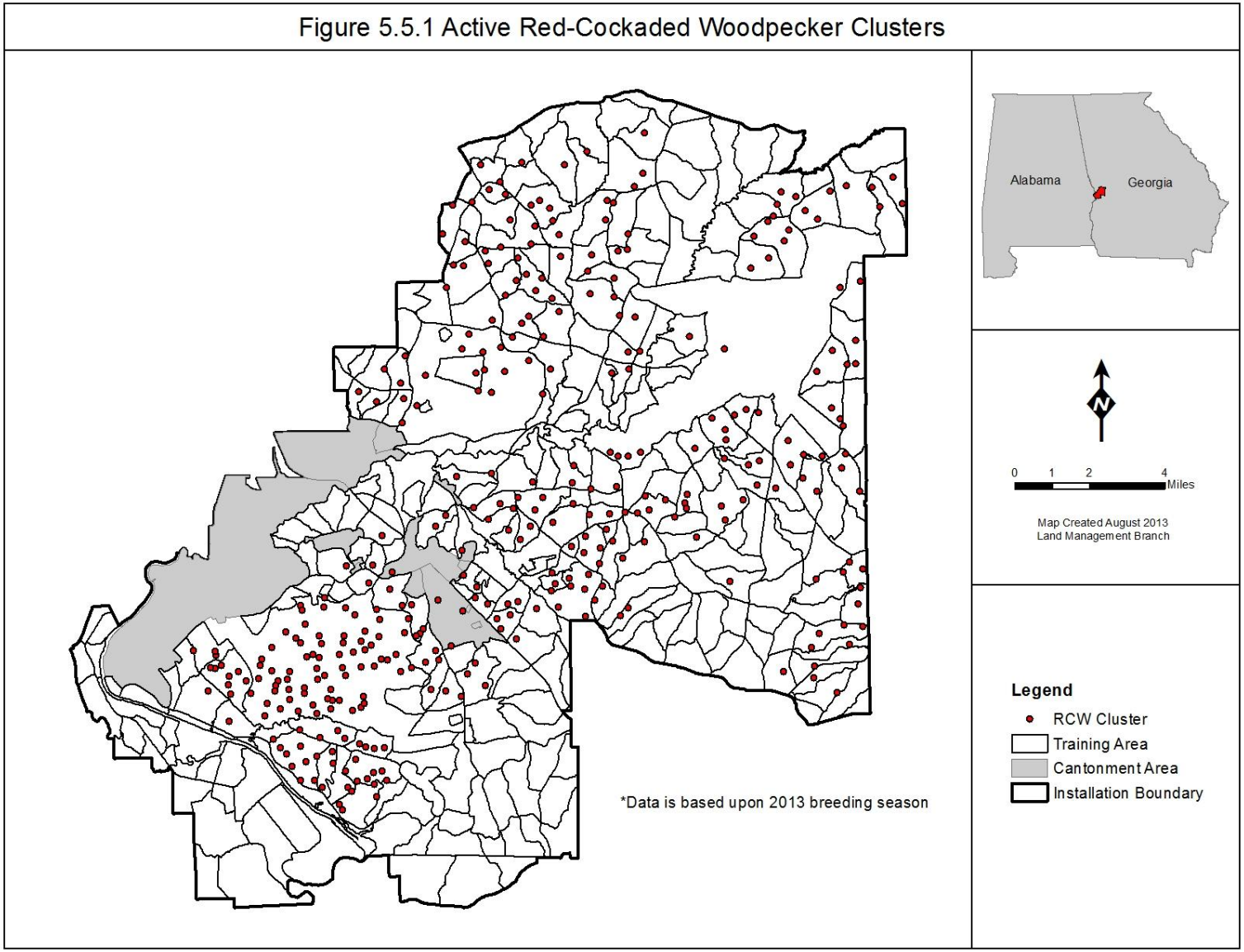
Habitat Requirements and Limiting Factors: According to the 2003 RCW Recovery Plan, it takes 30 years of growth for pine seedlings to mature to a point that they are considered suitable foraging habitat for RCWs; 60+ years before they are considered suitable nesting habitat. The primary limiting factor for the RCW is availability of suitable cavity trees. Encroachment of hardwoods due to the exclusion of fire has also degraded RCW habitat. Management tools such as the installation of artificial cavities, prescribed burning, and mechanical/chemical control of nesting and foraging habitat are necessary for the continued expansion and existence of the RCW.

Management Objectives: Management will be for the protection and enhancement of the existing RCW population on the Installation and expansion into unoccupied suitable and potentially suitable habitat consistent with training mission requirements and requirements of the ESA/Recovery Plan.

Conservation Goals: The RCW management goal is to recover the Fort Benning RCW population and eliminate conflicts with the training mission by eliminating the need for training restrictions.

The Installation's Recovery Goal is 351 potential breeding groups (PBG). This is the number of groups that will be necessary to have a recovered population according to the USFWS 2003 RCW Recovery Plan. Current data suggests that in order for Fort Benning to reach this goal, it will be necessary to have at least 386 cluster sites on the Installation. This recovery goal is derived from and can potentially adjust according to the past five years of breeding season and cluster inspection data. Although the population goal is 386 clusters, the habitat at Fort Benning can potentially support 410 clusters. Creating additional clusters will satisfy the difference. Recruitment clusters will be created via installation of boxes or drilled cavities. Additionally, naturally occurring budded and pioneered clusters will also be designated as recruitment clusters (DA 2007b). Recruitment clusters will either be Protected Clusters (PC) (marked with boundary signs) or Unprotected Clusters (UC) (no boundary signs). UCs will not be subject to training restrictions, so they should not adversely affect the training mission. These clusters will be located in areas where mission-related impacts should prevent the installation of a PC with restrictions. Existing natural clusters can also be either protected (PC) or unprotected (UC).

Figure 5.5.1 Active Red-Cockaded Woodpecker Clusters



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5.5.3.4 Relict Trillium

Current Species Status: Relict trillium (*Trillium reliquum* Freeman) is listed as endangered by the USFWS. Five relict trillium sites are known to occur on Fort Benning. The species occurs primarily in undisturbed moist hardwood forests in limited portions of Alabama, Georgia, and South Carolina. The 1994 USFWS BO states the Fort Benning populations may comprise a significant portion of the protected populations and are essential for the recovery of the species. The species is vulnerable to several activities on the Installation such as fire and timber harvesting and is threatened by feral swine and invasive plants—Japanese honeysuckle (*Lonicera japonica*) and kudzu (*Pueraria lobata*).

Habitat Requirements and Limiting Factors: The species is typically found in mature, undisturbed hardwood stands. The major limiting factor is the availability of suitable habitat.

Management Objectives: Management will be for the protection and enhancement of existing populations on the Installation.

Conservation Goals: The conservation goal is to maintain the existing populations found on Fort Benning and to continue surveying for new populations.

5.5.3.5 Wood Stork

Current Species Status: The wood stork (*Mycteria americana*) is listed as endangered by the USFWS. Wood storks are a transient species on Fort Benning, occurring during their post-breeding dispersal. Wood storks breed in Florida, Georgia, Alabama, and South Carolina. The biggest influence on wood storks present on Fort Benning is the water level manipulations conducted by USACE on the Chattahoochee River. These water level manipulations influence the availability of forage fish for the wood stork to feed upon. The major threat on the Installation is the degradation of wetland habitat, resulting in the loss of foraging areas.

Habitat Requirements and Limiting Factors: Wood storks use a variety of freshwater and estuarine wetlands for nesting, feeding, and roosting. Limiting factors include loss of feeding habitat, water level manipulations affecting drainage, predation and/or nest tree regeneration, and human disturbance.

Management Objectives: Management will be for the protection and enhancement of existing populations on the Installation.

Conservation Goals: The conservation goal is to maintain an after-breeding transient population and the necessary wetland foraging habitat.

5.5.3.6 Georgia Rockcress

Current Species Status: *Arabis georgiana* (Georgia rockcress) is state listed as threatened, but is a candidate for Federal listing. The Georgia rockcress is a short-lived perennial herb in the family Brassicaceae [Cruciferae] known extant from less than 25 total populations/sites in Georgia and Alabama. The species is known to occur along the banks of the Chattahoochee River within the boundaries of the Installation. These areas are dominated by relatively undisturbed hardwood corridors. All known populations of Georgia rockcress on the Installation occur where the forests give way to the steep banks of the river. The areas where Georgia rockcress occurs on the Installation have little training potential for the military and conflicts with training have not been an issue in the past. Current management efforts on the Installation for Georgia rockcress consists of habitat protection and periodic monitoring of the known populations. The species is vulnerable to several activities on the Installation such as fire and timber harvesting and is threatened by feral swine and invasive plants—Japanese honeysuckle (*Lonicera japonica*) and kudzu (*Pueraria lobata*).

Habitat Requirements and Limiting Factors: It is known to occur on rocky (limestone, shale, granite-gneiss) bluffs and slopes along watercourses, and also along sandy, eroding riverbanks hardwood stands. The major limiting factor is the availability of suitable habitat.

Management Objectives: Management will be for the protection and enhancement of existing populations on the Installation.

Conservation Goals: The conservation goal is to maintain the existing populations found on Fort Benning.

5.5.3.7 Gopher Tortoise

Current Species Status: The gopher tortoise (Gopherus polyphemus) is Federally listed as threatened in Louisiana, Mississippi, and west of the Tombigbee and Mobile Rivers in Alabama. It is listed as a candidate species by the USFWS in the remainder of its range. It is also listed as threatened by the state of Georgia. Gopher tortoises are a resident species of Fort Benning. They occur in the sandhill communities throughout most of the Installation. The largest concentrations of gopher tortoises are in the northeastern portion of the Installation. In 1998-1999 the USFWS surveyed the Installation for the presence of gopher tortoise burrows. They located over 8200 burrows on Fort Benning. Many of these burrows will used by many species of vertebrates and invertebrates, which greatly benefit from the gophers tortoise's burrowing nature. The biggest military influence impacting gopher tortoise habitat on Fort Benning is heavy mechanized training. Gopher tortoises rely on dry sandy sites to dig their burrows and for foraging habitat. These sites are also ideally suited for heavy mechanized training.

Habitat Requirements and Limiting Factors: It is commonly associated on sandy soils with a pine overstory and an open understory with a grass and forb groundcover and sunny areas for nesting (Landers 1980). There are many factors, which are limiting the gopher tortoise, but the most significant threat is the loss of habitat due to intensive land use.

Management Objectives: Management will be for the protection and enhancement of existing populations on the Installation.

Conservation Goals: The conservation goal is to maintain the existing populations found on Fort Benning.

5.5.3.8 Shinyrayed Pocketbook

Current Species Status: In 1989 the USFWS recognized *L. subangulata* as a candidate for endangered or threatened status. Williams and Butler (1994) considered the shinyrayed pocketbook to be a species of special concern in Florida. In 1994 the United States Fish and Wildlife Service (USFWS) proposed that *L. subangulata* have endangered status and in 1998 it was officially listed as an endangered species (USFWS 1994,1998). Historical records show that *L. subangulata* was once common in the main channel of the Flint and Chipola rivers, however it has not been collected from the main channel of the Apalachicola River. Brim-Box and Williams reported *L. subangulata* were found not only in tributaries of the Flint River but in tributaries of the Chattahoochee River in Georgia and Alabama. Live specimens of *L. subangulata* have been found in the Sawhatchee Creek which is a Chattahoochee tributary. *Lampsilis subangulata* was also found in the main channel of the Flint River near its headwaters, and at 4 sites in the main channel Chipola River (Brim Box and Williams 2000). There are currently no known populations on Fort Benning. The USFWS has however determined that all of Uchee Creek is considered to be critical habitat for the species.

Habitat Requirements and Limiting Factors: *Lampsilis subangulata* was reported from medium-sized creeks and rivers in clean and silty sand substrates in slow-to-moderate current (Williams and Butler 1994). Similarly, Heard (1979) found that in Florida populations of *L. subangulata* were found in muddy sand and sand in slight-to-moderate current. Clench and Turner (1956) reported that *L. subangulata* preferred small creeks and spring fed rivers. *Lampsilis subangulata* is unique because it is one of 4 mussels that produce a superconglutinate (a packet of larvae encased in a mucous tube) which is used to attract fish hosts (O'Brien et al. 1995, O'Brien 1997). Hosts fish include largemouth bass, *Micropterus salmoides*, and the spotted bass, *M. punctatus* (O'Brien 1995).

Management Objectives: Management will be for the protection and enhancement of existing habitat on the installation. Due to the designation of Uchee Creek as critical

habitat for shinyrayed pocketbook, Fort Benning will evaluate the potential impacts of any actions that might affect the quality and integrity of the creek prior to taking said action within the watershed.

Conservation Goals: The conservation goal is to maintain or improve the habitat quality within that portion of Uchee Creek that resides on Fort Benning by avoiding or mitigating adverse impacts of any action within the watershed that could have effects on the quality of habitat within Uchee Creek.

5.5.4 Initiatives

5.5.4.1 American Alligator

The major steps needed to satisfy management tasks and achieve conservation objectives are:

1. Protection of current and potentially suitable alligator habitat.
2. Annual spotlight survey to determine population levels.
3. Increase public awareness of species and its potential threats.

5.5.4.2 Bald Eagle

The major steps needed to satisfy management tasks and achieve conservation objectives are:

1. Protection of the two current bald eagle nests and any future ones through buffer zone closures and restrictions.
2. Restrict hunting, training, prescribed burning and other activities in portions of Training Compartments in and around the nest trees from December 1 to May 31.
3. Restrict low level aircraft from around nest to at least 1000 feet above highest object or 1000 feet horizontal distance.
4. Manage selected clumps of trees within 1.5 km from Chattahoochee River to create dominant pine trees and to promote large tree growth through selective cutting.
5. Monitor nesting activities for information on productivity, human disturbance, and nesting season timing.

5.5.4.3 Red-Cockaded Woodpecker

The major steps needed to satisfy management tasks and achieve conservation objectives are:

1. Manage forest ecosystems to improve RCW habitat using commercial thinning cuts, hardwood control, conservation and regeneration of longleaf pine, and other ecosystem management practices that will benefit the RCW.

2. Conduct prescribed burns on intervals of one to three years, with burns normally conducted during the growing season.
3. Use management techniques such as translocation and augmentation to increase the RCW population.
4. Enhance existing RCW clusters by provisioning artificial cavities in cavity-limited sites.
5. Create recruitment clusters/improve existing inactive clusters to promote population growth after forest habitat has been assessed and remediated if necessary to ensure sustainability of the habitat for the future cluster.
6. Protect all clusters from damage or disturbance by education, boundary marking, and inspections.
7. Maintain and improve environmental awareness of all personnel at Fort Benning, with respect to protection and habitat management goals of the RCW.
8. Monitor RCW population status and make necessary adjustments.
9. Conduct habitat improvements in protected and unprotected clusters to provide suitable recruitment sites in the future only after appropriate coordination with the military training mission and after assessment with Fort Benning's LMB on forest health and longleaf pine restoration needs.

5.5.4.4 Relict Trillium

The major steps needed to satisfy management tasks and achieve conservation objectives are:

1. Complete fencing of populations that are subject to damage from feral swine.
2. Monitor the encroachment of Japanese honeysuckle and kudzu, and initiate control efforts if needed.
3. Continue to monitor the present populations while developing and implementing additional monitoring methods.
4. Protect populations from man-made disturbances such as construction, timber harvesting, prescribed burning and wildfires during the venerable stages of plant development.
5. Continue to survey for new populations.

5.5.4.5 Wood Stork

The major steps needed to satisfy management tasks and achieve conservation objectives are:

1. Conduct annual surveys of potential foraging and roosting areas for wood storks to estimate population and identify habitats used by wood storks.

2. Monitor activities in known wood stork areas and limit any activity that would harm wood stork habitat.
3. Increase public awareness.
4. Conduct a preliminary assessment of sites suitable for water control that could be used for wood stork foraging areas will be made.

5.5.4.6 Georgia Rockcress

The major steps needed to satisfy management tasks and achieve conservation objectives are:

1. Protection of current and potentially suitable habitat.
2. Periodic survey to determine population trends.
3. Monitor current sites for disturbance and threats due to invasive species.
3. Increase public awareness of species and its potential threats.

5.5.4.7 Gopher Tortoise

The major steps needed to satisfy management tasks and achieve conservation objectives are:

1. Protection of current and potentially suitable habitat.
2. Surveys every 3-5 years to determine population densities and stability.
3. Increase public awareness of species and its potential threats.

5.5.4.8 Shinyrayed Pocketbook

The major steps needed to satisfy management tasks and achieve conservation objectives are:

1. Evaluate all actions within the watershed within Fort Benning for potential impacts to the habitat.
2. Monitor the encroachment of invasive species and consider control efforts if needed.
3. Minimize impacts to Uchee Creek from man-made disturbances such as timber harvesting, military training, and construction.

5.6 GAME AND SPORT FISH PROGRAM

Fort Benning possesses a wide diversity of wildlife habitat and correspondingly abundant populations of many game and sport fish species including white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), largemouth bass (*Micropterus salmoides*), and channel catfish (*Ictalurus punctatus*). These and many other species provide significant outdoor recreational value in the form of hunting, fishing, and wildlife viewing. Management of these

species is important to meet user demands and includes ensuring adequate enforcement of the hunting and fishing regulations, providing reasonable opportunities to hunt and fish, manipulating habitat, conducting censuses and surveys of game and sport fish populations, setting regulations, and controlling populations of selected species when needed. Table B.4.1 provides a list of game species known to occur on Fort Benning, and can be found in Appendix B4.

Laws and regulations direct the management of game and sport fish species because, in addition to their importance in providing outdoor recreational opportunities, these species also are components of the native biodiversity of the area. Feral swine (*Sus scrofa*) are not considered game species on Fort Benning. Feral swine are discussed in more detail in the Pest Management Operational Plan located in Section 5.7. They are mentioned in this operational plan because many hunters target them. Therefore, feral swine are included in the MCoE 200-3 (Hunting Regulation) to make it legal to hunt them on Fort Benning and to provide a hunting season for them. Feral swine are not a protected species under state or Federal law.

5.6.1 Game and Sport Fish Plan Goal

The goal of the Game and Sport Fish Program is to facilitate quality management of game and sport fish populations through effective management of habitat and resources consistent with mission requirements and sound biological principles to provide high quality recreational opportunities for Soldiers, Civilians, Family Members, and their guests, and the public when feasible. The program provides guidance and direction to ensure management goals and objectives are met. It addresses the biological aspects of game and sport fish management and other Conservation Branch administrative responsibilities associated with the use of 21X funds. These funds are derived from the sale of Installation hunting and fishing permits.

Some aspects of outdoor recreation, particularly hunting and fishing are the responsibility of the Program. The Program works collaboratively with The Directorate of Family, Morale, Welfare and Recreation (DFMWR) Outdoor Recreation Division and DPTMS to facilitate those opportunities.

This operational plan includes a brief overview of applicable laws and regulations, a review of the management goals and objectives and a description of some outdoor recreational objectives. The plan provides a description of the game and sport fish assets (wildlife openings, fishing ponds, and equipment), a brief description of ongoing activities, a schedule of activities for Fiscal Year 2014-2018, a list of future initiatives, and a five-year budget forecast.

The Game and Sport Fish Program manages game species, including sport fish, in a manner consistent with Fort Benning's ecosystem approach. The associated objectives include:

1. Develop and implement a game and sport fish program of appropriate scope and scale such that recreational opportunities are provided consistent with training mission requirements, listed species recovery, and the ecological integrity of the landscape.

2. Utilize scientifically based, modern game management practices, to the extent practicable, to be compatible with an ecosystem-based approach.

3. Identify habitat requirements for selected game species. Develop an ecosystem-based strategy to maintain, protect, and enhance these habitats.

4. Develop and implement management plans to achieve population objectives for selected game.

5. Monitor the population status of game species by selecting those species that are sensitive to management actions and that can act as indicators of ecological change.

6. Coordinate inventory, monitoring, management and research efforts. Share data results from such efforts with appropriate Federal and state natural resources agencies.

With the additional population on Post from the Armor School relocation to Fort Benning and other BRAC growth, program management has to be flexible and innovative to continue supporting recreational use for the community.

5.6.2 Policy and Guidance

The Sikes Act of 1960 authorizes the Secretary of Defense to carry out a program for the development, maintenance, and coordination of, wildlife, fish, and game conservation and restoration. AR 200-1 (Environmental Protection and Enhancement, 13 December 2007) states that management of flora and fauna be consistent with accepted scientific principles for conservation of indigenous species and provide access for hunting, fishing and trapping consistent with security requirements and safety concerns. It goes on to add that nongame as well as game species will be considered when planning land management activities.

5.6.3 Public Access

The Sikes Act states, "to the extent appropriate and applicable, the installation shall provide for sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources and is subject to requirements necessary to ensure safety and military security."

Due to safety and security concerns, Fort Benning limits access for hunting and fishing inside the boundaries of the Installation, except on navigable waters of the Chattahoochee River, to authorized personnel only. While unrestricted use by the general public is prohibited, Fort Benning does allow non-affiliated civilians of the general public to purchase temporary permits, of varying duration, to hunt and fish on the Installation as a guest hunter. Guest hunters must be sponsored and supervised by

an authorized participant as required in MCoE Regulation 200-3. The list of authorized participants includes:

- United States Armed Forces active duty personnel
- United States Armed Forces retired personnel
- Veterans having a service connected disability of not less than 30 percent
- Medal of Honor recipients
- Department of Defense Civilian Employees working full-time or equivalent status.
- Retired Department of Defense Civilian Employees
- Federal Civilian Employees working full-time or equivalent status on Fort Benning
- Retired Federal Civilian Employees who were employed at Fort Benning immediately prior to retirement
- National Guardsmen and Reservists who are on active status regardless of where they are assigned
- Surviving spouses of military personnel who possess a valid dependent ID card
- Foreign military personnel assigned to Fort Benning
- Primary dependents of all listed above. A primary dependent is defined as a lawful spouse or an unmarried child (including step children) who is less than 21 years old or those individuals less than 23 years old who are enrolled in a full-time course of education above high school level which receive over half of their support from the sponsor, and any child, regardless of age, living as a dependent due to disability.

Fort Benning is an area of exclusive Federal jurisdiction and public activities are regulated and limited. Safety is of paramount importance and while the safety of all hunters is a primary concern, nonaffiliated civilian hunters are relatively un-initiated with respect to military-specific safety concerns and are at greater risk. The Fort Benning landscape has numerous safety hazards including heavy track and wheeled vehicle movement including extensive night maneuvers, unmarked training compartments, insufficiently marked dud areas, deep erosion gullies, abandoned wells, abandoned concertina wire from military training, numerous wildfires and prescribed fires, and a road network that is often washed out and sometimes impassible.

Additionally, Fort Benning has four different live fire range complexes. With multiple TRADOC, FORSCOM, and SOCOM elements stationed at Benning live fire training far surpasses other installations. In FY12 over 38 million rounds were discharged which accounted for 10 million more rounds than Fort Campbell, the next highest installation. Generally speaking, Fort Benning discharges more than double the amount of ammunition expended on other installations.

There are 8 dud areas ranging in size from 5 acres to 10,000 acres. Most of these areas lack adequate signage along their boundaries. At least two soldiers and one young boy have been killed due to the handling of duds on Fort Benning. Explosive Ordnance Detachment regularly detonates duds outside dud areas due to rounds landing outside of the dud area or from historical usage.

Security is another concern. Classified training exercises conducted by SOCOM elements require strict security. Some of the equipment being used at different range complexes and training sites is security sensitive. As a result, limiting access to the Installation becomes increasingly important. There is sensitive and expensive equipment at many range sites. Due to its large size and remote locations, Fort Benning is susceptible to vandalism and theft.

Other constraints include increased training requirements and operational tempo, diminished resources to support and enforce an expansion of the hunting and fishing program, discipline limitations when dealing with nonaffiliated civilians, and liability. Fort Benning has experienced four lawsuits involving nonaffiliated civilians having serious automobile accidents who blamed military training as the cause of all accidents.
Other forms of outdoor recreation that Fort Benning offers include hiking on the River Walk, boating at Uchee Creek Recreation Area, and biking and hiking along roadsides. The River Walk is open to anyone who wishes to use it. For a nominal fee, the public can put boats in at the boat landing at Uchee Creek to obtain access to the Chattahoochee River. Additionally, Fort Benning is working collaboratively with GADNR and TNC to facilitate establishment of a Wildlife Management Area on 10,800 acres of previously purchased ACUB lands.

5.6.4 Program Activities

The game and sport fish program has been in existence for over 50 years and has undergone many changes. It peaked in the late 1960s and 1970s when there were hundreds of planted wildlife openings totaling thousands of acres, 14 managed fish ponds (with eight receiving intensive management), an active Rod and Gun Club with skeet ranges, restaurant, and tackle shop, and gun dog field trails. Today, in comparison, the scope remains relatively large with the program serving over 4000 hunters and fishermen annually.

5.6.4.1 Integration with an Ecosystem-Based Approach to Management

Under an ecosystem approach, game populations are managed consistent with and to the benefit of listed and nongame species and native plant communities. In this regard, the Game and Sport Fish Program has been scaled down from an enormous logistical effort that managed thousands of acres directly for increased game populations to a relatively small program that no longer has a primary focus of managing game populations to maximize carrying capacity. Although increased game populations are not the goal of ecosystem management, populations of game species including wild turkey (*Meleagris gallopavo*) bobwhite quail (*Colinus virginianus*), Eastern cottontail rabbit (*Sylvilagus floridanus*), and fox squirrel (*Sciurus niger*) may expand with continued thinning, prescribed fire, and longleaf establishment. However, those potential expansions will be directly tied to management unit size and distribution, particularly as it pertains to prescribed burning. Ecosystem-based management

activities which have been incorporated into the Game and Sport Fish Program are discussed below.

5.6.4.2 Wildlife Opening Planting

While wildlife openings are managed with a primary emphasis on game species they also provide valuable habitat for Neotropical migrants, small mammals and insects. Wildlife opening plantings consist primarily of fall plantings of wheat (*Triticum aestivum*), crimson clover (*Trifolium incarnatum*), and oats (*Avena sativa*) and summer plantings of browntop millet (*Urochloa ramosa*) and grain sorghum (*Sorghum bicolor)*. The major focus of the fall plantings is to attract deer and wild turkey to these openings. The summer plantings in dove fields focus on attracting mourning doves from September through December. Additionally, current management focuses on ensuring dove fields provide attraction for multiple species year round by establishing strips of winter grains as well. Currently, 55 wildlife openings are available for planting that range in sizes for a total of approximately 114 acres of plantable land. A total of nine dove fields are available for planting that range in size from approximately 5 to 419 acres for a total of approximately 119 acres. Three dove fields are in Alabama, whereas the rest are in Georgia. A list of all wildlife openings, their location, size, and other information are contained in Table B.4.2 in Appendix B.4.

A target of permanent wildlife opening acreage has been set at 300 acres. Although this represents about 10 percent of historical planted acreage, it is a reasonable goal for the current manpower and budget situation and fits in with the ecosystem approach. Several management techniques have been incorporated to further integrate game management with an ecosystem approach; including leaving field buffers of native vegetation, using no-till planting methods whenever feasible to minimize ground disturbance, and incorporating wildlife plantings into areas that are designated for specific purposes such as a power line rights-of-way or landing zones (multi-purpose areas). A list of plant species approved for planting in wildlife openings is provided in Table B.4.3 in the Appendix B.4. Adherence to this list will help to prevent the introduction of invasive species. Future site selection criteria for wildlife opening development will include:

- hunter requests,
- evaluation of currently disturbed areas such as a power line right-of-way (multipurpose area) before clearing an undisturbed area,
- selection of low ground sites before high ground sites,
- avoiding Unique Ecological Areas,
- evaluating threatened and endangered species requirements,
- evaluating ecological integrity requirements,
- logistics of maintaining the site, soil type, slope, and whether the site is a strategic location for the desired species.

The Geographic Information System will be a valuable tool in evaluating sites for wildlife openings because it will be able to display many data layers (soils, topography, location of threatened and endangered species) in a short time period to aid decision making.

5.6.4.3 Fish Pond Management

There are 14 named fish ponds that range in size from one acre to 72 acres, for a total manageable acreage of 253 acres. Seven of the 14 ponds receive active management. Management of the fish ponds includes a variety of activities that fall into four categories. These activities are:

- *Pond management:* The Fish and Wildlife Section of Fort Benning's CB has responsibility for stocking fish, liming, fertilizing, and pond balance checks by shocking and seine hauls, and aquatic weed control.

- *Support facilities:* The DFMWR, Community Recreation Division (CRD) has responsibility for outdoor recreational support facilities and structures such as picnic tables, grills, fishing piers, boat landings, and docks at Kings, Weems, Twilight and Russ Pool.

- *Grounds maintenance:* Mowing the open grassy areas around the ponds, especially those designated as outdoor recreation areas, improves accessibility and occurs as needed throughout the year. Fort Benning's LMB and CB personnel sometimes burn the open areas to help control the vegetation.

- *Dam and water control structure:* Repair and maintenance activities required on dam and water control structures are reported to DPW, and are performed by contract or in-house personnel. Periodically, water control structures are obstructed by beaver

activity, which is reported to the Chief of Conservation Branch. Beaver dams will be removed when there is a potential for damage to personnel or property.

A list of ponds, their location, size, and other information is contained in Table B.4.4 Appendix B.4.

5.6.4.4 Forest Management and Burn Plan Review

All forest management prescriptions and prescribed burn plans will be reviewed to ensure that game interests are considered in the planning process. Wildlife openings will be annotated on maps and may be used as logging decks. However, all openings utilized for logging decks will be cleared of logging slash once the harvest operation is complete so regular planting efforts can continue unabated.

5.6.4.5 Deer Check Station Operation

Hunters are required to bring all harvested deer to the deer check station on dates of mandatory deer checks as prescribed in MCoE 200-3. Generally, the opening weekend of the season is a required weekend in both Georgia and Alabama. Typically four check stations are managed where deer are weighed, sexed, aged, and various antler measurements are taken. This information is compared to previous years' to determine trends in physical condition and ultimately drive management strategies.

5.6.4.6 Census and Surveys

Various census and survey methods provide a means of determining trends in game and sport fish populations such as white-tailed deer, wild turkey, bobwhite quail, and largemouth bass. For terrestrial species, deer track counts, turkey poult counts, quail poult counts, and quail call counts may be conducted. In addition, reported deer and turkey harvest numbers are reviewed for total harvest and other information. For aquatic species, shocking, creel surveys, and seine hauls are or will be conducted. A survey of personnel who hunt and fish will be conducted every three years to help assess whether the Game and Sport Fish Program is meeting customer needs.

5.6.4.7 Hunting and Fishing Regulation Development

Annual revision of the MCoE Regulation 200-3 (Hunting, Fishing and Recreation) is the primary responsibility of the Conservation Branch. MCoE Regulation 200-3 is a Fort Benning-specific document that covers responsibilities, access, permits, fees, hunter call-in/call-out procedures, season dates and bag limits and penalties for various violations. While some policies found in MCoE Regulation 200-3 may be more restrictive than state law, all are based on and in accordance with the laws of Georgia and Alabama respectively. The goal is to publish MCoE Regulation 200-3 by 15 August each year.

5.6.4.8 Commanding General's Natural Resources Advisory Council

The objective of the Commanding General's Natural Resources Advisory Council (Council) is to keep the Commanding General advised on the scope and character of hunting, fishing, and other natural resource issues on Fort Benning. The Council also provides input to DPW pertaining to the updating and rewriting of the Hunting and Fishing Regulations. Fort Benning's CB is responsible for setting the date, time, and place of the meetings after obtaining approval from the Council President, and provides technical expertise on wildlife management and on interpretation of hunting and fishing regulations.

5.6.5 Administration

5.6.5.1 Funding

The Game and Sport Fish Program is funded from the sale of hunting and fishing permit fees. Army Policy Guidance for Fish and Wildlife Conservation Fund, 21X5095 (8 January 2002) and DFAS-IN Regulation 37-1 (June 2004) define how fees are collected and accounted for. The Sikes Act stipulates that such fees can be used only at the installation from which collected for the protection, conservation, and management of fish and wildlife, including habitat restoration and improvement, biologist staff and support costs and related activities, as stipulated in the Fish and Wildlife Cooperative Plan and INRMP. The funds cannot be used for construction of outdoor recreational structures such as fishing piers. No more than 10 percent of the annual 21X collections can be used for administration of the hunting and fishing permit sales. 21X5095 funds roll over at the end of each fiscal year if not spent.

Hunting and fishing permit fees generate approximately $90,000 annually. This annual revenue is sufficient to support current management efforts. A five-year budget projection, which only includes expenses from the 21X5095 account, by major expenditure is provided in Table B.4.5 located in Appendix B.4.

5.6.5.2 Personnel

Hunting and fishing permit sales are conducted by DFMWR CRD, which also provides viewing of the hunter safety film, and sells hunting and fishing equipment. Management of the automated telephone hunter control and game harvest reporting system (TELTRACK) is facilitated by DFMWR, Support Management Division. Fort Benning's CB manages the fish ponds, plants the wildlife openings, operates the deer check station, conducts census and surveys, develops the hunting and fishing regulations, and provides support to the Commanding General's Natural Resources Advisory Council.

Enforcement of the Installation hunting and fishing regulations as well as enforcement of state and Federal natural resources laws is the responsibility of the Directorate of Emergency Services (DES), Conservation Law Enforcement Division. The game wardens are DoD civilians, although active duty military police personnel are often detailed to provide support.

The manpower situation of the Game and Sportfish Program is less than optimal and remains in a state of uncertainty as contract support is required to facilitate adequate management of the program. One full-time Natural Resources Specialist with responsibilities beyond Game and Sport Fish management, one DA Civilian technician and one contractor technician are available to conduct program management. Currently there are sufficient rollover funds available in the 21X5095 account to fund the contractor technician position through March 2014 without required management activities suffering. Ideally, a Wildlife Biologist and two permanent Wildlife Technicians would operate the program. It is unlikely that such staffing levels could occur in the near future given funding constraints and manpower hiring ceilings. Current staffing is reasonable but not secure. For planning purposes, one more full-time Game and Sport Fish Technician is projected to be hired in the future. When funding contract support is no longer a viable option and if a second full time technician cannot be hired, additional work requirements will have to be supported by other Fort Benning CB technicians or volunteers.

5.6.5.3 Equipment

Fort Benning has sufficient equipment available for management at this time including tractors, farming implements, boats, boat trailers, boat motors, GSA fleet trucks and other miscellaneous equipment to support the Game and Sport Fish Program. Most of the major items of equipment are in relatively good working order. Several farm implements are being considered for turn-in because they are seldom used while others may need to be replaced in the coming years.

5.6.6 Initiatives

A five-year summary of game and sport fish management and administrative activities is provided in Appendix B4. Activities that typically occur on a cyclic, sporadic, or one-time basis are identified in Table B.4.6. Activities that typically occur at least once every year such as fertilizing fish ponds, working the deer check station, and planting fall openings are identified in Table B.4.7.

Some activities that are currently occurring but continue to expand and other new activities planned for the future include the following:

- *Outdoor Recreation Brochure:* This brochure will probably be a joint venture between DFMWR, CRD, Outdoor Recreation and Fort Benning's CB. It will showcase the hunting and fishing program and also include information on Uchee Creek Campground, Kings Pond Recreation Area, the River Walk, and other outdoor recreational opportunities.

- *Collaboration with National Conservation Organizations:* Organizations such as The Quality Deer Management Association, Ducks Unlimited, National Wild Turkey

Federation, and Quail Unlimited may provide management expertise, funds, seed, other supplies, and construct wildlife habitat projects.

- *Conduct Creel Surveys:* Conducting creel census at the fishing ponds is an excellent means of interfacing with the Fort Benning fishing community and can provide valuable information to help determine user desired management activities and management success.

- *Development of a Deer Management Plan:* Fort Benning is large and diverse. It seems feasible to develop a management plan that would divide the Installation into deer management units based on soil types, deer population trends, and other factors. For example, the Alabama portion of the Installation could be one hunt unit; the northern sandhills portion of the Installation could be another hunt unit, and so on. Hunting regulations would be tailored for each hunt unit such as type of firearm allowed (rifle, shotgun, bow), the harvest limit for bucks and does, minimum antler restrictions for bucks, etc.

- *Development of Management Emphasis Areas:* Management Emphasis Areas (MEA) for deer have been developed. Development of a MEA for quail or other game species will be evaluated in the future. Criteria for establishment will include support from the hunting community, ability of the Conservation Branch to handle the logistical and administrative load, and whether an MEA can be developed in harmony with ecosystem management and threatened and endangered species recovery.

- A growing disabled hunting program will hopefully continue to expand in future years. Several areas not otherwise available for hunting by the general authorized hunting population are available for use by disabled individuals and use must be scheduled through the Game and Sportfish Program.

- Overpopulation of deer and feral swine in and around Cantonment areas has created issues on Benning similar to those other municipalities are dealing with. In 2003 an initiative was developed which began allowing qualified individuals to harvest those animals to reduce negative impacts. The program has been conducted both safely and successfully and will continue to expand.

- Expand public information campaign through website postings, writing articles for the Installation's newspaper the Bayonet and Saber, as well as other media forums.

5.7 PEST MANAGEMENT PROGRAM: NATURAL RESOURCES COMPONENT

A pest can be defined as any plant, animal, or other organism (except for human or animal disease-causing organisms) in a location where it is not wanted. The natural resources component of Fort Benning's Pest Management Program addresses those pests that are of natural resources management concern, including pest management activities

associated with Fort Benning's golf course. General natural resource management considerations for all pest management activities across the Installation also are provided. Pests addressed in this plan include pest wildlife, undesirable plants and animals, and forest insects and diseases. This program supplements the Installation's Integrated Pest Management Plan.

5.7.1 Pest Management Plan Goal

A central theme of ecosystem management is the maintenance of ecological integrity—an important component of which is native biological diversity. A major obstacle to the achievement of this goal is the presence of non-native pest species, particularly invasive species. Next to habitat loss, non-natives collectively are the greatest threat to the persistence of native species that are of conservation concern. One example are Zebra mussels (*Dreissena polymorpha*), which probably arrived in the Great Lakes area as stowaways in ballast water, adhere to the shells of native freshwater mussels in such great numbers that they interfere with an individual's ability to feed, grow, move, respire, and reproduce. Native mollusk populations tend to crash within four years of zebra mussel colonization. A fungus disease, introduced from China, killed 98 percent of American chestnut trees and removed them as a functional part of the eastern deciduous forest ecosystem. Non-native plants and animals can drastically impact native species composition and abundance, alter food chains, and disrupt other ecosystem processes.

The objective is to manage problematic species to eliminate or minimize adverse impacts to natural resources. Fort Benning will strive to: implement a comprehensive and integrated pest management program (natural resources component) that conforms to the policy, procedures, and requirements specified in DoDI 4150.07; review the program strategy annually and revise as necessary; emphasize the use of Integrated Pest Management (IPM) techniques as a means to reduce pesticide risk and prevent pollution and ensure that the technical portions of contracts involving pest management reflect the methodology of IPM. Fort Benning will continue to implement a management strategy designed to eradicate or contain (to the extent attainable) kudzu and other undesirable plants with an emphasis on those invasive plant species that potentially impact listed species, undermine ecological integrity, or degrade military training activities. Fort Benning will use an appropriate ranking methodology, scientific literature, or expert opinion to identify those invasive species that should receive the priority for control measures. Continue to implement an aggressive management strategy for containment of insects and disease organisms that adversely impact the timber resources of the Installation while accounting for the potentially adverse ecological impacts caused by specific containment methods. We will strive to monitor the status of invasive plant and animal species and their impacts on natural resources. Continue to conduct IPM activities for those nuisance vertebrate animals in the cantonment areas where the Conservation Branch is responsible for promoting safety, human health, and an acceptable quality-of-life. We will continue to prohibit the purposeful introduction of

non-native animal species unless those animal species have been approved for use as biocontrol agents by appropriate Federal and state authorities.

There are 97 plants and animals on Fort Benning considered species of conservation concern due to some type of state or Federal designation, (e.g. endangered, threatened, at risk, etc.) Additionally, the Installation contains 19 Unique Ecological Areas (totaling about 21,400 acres) that represent the best potential examples of native plant and animal communities left on the Installation (perhaps in the area; see Appendix A2 for additional details). Fort Benning also is inhabited, however, by at least 150 non-native plant species (Hastings and others 1997; supplemented by information contained in reports prepared by the state of Georgia's Natural Heritage Program). Except for kudzu, the impact of non-native plant species on Fort Benning is largely unknown. Twenty-five or more plant species, however, can be considered invasive to differing degrees (see section 5.7.3.1.2). With the exception of feral swine, even less is known about the potential impacts of non-native animals.

Fort Benning also contains other important natural resource assets that could be impacted by unmanaged pest species. The Installation's vast timber resources must be protected against insect and disease outbreaks caused by both native and non-native species. Finally, besides contributing to its ability to be used for recreation, pest management operations on Fort Benning's golf course must be conducted to maintain the course's aesthetic and real property values.

If the benefits of an ecosystem management approach are to be realized fully on Fort Benning, invasive plants and animals must be identified, their distributions delineated, their impacts documented, and, if necessary, control measures taken. Additionally, measures must be implemented to prevent future introductions of currently existing and new invasive species. If new species are introduced, they must be detected early and appropriate actions taken immediately. Control efforts must be prioritized to efficiently use limited resources. Those invasive plants that pose the most potentially serious ecological threats, as well as the feral swine, should receive the highest priority for monitoring and control.

To support protection of Fort Benning's natural resource assets from the adverse effects of pests, this operational plan accomplishes the following purposes:

- identifies pest species occurring at Fort Benning, as well as those that potentially could be introduced to the Installation, and prioritizes their management
- describes the current and projected pest management activities to be accomplished under this component
- outlines the resources (that is, funding, manpower, and equipment) necessary for implementation of component activities
- identifies measures taken or planned to ensure an IPM approach to pest control

- identifies general environmental considerations applicable to control methods used in pest management
- describes the administrative, health and safety, and environmental requirements of the component insofar as the use of pesticides is concerned.

This operational plan does not cover pest management activities in the cantonment areas for cockroaches, termites, mosquitoes, and mice. Moreover, it does not address satellite installations or Installation-wide oversight of pesticide usage, storage, disposal, and record keeping; applicator certification and training; and applicator medical surveillance programs. The aforementioned are addressed in the Installation's IPM Plan. This operational plan does, however, address the preceding pesticide issues insofar as they concern the specific component activities covered in this plan.

The Installation's IPM Plan, dated March 2013, has been reviewed and approved by Army Environmental Command's (AEC) pest management consultants to ensure it includes all the provisions of the DoD Pest Management Program (DoDI 4150.07). Traditional, cantonment area pest management activities are performed by licensed pest control contractors that are certified by the state wherein business is conducted. Installation-wide oversight of pesticide usage, storage, disposal, and recordkeeping; applicator certification and training; and applicator medical surveillance programs is addressed in the IPM Plan.

In accordance with DoDI 4150.07 and AR 200–1 (Environmental Protection and Enhancement, 13 December 2007) requirements, pest management program oversight is accomplished by an individual with suitable educational background, technical knowledge, and management skills who has been designated in writing by the installation commander as the Installation's Integrated Pest Management Coordinator (IPMC). The IPMC monitors the Installation's IPM Program and provides annual reports and updates to this plan.

This operational plan does not represent a complete IPM Plan, but serves to define the natural resources component of the installation's IPM Plan. Moreover, insofar as pest management issues are ultimately issues of managing biological resources (that is, all pests are biotic organisms), this operational plan can provide an ecological contribution to the Installation's comprehensive IPM Plan.

5.7.2 Policy and Guidance

Policy and guidance for installation pest management programs and plans come in the form of DoD directives and instructions, Army regulations, AEC guidelines, and various technical information memoranda and handbooks prepared under the auspices of the Armed Forces Pest Management Board (AFPMB).

5.7.2.1 Army Regulations and Guidelines

In addition to the various DoD, Army, and Federal regulations listed in section 3.5.1, the Fort Benning pest management program also adheres to the following policy and guidance:

Department of Defense Instruction 4150.07. DoDI 4150.07 implements policy, assigns responsibility, and prescribes procedures for the DoD Pest Management Program. The instruction specifically identifies those implementation responsibilities that installations have for pest management, as overseen by the appropriate DoD component head. These responsibilities address various aspects of a pest management program, including but not limited to: IPM Plan development, self-help programs, pesticide application, record keeping, contracts, and quality assurance.

Army Regulation 40–5. In the context of this operational plan, AR 200–1 defers to AR 40–5 (Preventive Medicine, dated 25 May 2007) the requirements for protecting human health from occupational exposure to pesticides and other risks from pest management operations (DA PAM 40-11, Section 4-7.b(1)(f)1-2). Section 4-7.b(1)(f)4 of DA PAM 40-11 requires the Installation Medical Authority to review installation pest management programs and plans.

Army Regulation 215–1. The administration of pest management operations on golf courses is promulgated under AR 215–1 (Military Morale, Welfare, and Recreation Programs and Non-appropriated Fund Instrumentalities), dated 24 September 2010. Section 8-19.e of AR 215–1 provides policies and procedures that influence pest management operations at installation golf courses. In accordance with DoDI 4150.07, installation IPM Plans will include golf course pest management operations where applicable.

5.7.2.2 Armed Forces Pest Management Board Documentation

Various technical publications are available as guidance for many of the types of pest management activities conducted under this operational plan, including those conducted under contract. The AFPMB distributes these technical publications, which include:

- AFPMB Technical Guide (TG) No. 14: Personal Protective Equipment for Pest Management Personnel
- AFPMB TG 15: Pesticide Spill Prevention and Management
- AFPMB TG 16: Pesticide Fires: Prevention, Control, and Cleanup
- AFPMB TG 17: Military Handbook, Design of Pest Management Facilities
- AFPMB TG 18: Installation Pest Management Program Guide
- AFPMB TG 21: Pesticide Disposal Guide for Pest Control Shops

- AFPMB TG 29: Integrated Pest Management (IPM) in and Around Buildings
- AFPMB TG 37: Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the United States
- AFPMB TG. 39: Guidelines for Preparing DoD Pest Control Contracts Using Integrated Pest Management

5.7.3 Pest Management Program Activities

The Army NEPA regulation, (32 CFR 651, Environmental Analysis of Army Actions), specifies those circumstances that may result in a proposed action requiring an Environmental Assessment (EA) or Environmental Impact Statement (EIS). To ensure that all environmental concerns are reviewed and addressed, a Request for Environmental Analysis (REA) (FB Form 144-R; Appendix C.2) is used to assess whether an action involving a pesticide application may potentially cause a significant environmental impact. As a result, any pesticide application that has the potential: (1) to contaminate surface or ground water; (2) to adversely affect threatened or endangered species or their habitats, wetlands, or designated Unique Ecological Areas; (3) to affect human health; or (4) involves aerial application of pesticides requires submittal, review, and approval of a REA prior to treatment. If it is determined there are no significant environmental impacts, a Record of Environmental Consideration (REC) is prepared. If a REC cannot be granted, then more extensive environmental documentation and analysis may be needed should the proponent desire to continue pursuing approval of the proposed project or activity.

The preceding requirements apply to all pesticide applications that may occur at Fort Benning and not just to the program elements included in this operational plan. Additionally, any pest control operation on Fort Benning, whether the control measure makes use of pesticides or some other means, must identify the potential for secondary and non-target effects to other organisms and must be designed to preclude or minimize the risk to these organisms.

When a project or activity involves an aerial pesticide application, an aerial spray statement of need (ASSON) also is required. In accordance with DoDI 4150.07 and AR 200-1, the ASSON must be submitted to and approved by the Installation's AEC Pest Management Consultant before the application can occur. A copy of Fort Benning's ASSON can be found in Appendix B.5.2.

Pesticide applications that may adversely affect Federally TES or their habitats also may require consultation with the USFWS. Fort Benning intends that this INRMP and ESMCs will preclude the need for consultation before every pesticide application or operation that is addressed in the INRMP and occurs within the habitat of a TES. Any changes to the INRMP in regard to pesticide usage may require additional consultation. Any time the Service agrees that a pesticide application "may affect" a TES and the Installation

considers the application a DoD requirement, unless previously resolved through consultation, Fort Benning will request the appropriate level of consultation with USFWS.

This operational plan addresses those Fort Benning Pest Management Program elements associated with natural resources management—undesirable plants (including management requirements for kudzu and plant introductions); harmful forest insects and disease organisms; undesirable animals on mission lands (including management requirements for feral swine); nuisance vertebrate species within the cantonment areas; and golf course pests. A final program element addressed in this operational plan is the use of pesticides. General requirements on the use of pesticides for each of the organizational entities and its activities are addressed in this plan. Some program element activities that involve the use of pesticides may be accomplished through an offsite contractor. The Fort Benning organization administering the contract has specific oversight responsibilities associated with the pest management operations specified in the contract or lease agreement. All natural resource management activities on Fort Benning, even those not specifically addressed in this operational plan, must meet the requirements for pesticide use.

5.7.3.1 Undesirable Plants

Undesirable plants are classified by Title 7 of the USC, Chapter 61 (“Noxious Weeds”) as undesirable, noxious, harmful, exotic (non-native), injurious, or poisonous pursuant to state or Federal law. Species listed as endangered by the ESA of 1973 (16 USC Section 1531 et seq.) shall not be designated as undesirable plants and [the term] shall not include plants indigenous to an area where control measures are to be taken. Control measures are taken for that may cause economic, human health, and ecological impacts.

5.7.3.1.1 Applicable Laws, Regulations, Executive Orders, and Presidential Memoranda

In conjunction with legal requirements summarized in Sections 3.5.1 and 5.7.2.1, this section provides a brief overview of the regulatory and policy context specific to the management of undesirable plants.

Plant Protection Act. Introduced in 2000, this act consolidates pest management responsibilities that were spread over several other legislative statutes, including the Plant Quarantine Act, the Federal Plant Pest Act and the Federal Noxious Weed Act of 1974. This law is enforced by the US Department of Agriculture through the Animal and Plant Health Inspection Service (APHIS). APHIS regulates and restricts exports, imports and interstate commerce of plants, plant products, certain biological control agents, noxious weeds, and plant pests in order to protect the United States economy, agriculture, and environment.

Executive Order on Invasive Species. This particular EO No. 13112, was signed by the President on 3 February 1999. It requires each Federal agency, to the extent practicable

and permitted by law and subject to the availability of appropriations, to use relevant programs and authorities to, among other things:

- prevent the introduction of invasive species
- detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner
- monitor invasive species populations accurately and reliably
- provide for restoration of native species and habitat conditions in ecosystems that have been invaded.

Additionally, each agency is prohibited from authorizing, funding, or carrying out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions. An exemption from the preceding requirement is permitted to the DoD when the Secretary of Defense finds that exemption is necessary for national security reasons.

Presidential Memorandum on Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds. This 26 April 1994 memorandum, though not dealing strictly with the issue of introductions to natural ecosystems, directed the use of regionally native plants (as well as directing a reduction in the amount of chemicals applied) on Federal landscaped grounds. Additionally, although major restoration of natural habitats was not envisioned, part of the intent of the memorandum was to: (1) maintain and promote the existing natural habitat, (2) minimize disturbance to the natural habitat, and (3) integrate design and construction of Federal projects with the surrounding natural habitat. The guidance contained in this memorandum directly applies to the Fort Benning golf course and landscape projects.

5.7.3.1.2 Identification

Undesirable Plants Present at Fort Benning

The Center for Ecological Management of Military Lands (Hastings and others 1997) and the GADNR Natural Heritage Program have enumerated over 150 non-native plant species that occur on Fort Benning. Updates to this list can be found on the Georgia Exotic Pest Plant Council web site. These plants have varied distributions, abundance, and degrees of invasiveness. For example, Chinese tallowtree (*Triadica sebifera* [= *Sapium sebiferum*]) is an invasive species that up to 1998 had been documented at Fort Benning on only one island in the Chattahoochee River backwaters of the Z3 training compartment. Eradication of these populations would be difficult as the species has spread to other islands. Conversely, some species such as Japanese honeysuckle (*Lonicera japonica*) are

so widespread on the Installation that they are considered naturalized. Although this honeysuckle can cause significant environmental damage, eradication is not feasible; however, site-specific treatments at locations where it is impacting sensitive plants, such as relict trillium, remain feasible. Some species are conspicuous at old house sites, such as Chinese wisteria (*Wisteria sinensis*) and giant reed cane (*Arundo donax*), and appear to be spreading.

Some non-native species have been purposely introduced. Bicolor lespedeza (*Lespedeza bicolor*) was planted in wildlife openings for many years and has now escaped into the wild. Common Bermuda grass (*Cynodon dactylon*) is planted in cantonment areas and for soil conservation projects (a non seed-producing hybrid, Tifton 44, is planted at the airfield).

A complete survey of mission lands has been conducted for only one species: kudzu. Kudzu has been located at numerous sites ranging in size from 0.01 acre to 60 acres in size (see section 5.7.3.1.6 for additional details). Although most of the 150 plus non-native species occurring at Fort Benning are not invasive, a few species can cause significant ecological harm. The focus of this operational plan is the control of those invasive plant species determined to pose the most significant threats to Fort Benning's natural resources. One such species is cogon grass (*Imperata cylindrica)*, which was first discovered on Fort Benning in 2012 and is now known to exist in 4 locations on the Installation. All sites have been treated with herbicides and are thought to be under control at this time.

Ranking Undesirable Plants for Purposes of Setting Management Priorities
Several types of ranking systems have been developed to help assess the ecological threats posed by the many non-native plant species that may occur in an area (for example, see Hiebert and Stubbendieck 1993). Ranking separates the invasive from the innocuous species, categorizes the relative degree of threat posed by individual invasive species, and helps to focus management efforts on those species whose monitoring and control will do the most good. During times of lean budgets and limited emphasis on natural resource management programs, a ranking system is important because only about two to five percent of non-native plants actually are invasive.

The Georgia Exotic Pest Plant Council (EPPC) Invasive Plant List is to identify and categorize plants that pose threats to natural areas in Georgia. Natural areas are those areas that are managed to conserve or restore the native plant communities. For this list, invasive plants do not include plants that are only problems in agricultural or pastoral systems. Dr. Jim Allison of the Georgia Natural Heritage Program developed a "working" list of non-native species that is specific to the Fort Benning environment. Additionally, the Alabama Invasive Plant Council (AIPC) has its own criteria for evaluating the invasiveness of plant species. A detailed description of criteria used for ranking invasive plant species can be found in Appendix B.5.1.

Undesirable plant species management at Fort Benning is prioritized based on rankings developed by the Georgia Natural Heritage Program, the Georgia Exotic Pest Plant Council, and the Alabama Invasive Plant Council of 2007. Fort Benning's invasive plant rankings are compiled in Table B.5.1 found in Appendix B5.

Undesirable Plants Potentially Present at or at Risk to be Introduced to Fort Benning
Some undesirable plants, though actually present, may not have been identified during previous surveys. Additionally, future introductions of invasive plants to Fort Benning are possible. A draft list of invasive plants that either potentially could be introduced or whose presence may have been missed is included in Table B.5.2 located in Appendix B5. Dr. Jim Allison of the Georgia Natural Heritage Program compiled this list. The species in Table B.5.2 have a reasonable likelihood of being discovered at Fort Benning, because either they have been found relatively close by or their current dispersal pattern makes them a threat to be introduced. In either case, they are known to be invasive in habitats similar to those occurring at Fort Benning. Because of the degree of their invasiveness, some of these species are a focus for management concern now.

Invasive Plant Species that are a Focus for Management at Fort Benning
Because of the degree of their invasiveness, certain non-native species represent a particularly significant ecological threat to the natural resources occurring at Fort Benning. These species are placed on a special list, referred to as the "Least Wanted" list (Table B.5.3 located in Appendix B5). These species are a subset of those invasive plant species identified in Tables B.5.1 and B.5.2. Table B.5.3 includes species already known to occur at Fort Benning, as well as those species potentially present or at risk to be introduced. These species will receive the highest priority for monitoring and, if not currently documented at Fort Benning, for ensuring early detection. The "Least Wanted" list will be updated periodically as new information about invasive species at Fort Benning and within the region becomes available.

5.7.3.1.3 Management Elements

The overall responsibility for management of undesirable plants resides in the TES Program of Fort Benning's Conservation Branch with exception to kudzu. Kudzu control and eradication is managed by Fort Benning's LMB. Invasive plants can have adverse impacts to many natural resource management activities, but impacts to TES or the communities that support them is of paramount concern. The TES Biologist is assigned the responsibility to coordinate the program, though other program areas, such as forest management, game and sport fish management, and soil conservation management, all have critical parts to play in regard to funding, preventing introductions of non-native plants, and detecting invasive plants.

Detection and Monitoring
Before management decisions can be made concerning invasive plant species, it is necessary to know which species presently occur on the Installation and where they are

located. The Center for Ecological Management of Military Lands and GADNR, Natural Heritage Program documentation described in section 5.7.3.1.2 provide a basis for identifying those non-native plant species known to occur at Fort Benning, as well as providing at least some location information for each species.

One method that can assist in detecting species on the "Least Wanted" list is to train all field personnel, including wildlife, forestry, and soil conservation staff, in the identification of these species. To support this initiative a pictorial guide and written description of each "Least Wanted" species has been developed and provided to all field personnel. Field personnel are instructed to look out for these plants during their normal work assignments. A simple reporting form is used to notify Fort Benning's CB, Endangered Species Program when any of these species are found. TES Program personnel, as well as selected other personnel, can monitor more broadly and look out for any of the invasive plant species listed in Tables B.5.1 and B.5.2.

Control Measures

Control methods for invasive plant species will follow the principles of IPM. The IPM approach emphasizes monitoring pest populations and related damage to ensure treatments are applied only when necessary and when most effective, and also IPM stresses the use of a combination of treatments, including biological, cultural, physical, mechanical, and chemical, in a manner that achieves a high level of effectiveness while minimizing environmental impacts.

Cultural methods include reducing fire suppression and replanting forests with indigenous fire-tolerant species instead of off-site species. It is likely that the establishment of some of the invasive plant species occurring on Fort Benning was facilitated by fire suppression. A vigorous prescribed burning program, (a physical control method), should help to control these species; however, some mechanical activities, such as timber thinning operations, may stimulate invasive plants such as kudzu and bicolor lespedeza. As a result, several factors must be considered to determine which control measure is the best to use for a given plant. These factors include the life cycle and biology of the plant in question, acreage to be treated, environmental and legal constraints, logistics, cost, and timing. Control activities are conducted with in-house staff, by contract, or through cooperative arrangements (e.g., with USACE). Fort Benning's LMB has two DoD certified pesticide applicators that are qualified to oversee the use of backpack and vehicle-mounted applicator systems. One of the LMB pesticide applicators is also certified for airborne pesticide applicator systems. Fort Benning's CB has 11 DoD certified pesticide applicators that are qualified to perform, plan, and /or supervise pesticide applications.

Funding for undesirable plant control may come from several sources. These sources include the:

- U.S. Department of Agriculture, Forest Service through the AFPMB
- DoD Sustaining Our Forests, Preserving Our Future Funding Program

- U.S. Army Forestry Reimbursable Account
- DoD Forestry Reserve Account
- Fort Benning's Operations and Maintenance Account—Environmental Compliance and Prevention (OMA-ECAP) monies received from TRADOC

The U.S. Army Forestry Reimbursable Account funds are acquired solely from the sale of forest products. Some of the forest product revenues generated as a result of Fort Benning's Forest Management Program (Chapter 5.2) can be used for invasive plant control. The DoD Sustaining Our Forests, Preserving Our Future Funding Program was established in 1999 by the Deputy Under Secretary of Defense for Environmental Security to ensure that the integrity of the DoD's forested lands remains intact. Up to $50,000 may be obtained by an installation to purchase and plant native species, to remove invasive plants, and to test new sustainable forest management techniques. The Forestry Reserve Account is a DoD account that accumulates as a result of excess forest product revenues from military installations. Fort Benning can request funds from this account on an annual basis for natural resource projects including invasive plant control.

Additionally, through the 1990 *Memorandum of Agreement Between the United States Department of Agriculture and the United States Department of Defense for the Conduct of Forest Insect and Disease Suppression on Land Administered by the U.S. Department of Defense,* the Army can request emergency pest suppression funds through the AFPMB. Upon request, the U.S. Department of Agriculture (USDA), Forest Service will conduct a biological assessment to determine if control measures are needed. If approved, the Forest Service informs the U.S. Treasury to send appropriate funding to the Army, which then transfers the money to the specific installation in need. Section 5.7.4.1.2 provides additional details on suppression funds.

Plant Species Introductions

Native plants versus non-native plants. The goal of Fort Benning natural resource managers is to implement an ecosystem approach to management. Part of this approach involves maintaining those native plant species that presently occur here and reestablishing native species in locations where they have been eliminated. This can be accomplished either by planting stock or by establishing proper growing conditions that enable native species to become established by natural dispersal mechanisms such as wind. Additionally, native species are planted as a part of land rehabilitation projects, wildlife opening plantings and landscaping projects. Unfortunately, the preceding activities can present more opportunities for non-native species to be introduced than native species, as stocks of native plants suitable to the task are often not available or are prohibitively expensive to use as alternatives. As a result, some non-native species are used often because of these potential problems. As native plant materials become more readily available, however, native plant species will be evaluated carefully when selecting future stock for these activities.

Landscaping, in particular, frequently uses non-natives, though adherence to the Presidential Memorandum on Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds will encourage a renewed interest in the use of native plant species. Additionally, in some cases non-native plants are used because they are better adapted to survive in hostile environments (e.g., a heavily degraded mechanized training site) and may be the better choice to stabilize an area. Some non-native species that have been used traditionally for planting wildlife openings (e.g., wheat [*Triticum aestivum*] and crimson clover [*Trifolium incarnatum*]) have no record of escaping the planting site after over 30 years.

To ensure that Fort Benning does not intentionally plant an invasive species, various lists of plant species approved for use at Fort Benning have been developed for each type of activity. These lists are presented in the Table B.5.4 and Table B.5.5 referenced in Appendix B5.

Land rehabilitation and habitat (ecosystem) restoration. Rehabilitation and restoration projects take many forms, but most are conducted as part of the Conservation Branch's Soil Conservation Program (Chapter 5.1), or the ITAM Program's Land Rehabilitation and Maintenance component as described in the Land Management Plan found in the RCW ESMC. The Soil Conservation Program focuses on stabilization of RCW habitat, whereas the LRAM component strives to sustain military training. Both programs utilize vegetation to accomplish their objectives. The NRCS, through a cooperative agreement with Fort Benning, designs, contracts, and oversees most of these projects. A list of plant species approved for use by the NRCS at Fort Benning is provided in Table B.5.4 located in Appendix B5. A long-term goal is to plant only native species for soil conservation projects. Currently, common Bermuda grass, rye (*Secale cereale*), and some other non-native plants are used. The NRCS does plant some native species on Fort Benning such as switchgrass (*Panicum virgatum*) and little bluestem (*Schizachyrium scoparium scoparium*).

The NRCS operates several Plant Materials Centers as part of the Plant Materials Program. The Plant Materials Program has four national focus areas: (1) reduce erosion by establishing vegetation; (2) improve and protect the quality of surface and ground water; (3) protect, create, and restore critical areas such as wetlands and riparian areas; and (4) provide protective cover on disturbed areas. The purposes of a plant materials program are to: (1) assemble, evaluate, and release new plant materials for conservation use; (2) determine techniques for their successful use; (3) provide for their commercial increase; and (4) promote the use of plant materials needed to meet the objectives of the National Conservation Programs. This center does work with some native plant species for grazing lands that support sustainable agriculture, for water quality riparian areas to improve surface and ground water quality, and for conservation tillage (annual legumes and grasses) to reduce surface erosion.

Fill dirt for rehabilitation and restoration projects normally comes from borrow areas on Fort Benning. Any dirt obtained from outside the Installation may have invasive plants or

their propagules contained within the fill dirt. Off-site fill dirt should be used with caution and checked for the presence of invasive plants prior to collection.

Wildlife food and cover. Planted wildlife openings have been part of the Game and Sport Fish Management Program (Chapter 5.6) for over 50 years. In the 1960s, over 2,500 acres were planted. Consistent with the ecosystem theme of management, this acreage has been reduced greatly. A cap of 300 acres of planted wildlife openings will ensure that game management is consistent with and to the benefit of TES management, maintenance of biodiversity, and military training. Plant species approved for planting are identified in Table B.4.3 can be found in Appendix B4. Almost all of these plant species are standard, annual agricultural crops such as wheat and browntop millet (*Urochloa ramosa*) that do not survive outside of cultivation. In 1994, however, 3,000 sawtooth oaks (*Quercus acutissima*) were planted by volunteers in dove fields and in wildlife openings. This native of Korea produces large acorns in as little as four to five years. Many years of planting in the United States demonstrate that it is not invasive and rarely survives outside of an agricultural setting. Nevertheless, no additional expansion of sawtooth oak acreage will be planted. Replacement of dead or damaged trees already planted will be allowed. One invasive species that was planted for bobwhite quail (*Colinus virginianus*) in the past, but is now prohibited, is bicolor lespedeza. This plant has escaped from wildlife plantings and can be found under the pine canopy in many areas.

Landscaping. Landscaping projects associated with barracks, office buildings, and other facilities in the cantonment areas are of great concern, because non-native species are typically used. If invasive, these plants can escape easily from the cantonment areas to the mission lands. The 26 April 1994 Presidential Memorandum on Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds (see section 5.7.3.1.1 for additional details) directed the use of regionally native plants on Federal landscaped grounds and emphasized integrating design and construction of Federal projects with the surrounding natural habitat. The guidance contained in this memorandum directly applies to landscape projects, as well as to the Fort Benning golf course. A list of plants approved for landscaping (Table B.5.5 in Appendix B5) has been included as part of the Installation Design Guide and will be included in landscaping contracts. Fill-dirt concerns discussed previously for rehabilitation and restoration projects apply as well to landscaping projects.

Deployment and redeployment. One of Fort Benning's primary missions is force projection. Soldiers and equipment are transported to other states and other countries on short notice (deployed) and then returned to Fort Benning upon mission completion (redeployed). Troop and equipment movements can be by truck, plane, ship, or rail. An important mechanism for introduction of undesirable plants onto Fort Benning is via redeployment of Soldiers and other DoD affiliated personnel from other parts of the United States, such as Fort Irwin, California, or from foreign countries, such as Bosnia, Germany, Saudi Arabia, Haiti, Panama, Honduras, and Egypt. Introduction of undesirable plant species from Fort Benning to other locations through deployment to other states and countries also is a possibility that must be addressed.

Currently, Soldiers do not receive any briefing concerning undesirable plant introductions during their deployment processing, however, certain measures are taken to inspect planes upon their return to Lawson Army Airfield from direct overseas flights. Personnel from the Army Materiel Command conduct an inspection of both luggage and the aircraft for any undesirable plants. All confiscated plants or plant parts are burned in accordance with USDA guidelines. All ships returning from overseas with Soldiers and equipment en route to Fort Benning are inspected by USDA and U.S. Customs personnel either at the Savannah or Jacksonville ports-of-call.

5.7.3.1.4 Undesirable Aquatic Plants

Numerous invasive aquatic plants are capable of infesting Installation ponds, lakes, swamps, and creeks and the Chattahoochee River and its backwaters. These species are listed in Table B.5.6located in Appendix B5. Of particular concern are water hyacinth (*Eichornia crassipes*) (floating aquatic), alligator weed (*Alternanthera philoxeroides*), giant salvinia (*Salvinia molesta*), and hydrilla (*Hydrilla verticillata*). Giant salvinia and hydrilla have not yet been found in the Chattahoochee River backwaters or in the other water bodies of Fort Benning. Of the four species mentioned above, giant salvinia is of the greatest concern because of its extreme invasiveness. Alligator weed is present in the managed ponds and in the Chattahoochee River backwaters. Alligator weed in the backwaters forms dense mats in some locations, but it has not become a serious pest to the extent that waterways are clogged.

The Resource Management Office of USACE at Fort Gaines, Georgia is located on Lake Walter F. George. This office conducts periodic invasive aquatic plant surveys of the Chattahoochee River from Fort Gaines to Uchee Creek on Fort Benning. During the surveys in the past, the Corps found giant cut grass (*Zizaniopsis miliacea*), a native species, and water hyacinth within the Chattahoochee River backwater areas of Fort Benning. Both species can create a management problem because the plant can form dense mats of vegetation and reduce the usage of affected areas by waterfowl and listed species. Various control measures have been implemented over the years by USACE for these species. Pesticide application data resulting from aquatic plant control activities by USACE on the Chattahoochee River are documented and reported independently from Fort Benning by USACE.

In addition to the regulatory and policy guidance related to undesirable plants discussed previously, non-indigenous aquatic plants (and animals) are addressed by the Non-indigenous Aquatic Prevention and Control Act of 1990 (16 U.S.C. Section 4701 et seq.). Although a main focus of the Act is to prevent introductions through vessel ballast water, the Act also recognizes the importance of preventing, monitoring, and controlling unintentional introductions of non-indigenous species, including aquatic plants, from pathways other than ballast water exchange (for example, recreational boaters). Although the Act does not prescribe any specific regulatory requirements that directly affect Fort Benning, the Installation will attempt to abide by the intent of the Act. Undesirable, non-native aquatic plants are listed in Table B.5.6located in Appendix B5.

5.7.3.1.5 Problematic Native Species

Occasionally, a native species may become a pest. This has occurred in Weem's Pond, which is a popular fishing pond at Fort Benning. In the past, White water-lily (*Nymphaea odorata*) and American lotus (*Nelumbo lutea*), have covered almost the entire surface of the pond, and has made fishing nearly impossible. Various treatments have been attempted over the years, including spraying with herbicide. These preceding treatments have been effective, but they must be reapplied in some cases every three years or so. Problems associated with giant cut grass as described in section 5.7.3.1.4.

5.7.3.1.6 Kudzu

Kudzu is an invasive, non-native vine introduced into the southeastern United States from Asia in the late 1800s. The species initially was used as an ornamental and later was used for erosion control. Kudzu now infests about two million acres across the Southeast. It can readily outgrow most other plants in areas of full sun. Because kudzu produces dense shade and possesses an extensive root system, it prevents the growth of pine seedlings and other trees. Its vines also can affect mature pines by growing over limbs and, as a result, reducing photosynthesis. Because of these characteristics kudzu is recognized as a noxious weed/undesirable plant.

History and Current Efforts

Fort Benning's Kudzu Containment Project began in 1995 as a direct result of the USFWS's 1994 BO. The USFWS identified the potential for kudzu to reduce pine regeneration and growth and, as a result, indirectly affect the Federally endangered RCW on Fort Benning by degrading its habitat. The USFWS also suggested that kudzu could have played a role in the demise of the Federally endangered Michaux's sumac (*Rhus michauxii*) in Georgia and may be a potential threat to the Federally endangered relict trillium (*Trillium reliquum*) populations on Fort Benning. In its BO, the USFWS identified kudzu eradication as part of the Reasonable and Prudent Alternatives it specified to avoid jeopardizing the continued existence of the RCW. More specifically, kudzu eradication was to be conducted wherever listed species potentially were affected.

Current Control Activities

The Fort Benning management strategy for kudzu is first, to prevent the spread of kudzu to uninfested areas by containing kudzu to areas already infested and second, to eradicate kudzu in all areas where listed species potentially are affected. Elements of the kudzu containment and eradication plan include inventory, containment/eradication, reforestation, and monitoring.

Fort Benning has numerous individual populations of kudzu which range from 0.1 acres to 60 acres in size (Figure 5.7.1). Small populations are treated by in-house DoD certified forestry personnel and larger populations are treated under a service contract when funds are available. Annual chemical treatments to control/eradicate kudzu are applied during the months of June – August. Kudzu is either treated with Tordon K or Escort. It usually takes multiple treatments to successfully eradicate kudzu. Once completely eradicated in an area, the area is reforested with longleaf pine.

5.7.3.2 Harmful Forest Insects and Disease Organisms

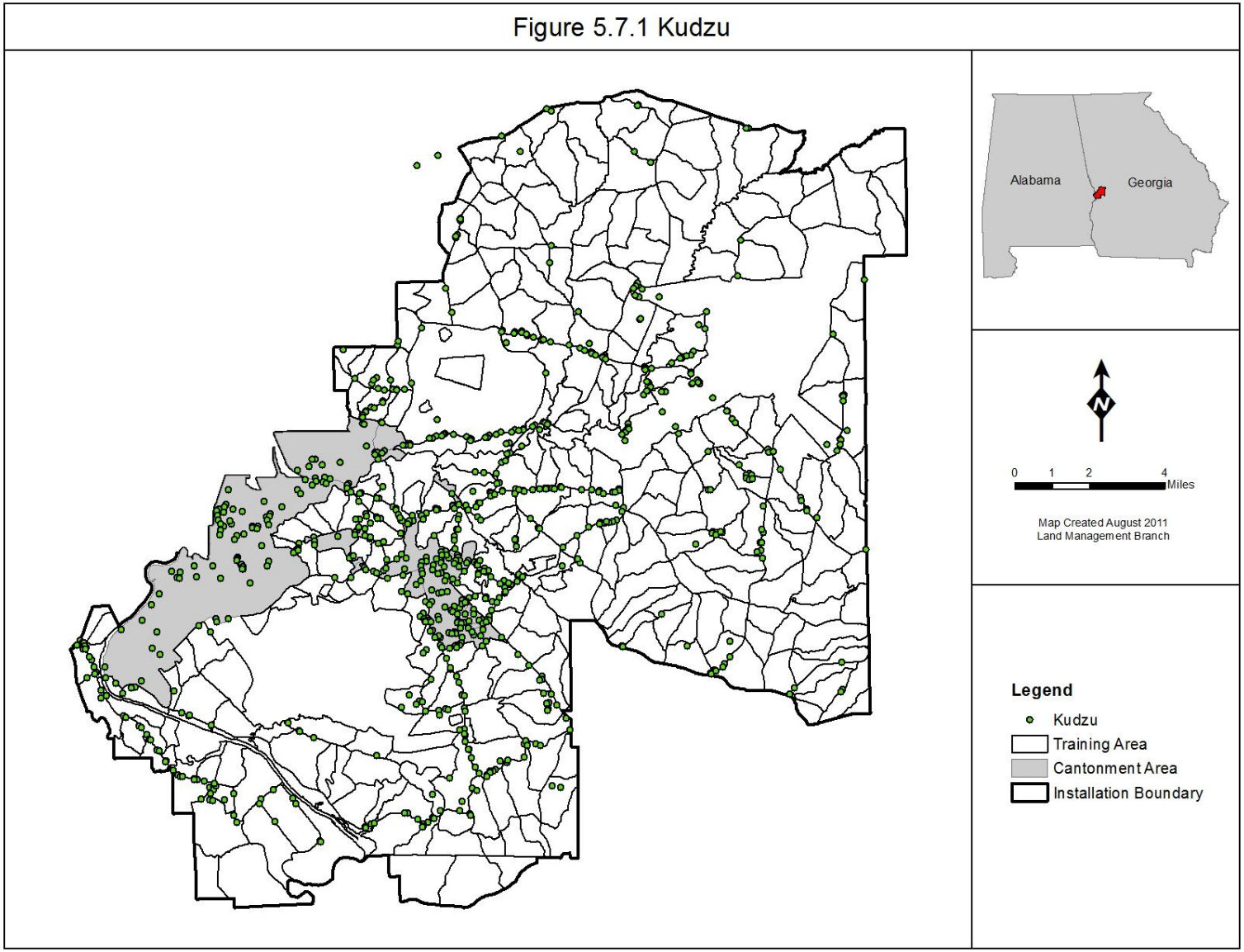
The major forest insect and disease problem areas on the Installation are caused by pine bark beetles, fusiform rust (*Cronartium quercuum* (Berk.) Miyabe ex shirai f. sp. *fusiforme*), and littleleaf disease (caused by a complex of factors, including the soil fungus *Phytophthora cinnamomi* and poor site conditions [Forest Service 1982]). Minor insect and disease problems include those impacts caused by annosus root rot (*Fomes annosus*), brown spot needle blight (*Scirrhia acicola*), and Nantucket pine tip moth (*Rhyacionia frustrana*).

Historical records indicate that forest insects and diseases have been impacting the timber resource on Fort Benning since the Installation's establishment in 1918. As part of the Forest Insect and Disease Suppression Project, insects and disease problems are monitored continuously and those areas experiencing major adverse impacts to the timber resource are managed aggressively to minimize damages. Loblolly pine and shortleaf pine are the species most susceptible to those insect and disease problems causing the most damage at Fort Benning: southern pine beetle (*Dendroctonus frontalis*) and littleleaf disease. Timber harvest, a physical IPM method, is the most effective suppression measure available for both these destructive pests and is used almost exclusively. As a result, specific suppression methods are addressed in more detail in the Forest Management Operational Plan (Chapter 5.2).

5.7.3.3 Undesirable Animals

Undesirable animals include any animal occurring on Fort Benning that because of actual or potential adverse effects to listed species or other natural resources of concern, military readiness, personnel well-being, real property, supplies, or equipment requires some degree of control.

Figure 5.7.1 Kudzu



5.7.3.3.1 Applicable Laws, Regulations, Executive Orders, and Policies

In conjunction with legal requirements summarized in Section 3.5.1 and the Executive order on Invasive Species as discussed in Section 5.7.3.1.1, this section provides a brief overview of the regulatory and policy context specific to the management of undesirable animals:

Maneuver Center of Excellence Regulation 210–5. Fort Benning Garrison Regulation, (dated 22 February 2012), section 4-2(d) prohibits the possession of wild, exotic, and livestock animals in family housing without permission of the Garrison Commander.

Maneuver Center of Excellence Regulation 200–3. Fort Benning Hunting, Fishing, and Recreation Regulation, (dated 3 August 2012), section 6**–**1(d) prohibits the release into the wild or the import of any wildlife.

Maneuver Center of Excellence Regulation 40-905. Fort Benning Garrison Regulation (dated 15 December 2011), section 2i prohibits possession of pets in unaccompanied housing or in public buildings except for facilities designed for their use or care. In the case of Handicap Assistance Dogs, an exception will be made for those areas as authorized by Congress.

Georgia Department of Natural Resources Wildlife Regulations. Georgia State Code 27**–**5**–**7, (Release or Escape from Captivity, 2012), prohibits the intentional or accidental release from captivity of any wild animal.

5.7.3.3.2 Identification

Undesirable animals fall into three categories. First, several species of undesirable non-native animals already have become established on Fort Benning and must be controlled to protect natural resources or for other reasons. Second, other undesirable non-native animals have the potential to become established. Protocols must be developed that enable early detection of those species that, because of their invasiveness, pose the greatest ecological or economic threat. Third, when human health, Installation natural resources, or facility assets are at risk, localized control measures may be necessary for undesirable native animal species. The latter situation is infrequent enough that the focus of this operational plan is the identification and appropriate management of species within the first two categories.

The feral swine is of the greatest immediate management concern. Wherever feral swine have been introduced, they have become a pest species. They can cause many problems, but their negative impact on native plants and animals is well documented. Feral swine are discussed in more detail in section 5.7.3.3.4.

The armadillo (*Dasypus novemcinctus*) and coyote (*Canis latrans*) are animals native to the southwestern United States that have migrated to the southeast. Additionally, coyotes have been translocated illegally to the southeast for purposes of chasing them with hunting dogs. Both of these species are considered naturalized on Fort Benning

and in Georgia. Although they are non-native, no significant ecological problems are associated with these species at Fort Benning.

The European starling (*Sturnus vulgaris*), House sparrow (*Passer domesticus),* and rock dove (pigeon) (*Columbia livia*) are three birds that also are considered naturalized. All three species were introduced into the United States in the late 1800s from Europe and quickly became established. Of the three, the starling is one of the most common birds in the United States and poses greatest ecological concern. Starlings are aggressive and take over nesting holes used by eastern bluebirds (*Sialia sialis*), tree swallows (*Iridoprocene bicolor*), woodpeckers (Family Picidae), and other cavity nesting birds. The Eurasian collared-dove (*Treptophelia decaocto*) was imported from India in the 1970s. It was first observed in Georgia in the 1980s and seems to prefer the edge habitats created by urbanization around agriculture. The bird was first observed nesting on Fort Benning in 1998 in a housing area on Main Post. It is unlikely that the collared-dove will become a problem in the training areas, but it may become more common in the cantonment areas.

The common carp (*Cyprinus carpio*) was introduced into California in 1872. It is now in virtually every lake, pond, river, and stream in Georgia. Carp damage natural ecosystems by competing with native fishes for food. Because they suck materials from the bottom while looking for food, water quality also is degraded. The flathead catfish (*Pylodictis olivaris*) is native to northeast Georgia, but it has been illegally introduced into other areas of the state. This catfish is a voracious feeder, and redbreast sunfish (*Lepomis auritus*) and bullhead (*Ameiurus* spp.) populations decline when flathead catfish are introduced.

One of the greatest potential invasive animal threats is the zebra mussel (*Dreissena polymorpha*). This mussel, a native of Europe, was first discovered in 1988 in North America. It is thought to have arrived in ship ballast water. It is now widespread in the Great Lakes and Mississippi River drainage where it out competes zooplankton for food and disrupts natural food webs. The zebra mussel adheres to the shells of freshwater mussels and eventually kills them. Native mollusk populations tend to crash within four years of zebra mussel introduction, and fish populations can decrease also due to disruption of the food chain. This species represents the greatest animal threat to Fort Benning's aquatic ecosystem. Zebra mussels are not known to occur in Georgia, but are present in Alabama.

Other non-native animals, such as pythons, ferrets, and iguanas, have been observed in the housing or barracks areas. As soon as they are reported, the Fort Benning Law Enforcement Division (Military Police) confiscates them.

Table B.5.7 in Appendix B5 provides a list of undesirable non-native animal species (current and potential).

5.7.3.3.3 Management Elements

The number of undesirable non-native animal species currently occurring on Fort Benning represents a relatively small number of species to contend with compared to the number of undesirable plant species (more than 150). This enables monitoring and control efforts to be more focused. Of the undesirable non-native animal species that are known to exist on Fort Benning, currently only the feral swine requires monitoring and control. The feral swine has the highest likelihood to cause ecological damage and presents the most formidable challenge to control. The flathead catfish and zebra mussel represent the greatest potential future threats to the ecological integrity of Fort Benning. As with undesirable plants, the responsibility for management of undesirable animals will be the responsibility of the TES Biologist from Fort Benning's CB.

Detection and Monitoring

In addition to the TES Program, other program areas such as forest management and game and sport fish management assist in the detection and reporting of selected undesirable species. Detection will focus on the flathead catfish and zebra mussel. Monitoring is focused on the feral swine.

Control Measures

Control methods for undesirable animal species will follow the principles of IPM. Control measures stress the use of a combination of treatments—including biological, cultural, physical, mechanical, and chemical—in a manner that achieves a high level of effectiveness while minimizing environmental impacts.

Introductions

Introductions of undesirable non-native animal species can occur through many mechanisms. The previous discussion of undesirable plant introductions via planes, ships, and rail is valid for undesirable non-native animal species as well. This includes the need to educate personnel who are deploying and redeploying and who may bring back species within their luggage or in their equipment, as well as addressing the transport vehicles themselves.

Release or escape of undesirable animals, especially non-native species obtained through the pet trade, is another avenue for introduction. For example, once an owner becomes tired of caring for non-native (tropical) fish, the person may release them into a pond or stream. Several incidents of possession of non-native snakes (for example, pythons), lizards, and ferrets have occurred in the housing areas. The potential exists for some pets to escape or to be released that could survive and become established on mission lands. Various regulations discussed in Section 5.7.3.3.1 provide guidance to help prevent the introduction of non-native species on Fort Benning.

5.7.3.3.4 Feral Swine

Feral swine, also known as wild hogs or wild pigs, are self-perpetuating populations of swine that are able to survive off the land (free-ranging) without assistance from humans. Swine in the United States came from several sources (Bratton 1977). Some were brought into the United States by the earliest settlers arriving from Spain, England, or northern Europe in the 1500s. These were domesticated swine that probably had

their origin in Asia and were derived from one or more wild boar (*Sus scrofa*) populations. Once imported into the United States, these animals escaped or were abandoned or allowed to free range. Additionally, true wild stock of boars have been introduced for hunting purposes. Populations of feral swine and wild boar have interbred to the point that all can be referred to as feral swine (Bratton 1977).

History and Current Efforts

Feral swine have occurred on Fort Benning at least since the 1950s (Peter Swiderek, personal communication); however, the occurrence of large numbers of feral swine is a relatively recent phenomenon. In 1994 frequent sightings made it apparent that feral swine were numerous within several areas of the Installation. The main areas of feral swine sightings were the K9, K17, and K18 training compartments along the northern edge of the Installation, and the CC1 and CC2 training compartments adjacent to the extreme southern edge of the Installation. It is likely that these feral swine originated from swine illegally released on or adjacent to Fort Benning to perpetuate hunting or that these swine had escaped from local pig farms. By 1997, feral swine sightings had been received from many locations of the Installation and, as a result, feral swine are determined now to be widespread.

In 1995, Fort Benning began to allow feral swine harvesting during the gun-deer season. In subsequent years, the feral swine hunting season was extended to year-round per the provisions of the United States Army Infantry Circular 200-3, (now governed by the MCoE Regulation 200-3). In 2007 Fort Benning implemented a special feral swine control program to help reduce population numbers on the Installation. Feral swine had become a regular problem in the Cantonment Areas and were regularly being reported in and around housing areas and other developed sites. This program allowed individuals to hunt and trap feral swine on the Installation at night and over bait in an effort to reduce the population to a less destructive size. Fort Benning also implemented a bounty program, (from July 2007 through January 2010), where feral swine tails could be turned in to CB for vouchers redeemable at MWR for cash. During the same time period the Conservation Branch and DES personnel implemented trapping and shooting efforts inside the Cantonment Area which is off limits to hunting and trapping by feral swine control participants. This combined with the additional hunting and trapping outside of the Cantonment Area significantly reduced the reported feral swine incidences in and around the Cantonment Areas and other housing areas.

In 1997, three relict trillium (*Trillium reliquum*) sites were fenced with hog wire fence (three-foot high fence supported by metal posts). The populations of this Federally endangered plant on Fort Benning are critical to the recovery of this species. Feral swine rooting was damaging these populations and action had to be taken to prevent their loss. Currently, monthly inspections of the relict trillium populations are made to monitor for further damage and to determine whether additional control measures are needed. Additional sites may have to be fenced in the future.

In 2003, at the request of Fort Benning's CB, a feral swine population and control study was initiated by Auburn University. The study lasted five years and focused on control

measures and impacts to threatened and endangered species. The goal of the study was to develop control measures that will allow Fort Benning to restrict the feral swine population on the Installation to a level which is not significantly detrimental to endangered species or their habitats. A synopsis of the results of the study and recommendations for the way ahead were provided to Fort Benning at the conclusion of the study.

Although feral swine are considered a game species in some states, they are considered a pest species by Fort Benning. Feral swine are a popular target for many hunters on Benning but designating them as a game animal would imply that Fort Benning intends to manage the population by establishing seasons and bag limits to propagate this animal. As a result, management of this species is primarily the responsibility of the TES Program and not the Game and Sport Fish Program, however, both programs work cooperatively to monitor populations and facilitate control. Feral swine are an impediment to achieving and maintaining Fort Benning's ecological integrity and pose other concerns as well. The following problems are associated with feral swine:

- **Soil disturbance:** Feral swine can cause extensive damage through their feeding behavior and their characteristic "rooting" with their nose. The soils of Fort Benning are highly erodible, and the loss of vegetation and destabilization of the soils results in soil erosion, sedimentation of streams, and increased opportunities for colonization by invasive plant species. Sedimentation impacts aquatic biota and degrades water quality.

- **Impacts to threatened and endangered species:** Feral swine activities, such as rooting, feeding, and trampling, can devastate populations of plants and animals sensitive to soil and ground cover disturbance. The relict trillium populations discussed above are a good example. Because feral swine are omnivores, they may have an adverse impact on sensitive animal species such as immature gopher tortoises and eastern diamondback rattlesnakes.

- **Competition with wildlife species:** Feral swine prefer many of the same foods as many wildlife species. For example, they readily consume large quantities of oak acorns, a critical winter food for white-tailed deer, wild turkey, bobwhite quail, gray squirrels, raccoons, and many other species of wildlife. Feral swine also may disturb ground-nesting birds, such as wild turkey or bobwhite quail, and prey on eggs and poults.

- **Impacts to pine and hardwood trees:** Feral swine have been known to feed heavily on roots of various species of both planted and natural regeneration, particularly during the summer when other foods are not available. Additionally, extensive rooting has been observed around mature hardwoods in the Oswichee Creek floodplain; however, the impact of this rooting is unknown. Some rooting has been observed in longleaf pine plantations, but the feral swine do not appear to be feeding on the seedlings.

- **Training area degradation:** Various types of damage have been observed that can have impacts on military training. Arkmann Drop Zone has hundreds of holes up to 1.5 feet deep as a result of rooting activities. These holes present a safety hazard to parachute jumpers. Additionally, feral swine have chewed up targetry cables on Carmouche Range, requiring replacement and installation of protective measures to prevent repeated occurrences. Other potential damage may include the rooting up of roads, bivouac sites, and other training areas.

- **Disease transmission:** Feral swine are susceptible to two serious diseases: brucellosis and pseudorabies. These diseases can be transmitted to domestic livestock and can cause production losses and decreased profits. Hunters are also at risk of brucellosis when they field-dress feral swine. They should take the precaution of using rubber gloves when field-dressing. Pseudorabies is a fatal infection in farm animals, such as cattle, sheep, and goats, as well as in cats and dogs. Wild mammals, such as raccoons, skunks, foxes, opossums, and small rodents, also can be fatally infected.

- **Automobile accidents:** Feral swine can attain weights of 300 pounds or more and sometimes travel in packs of 10-20 animals. Most feral swine are black in color and are often active at night. For all these reasons they pose a serious hazard to motorists.

- **Food plot and dove field damage:** Feral swine have caused serious damage to the Yankee Road dove field and several wildlife openings.

- **Other damage:** Damage to Fort Benning's golf course and outdoor recreational areas, such as King's Pond, have occurred with the expansion of the feral swine population. Additionally, feral swine can present a human safety hazard and are a nuisance to most people.

Current efforts to monitor and control the feral swine population include hunting, fencing of sensitive areas, and trapping. These efforts and management objectives are discussed in more detail in Section 5.7.5.5.

5.7.3.4 Pest Vertebrate Species within the Cantonment Areas

Lands that are not used for operational training at Fort Benning are used to support cantonment functions. The cantonment areas at Fort Benning have been developed into a wide variety of land uses that comprise the elements necessary for a complete urban-style community. There are four cantonment areas within the Installation boundaries: Main Post, Sand Hill, Kelley Hill and Harmony Church, which are discussed in Section 3.4.6 of this INRMP.

This operational plan does not cover pest management activities in the cantonment area for cockroaches, termites, mosquitoes, mice, and other household pests; those are addressed in detail in Fort Benning's Integrated Pest Management Plan. Instead, the

focus of this section is on those pest management activities conducted by CB, within the cantonment areas and on any coordination measures the section may need to conduct with other Fort Benning organizations to meet its responsibilities.

The Wildlife Management Section is responsible for the control of some pest vertebrate species, except for stray dogs and cats. The latter are the responsibility of the DES, Animal Control (Military Police). Pest wildlife infesting government structures are removed by GADNR-licensed wildlife trappers under contract by Fort Benning's DPW. Pest wildlife infesting family housing structures are removed by GADNR-licensed wildlife trappers under contract by the family housing privatization partner. A Vertebrate Pest Control Responsibility Matrix is available from the IPMC to more clearly define responsibility for control of pest animals.

5.7.3.4.1 Environmental Policies

The principles and techniques of IPM shall be used to control all pests. The procedures for implementing IPM shall be as follows:

- identify the problem and the pest(s) responsible as accurately as possible
- evaluate all available management and control alternatives and establish an action threshold
- choose the safest, most economical, and most efficient solution that achieves the desired result with the least environmental impact
- time control and management techniques to achieve maximum beneficial results.

5.7.3.4.2 History and Current Efforts

History of Control Activities

Fort Benning's CB has been responsible for pest vertebrate species (hereafter pest wildlife) management for many years. Most management efforts have focused on responding to pest wildlife complaints. A pest wildlife complaint is considered an incident when anyone from the Fort Benning community (active duty, dependent, DoD civilian, contractor) contacts the CB about an animal-related situation in the cantonment area. A situation usually addresses a person's concerns about the safety of their families and pets, protection of their property, appearance of their yard, or an animal that has been injured, orphaned, abandoned, or illegally held. Normally, these animals are native or naturalized wildlife species, such as white-tailed deer, coyote, gray squirrel, armadillo, bat, snake, raccoon, and songbirds. Occasionally, a non-native species, such as a python, may be the subject of the call. Normally, the Conservation Branch does not respond to dog, cat, insect, mice, or rat complaints. Dogs and cats are the responsibility of the Animal Control Section, Law Enforcement Division, DES (Military Police).

Responsibility for handling pest vertebrate complaints has changed over the years. Currently, the Fish and Wildlife Technician of Fort Benning's CB administers the program; however, all Conservation Branch employees may have to respond to

complaints. About 100–150 complaints are handled annually. Fort Benning's goal is to respond to pest vertebrate complaints in a timely, safe, and ethical manner. The desired result is a satisfied customer who is relieved of a problem and the capture and relocation of the offending animal without harm.

Current Control Activities

Pest wildlife complaints are divided into two categories: family housing (residential) areas and non-housing areas. Barracks and the Cuartels are considered non-housing areas. A licensed pest wildlife control contractor will handle family housing area complaints under the direction of property managers. Fort Benning's CB will respond, if necessary, to incidents involving protected and game species or dangerous wildlife outside of the structures, and will handle protected and game species or dangerous wildlife in non-housing areas. For other non-housing area wildlife complaints during normal business hours (0800-1700, Monday-Friday), Installation personnel will contact the DPW Work Order desk (545-2135).

Outside of normal business hours, only priority complaints will be handled. Pest vertebrate complaint calls that are designated "high priority" include: (1) bats inside offices or residences; (2) snakes inside offices or residences; (3) venomous snakes in yards or other cantonment areas; and (4) raccoons, foxes, or skunks that are active during daylight hours or appear to be sick. Bats inside structures are a particularly urgent complaint because of the possibility of rabies transmission.

A pest wildlife complaint form documents each complaint. After resolution of the complaint, information on the complainant's name, phone number, and address is entered into the Excel database. In some cases, complaints are handled over the phone, but in most instances an on-site visit is required.

Most pest wildlife complaint calls originate from housing areas, barracks, and office complexes. Occasionally, unusual complaint calls are handled. For example, white-tailed deer and feral swine can gain entry inside the Lawson Army Airfield fence where they are a hazard to aircraft. Additionally, feral swine root up the dirt portions of the airfield and can damage airfield assets such as underground cables. Fort Benning's CB works with airfield personnel to locate entry points in the fence and to shoot or trap the deer and swine.

Coordination

Besides the coordination with the Military Police and DPW described in the previous section, coordination with several other organizations and agencies is necessary to effectively handle the full range of nuisance species complaints. For example, the Wildlife Management Section coordinates with the Environmental Health Section, Preventive Medicine Services and/or Veterinary Services, Medical Department Activity when a bat exposure occurs. Potential exposure situations may include any one of the following: (1) an observable scratch or bite marks, (2) a bat in a room with sleeping persons, (3) a bat in a room with an unattended infant, or (4) a child that acknowledges physical contact with a bat. Because the Wildlife Management Section employee is

often the first on the scene, a preliminary determination of an exposure situation is made and then documented on the bat complaint questionnaire mentioned in the section above. If a bite or scratch is confirmed, the affected person is directed to go to Martin Army Hospital immediately. If an unvaccinated pet is exposed, the owner is directed to take the pet to Veterinary Services immediately. Any bat involved in a potential exposure situation is taken to Veterinary Services as soon as possible for rabies testing. Within 10 days Veterinary Services determines whether the bat is positive for rabies. If the bat is positive, potentially affected individuals are directed to go immediately to Martin Army Hospital regardless of the exposure situation. The Environmental Health Office is contacted as soon as possible after an exposure has occurred to document information related to the incident in an animal bite report. Additionally, all of the preceding information is documented on the bat complaint questionnaire.

Construction Inspection Branch, Engineering Division, DPW, coordinates bat exclusion and sealing activities in government buildings, barracks, and the Cuartels. The purpose of exclusion is to remove the bats from the building unharmed and then to seal up the entry holes to prevent future problems. This work is normally conducted by a contractor under the supervision of the Construction Inspection Branch with technical assistance from the Wildlife Management Section. The exclusion work follows state regulations.

In some cases, the buildup of feces behind the walls can require the plasterboard walls inside the structure to be torn down, cleaned, and rebuilt. This effort may require occupants to be relocated to another facility. In situations such as the preceding, as well as when a facility requires bat exclusion work, Fort Benning's CB may request the Environmental Health Section to conduct a bat survey to ascertain whether a health hazard exists. If such a hazard exists, the Environmental Health Section will document the hazard condition via letter. The letter itself, however, is not authorization to move occupants to another facility. The final authority to remove and relocate facility occupants rests with DPW.

Disposition of injured, orphaned, or abandoned wildlife is handled by transporting the animal to a licensed rehabilitator. These persons are specially trained and licensed by the GA DNR and/or the USFWS. Priority of effort is given to raptors, such as eagles, hawks, ospreys, and owls, though a reasonable effort is made to get any animal to a rehabilitator. Raptors are transported to the Southeastern Raptor Rehabilitation Center located at Auburn University, Alabama. Fort Benning has a "Scientific Collecting" permit (29-WKR-99-73) issued by the GA DNR Permit Office. This permit covers a number of activities, including the capture and transport of injured wildlife for rehabilitation. Fort Benning also has a "Nuisance Wildlife" permit that is issued by the GA DNR. This permit allows the capture and relocation of certain species, such as bats, squirrels, and deer. Finally, Fort Benning has a "State of Georgia Animal Nuisance Control Program Memorandum of Agreement between Georgia Department of Natural Resources and Fort Benning" that covers the shooting of nuisance or injured deer on the Installation. All nuisance deer must be donated to the needy.

In addition to the above coordination activities, Fort Benning's CB can at its discretion seek the assistance of the U.S. Department of Agriculture, APHIS, Wildlife Services organization (formerly Animal Damage Control). Via a MOU with the DoD, Wildlife Services can provide Fort Benning with expertise on animal damage management. The MOU establishes the procedures for planning, scheduling, and conducting animal damage control activities (exclusive of routine, vertebrate pest control operations) on military installations. All such activities must be coordinated with the appropriate state and other Federal agencies having management responsibilities for the animal species to be controlled, except for situations in which the specific animal damage control authority has been delegated to Wildlife Services or DoD military installations.

5.7.3.4.3 Dead Animals

Personnel detailed to the Staff Duty Desk will remove carcasses from roads and road shoulders in the cantonment area(s) under their responsibility. Fort Benning's CB will respond to carcasses on the airfield and roads and road shoulders outside of cantonment areas covered by the Staff Duty Desk. Carcasses occurring in other locations (golf course, ranges, family housing, etc.) are removed by maintenance staff assigned to the area. If a carcass appears too large to be safely handled by local maintenance staff, a Work Order request may be submitted to DPW for review (not applicable to family housing). Carcasses are to be relocated to an uninhabited area well off the road shoulder and allowed to decay naturally. Carcasses of hawks, owls, and other birds of prey may only be moved by Fort Benning's CB.

5.7.4 Administration

Review and revision of this pest management operational plan shall be accomplished concurrent with the schedule for the INRMP as a whole as stated in Chapter 6. As a result, this operational plan shall be reviewed annually and updated (revised) if necessary, updated as mission or environmental changes warrant, and otherwise updated at least every five years. As indicated in section 5.7.4.2.5, the Pest Management Consultant (or a designated pest management professional) shall review the Installation's pest management programs onsite at least every 36 months and annually review Installation pest management plans for adherence to DoD policy and Army standards. Onsite review requirements can be met by formal program reviews, environmental audits, or assistance visits. The Pest Management Consultant's review shall be used, in part, as a basis for determining whether a revision to this operational plan is necessary.

5.7.4.1 Funding

5.7.4.1.1 Kudzu

Funding sources for kudzu containment are Environmental Funds and Forestry Funds (U.S. Army Forestry Reimbursable Account and DoD Forestry Reserve Account). Environmental Funds for kudzu containment are provided by the U.S. Army through the GERB process. Pesticide application for kudzu treatment is either contractor applied (but overseen in-house) or applied by Fort Benning's LMB personnel.

5.7.4.1.2 Forest Insects and Disease Organisms

Funding sources for insect and disease suppression are Forestry Funds and USFS Pest and Disease Suppression Funds. In most cases, revenues are generated from timber harvesting, so additional funding is not critical to implementation of suppression operations. Additional funding for southern pine beetle suppression is requested on an as-needed basis when epidemics occur. Southern pine beetle infestations will continue to be monitored and suppressed as required, whereas most disease problems will be controlled with scheduled timber management activities.

5.7.4.2 Personnel

Although the responsibilities for pest management are to some degree Installation-wide, a few organizations carry the primary responsibilities for implementation and oversight of the natural resources component of Fort Benning's Pest Management Program. These include the Directorate of Public Works, Family and Morale, Welfare, and Recreation, and Emergency Services, and the Medical Department Activity. Besides their own specific responsibilities for pest management activities they perform, each of the preceding organizations that contracts pest management services has oversight responsibility associated with the performance of that contract. Additionally, all Fort Benning organizations that are responsible for the application of pesticides (whether in-house or by contract) must address the potential impacts of their applications on natural resources. Unless otherwise specifically addressed in this operational plan, responsibilities for cantonment area and other non-natural resources management-dependent, pest management operations (including satellite operations) are not identified.

Because the AEC Pest Management Team plays such an important oversight role in regard to an installation's pest management operations, specific responsibilities of the consultant also are identified. These responsibilities as they pertain to this operational plan are listed in Section 5.7.4.2.5.

5.7.4.2.1 Directorate of Public Works

5.7.4.2.1.1 Environmental Management Division

The EMD is responsible for the overall coordination and oversight of the Installation's IPM Program, natural resources component and this operational plan. The chief of this division is designated the Installation's Environmental Coordinator. The Environmental Coordinator will work closely with the IPMC on issues involving pest management.

5.7.4.2.1.2 Land Management Branch

The EMD LMB is responsible for managing the Kudzu Containment Project (section 5.7.3.1.6) and the Forest Insect and Disease Suppression Project (section 5.7.3.2) as part of the Forest Management Program (Chapter 5.2). Each of the pests considered under these two projects can have a direct adverse effect on Fort Benning's natural resources. As a result, LMB is responsible for monitoring their occurrences and impacts, as well as for implementing containment/suppression measures.

5.7.4.2.1.3 Conservation Branch

The EMD CB is responsible for the management of certain undesirable plants (section 5.7.3.1), management of undesirable animals on mission lands (section 5.7.3.3), and some capture and removal of bats and other nuisance vertebrates (except for stray cats and dogs) in the cantonment area (section 5.7.3.4). Contract services are being utilized for some vertebrate pest control functions within the cantonment area.

5.7.4.2.2 Directorate of Family and Morale, Welfare and Recreation

Business Operations Division, through the Director of Golf Course Maintenance (Course Superintendent), is responsible for supervising and monitoring the conduct of Fort Benning's Pest Management Program as it pertains to the 350 acre golf course. Responsibilities include: diagnosis of all pest problems (diseases, insects, invasive plants [weeds]), selection and scheduling of all pesticide applications, supervision of pesticide application, follow-up assessments to measure the degree of control achieved, maintenance of an appropriate inventory of equipment and pesticides and of accurate records of their use, and assurance that the program is carried out safely and in accordance with all applicable environmental regulations. The Environmental Specialist also assists in the preparation of statements of work for pest control contracts entered into by Fort Benning's Mission Installation Contracting Command.

5.7.4.2.3 Directorate of Emergency Services

Animal Control (Military Police) is responsible for animal control on the Installation, including capturing and removing stray dogs, cats, and, when necessary, other pest wildlife in coordination with the Fort Benning's CB, Wildlife Management Section. The Fort Benning Safety Office is responsible for conducting hazard communication training.

5.7.4.2.4 Medical Department Activity

Three sections within the Preventive Medicine Service have responsibilities: the Environmental Health Section, the Industrial Hygiene Section, and the Occupational Health Section. The Environmental Health Section is responsible for conducting routine scheduled surveillances for medically important pests (that is, those pests that function as disease vectors) at food service and medical treatment facilities, barracks, child care facilities, detention centers, dependent schools, and, as required, family housing and other areas. The Environmental Health Section also monitors sanitation conditions where appropriate. The Industrial Hygiene Section is responsible for conducting training on the proper use of "Personal Protective Equipment." The Occupational Health Section is responsible for conducting medical surveillance of military and DoD civilian personnel that apply pesticides at Fort Benning. For the purposes of this operational plan, Preventive Medicine Service's primary responsibility is to coordinate with the Fort Benning's CB, Wildlife Management Section on those animal control operations undertaken by the section that potentially involve disease vectors and health issues.

5.7.4.2.5 Army Environmental Command Pest Management Team

Responsibilities for Pest Management Team members are based on responsibilities outlined in DoDI 4150.07 and AR 200–1, Chapter 5. The AEC Pest Management Team shall:

- review installation pest management programs onsite at least every 36 months and annually review installation pest management plans for adherence to DoD policy and Army standards; provide professional oversight of installation pest management program goals and objectives

- ensure that installations procure, acquire, and use only those pesticides that have been recommended by the AFPMB and approved by the AEC pest management consultant (Pesticides approved by the AFPMB are assigned a National Stock Number.) The consultant can approve local procurements of pesticides not assigned a National Stock Number if desired.

- review and approve the technical portions of contracts, including augmentation contracts, involving pest management before solicitation to ensure such contracts reflect IPM methodologies and appropriate pest management standards; act as a technical consultant during the performance of the contracted work

- assist installations with the pesticide portion of environmental audits

- determine the training and experience necessary for installation pesticide applicators to perform their pest management activities

- when designated as a certifying official, certify the competency of installation pesticide applicators

- accredit installation professional pest management personnel, Pest Management Quality Assurance Evaluators, and the IPMC

- approve preventive pesticide treatment approaches only when installation surveillance information or records documenting past disease vector or pest problems require this type of approach

- when designated and certified in aerial application pest control, approve installation pest management projects requiring aerial application of pesticides

- approve research projects involving new pest management technologies

- use installation reports that address pesticide applications and non-chemical pest management operations to evaluate the efficiency of the installation's overall pest management program and pest management operations.

5.7.4.3 Manpower and Equipment Resources

5.7.4.3.1 Kudzu

Manpower is currently available to handle pesticide treatments in-house or to administer contracts for kudzu eradication. LMB personnel accomplish spot treatment applications and administer/oversee broadcast treatments accomplished under contract.

5.7.4.3.2 Forest Insects and Disease Organisms

The main forest diseases, littleleaf disease and fusiform rust, are handled by salvage logging operations or by normally scheduled timber harvest operations. Because this is the case and timely suppression is not critical as it may take 10 years or more for the disease to cause tree fatality, the existing staff is sufficient to handle most foreseeable disease suppression operations.

Because southern pine beetle epidemics are cyclical, seasonal, and require immediate, timely oversight, additional manpower always is needed during these periods. The use of overtime by forestry technicians and the hiring of temporary personnel are normally the best options for southern pine beetle suppression operations. Additionally, LMB personnel can be used to operate dozers for push, pile, and burn of unmerchantable timber or inaccessible areas. Contractors also can be used for cut and leave suppression support.

5.7.5 Initiatives

This operational plan provides a framework for IPM relevant to natural resources at Fort Benning. Some of these initiatives are fully in place while other will be pursued as resources become available.

5.7.5.1 Undesirable Plants

- *Continue development of invasive and other appropriate plant species lists:* Several draft lists have been developed and are included in specific tables within this operational plan (Appendix B5). These lists will need to be updated frequently. These lists will be review and updated as necessary during the annual INRMP review.

- *Update the identification guide for the "Least Wanted" plants:* This guide will include pictures and descriptions of each plant and will be used as a reference by CB and LMB personnel for field identification.

- *Develop native plant stocks:* Fort Benning will continue to develop native plant stocks for use in rehabilitation and restoration projects.

- *Post signs at all managed fish ponds and at Uchee Creek Marina:* Warning signs will be posted at the preceding locations that instruct fishermen and boaters to

remove before entering and upon leaving the water all aquatic weeds that are attached to boats, trailers, boat motors, and vehicles.

5.7.5.2 Kudzu

Known kudzu populations on Fort Benning will continue to be monitored annually and treated as necessary. Areas will continue to be reforested with longleaf pine when the kudzu in the population is deemed eradicated.

5.7.5.3 Harmful Forest Insects and Disease Organisms

Southern pine beetle and littleleaf disease will continue to be the major insect and disease emphasis for suppression. Minimizing losses by salvaging timber through commercial timber harvest will be a major focus, as will reforesting the harvested areas with longleaf pine. Longleaf pine is more resistant than loblolly and shortleaf pine to many of the insects and diseases that plague the other southern yellow pine species.

5.7.5.4 Undesirable Animals

- *Continue development of undesirable animal lists:* A draft list of currently occurring undesirable non-native animal species and those invasive species that potentially could be introduced to Fort Benning is provided in Table B.5.7 in Appendix B5. This list will be evaluated at least annually to determine whether an update is needed.

- Continue monitoring for invasive mussel species with an emphasis on the zebra mussel.

5.7.5.5 Feral Swine

Overall, Fort Benning's management objectives are to monitor and control the feral swine population. Eradication is not an achievable objective considering the extensive acreage of the Installation, the large acreage that is not readily accessible (impact areas), and the potential source pool of feral swine outside the Installation.

Monitoring – Based on the research conducted by Auburn University, a feral swine density survey was developed and is conducted annually in February of each year. This camera survey provides a minimum known alive estimate and allows Fort Benning's CB Personnel to track population trends. Currently the population is in an upward trend.
Hunter harvest information and other methods will be evaluated for monitoring the distribution, spread, and abundance of the feral swine population. This information will supplement trend data and may help to prioritize control efforts. Monitoring methods that will be evaluated and may be incorporated into a comprehensive feral swine management program are discussed below:

- *Range technician observations:* Range technicians work out of Range Division, DPTMS. These personnel inspect ranges and training areas for safety and environmental compliance on a daily basis.

- *Military Police automobile accident reports:* The Military Police keep Vehicle Accident Reports of all vehicle collisions involving feral swine.
- *Monitoring of sensitive areas:* Relict trillium sites are monitored monthly for feral swine activity.

Control measures – Control of feral swine is difficult, but all measures continue to be evaluated to determine which are the most feasible and productive. A combination of measures will be needed to control feral swine populations, though the focus will be to control feral swine in selected areas. High-priority areas include military assets, Cantonment Areas, TES habitat, UEAs, archeological sites, and the golf course. Research conducted by Auburn University demonstrated that wild pigs can be controlled or eliminated from a specific area using lethal control; however efforts must be focused on removing entire sounders not just maximizing harvest.

- *Staff:* To truly focus on feral swine control, a full time employee dedicated to developing and implementing a strategic plan for feral swine control is a necessity.

- *Hunting/shooting:* The Commanding General's Natural Resources Advisory Council is a forum comprised of a chairman (military O-6),voting representatives from Subordinate Command units and non-voting members from various directorates, other tenant units and staff agencies. The objective of the Advisory Council is to keep the Commanding General advised on the scope and character of hunting, fishing, and other natural resource issues on Fort Benning. The Advisory Council can be used to develop additional control measure strategies related to hunting. One possible approach is to consider expanding hunting and trapping opportunities. Additionally, volunteers can be issued special permits to shoot and trap feral swine in selected training compartments outside the current feral swine hunting season.

- *Trapping:* FortBenning's CB has been periodically trapping feral swine on the Installation since 1996. In-house trapping efforts occur as necessary to help lower feral swine numbers in and around sensitive locations. Use of multiple-catch box and corral traps is effective, but it can be logistically demanding. Long-term trapping may be feasible in sensitive areas such as relict trillium sites or in the UEAs. The CB has the capability to erect traps rapidly to handle urgent situations, such as damage to parade fields, bivouac areas or targetry and when feral swine invade cantonment areas. In addition to in-house trapping, Fort Benning has a volunteer trapping program to assist with control efforts.

- *Fencing:* Fencing has proven effective in protecting relict trillium sites. Fencing requires at least monthly inspections to repair damage from falling limbs and tree blowdown. In the future, it may be necessary to use fencing to protect other sensitive plant sites or training assets.

5.8 ACUB IMPLEMENTATION

Fort Benning is threatened with loss of mission capability due to encroachment from surrounding lands and limitations on full use of Installation lands for training activities and infrastructure. To date, the threats and limitations have been manageable. However, impending growth and development, training needs, and unrelenting stewardship responsibilities combine to increase the likelihood of both external and internal encroachment, representing new challenges for Fort Benning's training mission. An Army Compatible Use Buffer (ACUB) program is a logical and timely strategy to address these challenges. Another program that addresses encroachment is the Joint Land Use Study that is discussed in Appendix F2.

5.8.1 ACUB Plan Goal

An ACUB Proposal for Fort Benning (see Appendix F1) was developed during 2004-2005 that outlines the rationale and approaches to establish an ACUB around portions of Fort Benning, using a combination of no-development easements, conservation easements, and conservation-focused land acquisitions. The buffer lands are intended to facilitate training activities by: (1) channeling incompatible growth and development away from critical portions of the Installation boundary, and (2) reducing conflict between Fort Benning's training mission and its environmental stewardship responsibilities. Fort Benning's ACUB Proposal was developed by TNC in close partnership with Fort Benning's EMD, DPTMS, Range Division, and Staff Judge Advocate (SJA).

5.8.2 ACUB Policy and Guidance

The Sikes Act (10 USC 2684a) authorizes the DoD to partner with non-Federal governments or private organizations to establish buffers around installations. The Army implements this authority through the ACUB program, of which the Assistant Chief of Staff for Installation Management (ACSIM) has overall management responsibility. DoD's Readiness and Environmental Protection Initiative (REPI) provides funding for the military to work with state and local governments, non-governmental organizations (NGOs), and willing land owners to help prevent encroachment of training areas. The funding leverages public/private partnerships and additional financial commitments to promote innovative land conservation solutions that benefit both military readiness and the environment.

Fort Benning has made a substantial commitment to its ACUB program emphasizing multiple conservation benefits from buffering encroachment to protection and restoration of protected/listed species habitat. In 2009 the Army's Biological Assessment for the MCoE proposed to accelerate the ACUB program at Fort Benning and to develop and implement a "Red-cockaded Woodpecker Off-Post Conservation Plan" (included in Appendix E as part of the RCW ESMC), as well as establish a larger stakeholder partnership via a formal conservation partnership (Chattahoochee Fall Line Conservation Partnership), such as those established at Fort Bragg and Eglin Air Force Base. This Partnership was established in 2011, and it will continue to leverage resources and help develop the science necessary to protect and ecologically connect the buffer lands to Fort Benning.

5.8.3 ACUB Program Activities

Fort Benning's ACUB program is focused on implementing land protection strategies as presented in the ACUB proposal described in Appendix F1. By 2014, the ACUB program at Fort Benning intends to protect over 20,000 acres around Fort Benning via non-federal fee purchase acquisitions and permanent conservation easements with a goal of protecting about 40,000 acres by 2020. TNC along with partners intends to ecologically enhance over 20,000 acres by applying appropriate restoration and management techniques, such as prescribed fire and timber harvest. TNC works to develop the science and expertise necessary to restore, manage, and connect the ACUB landscape. TNC will also seek creative ways to increase non-military funding to support land protection and stewardship activities on ACUB as well as education and public outreach opportunities.

5.8.3.1 Project Review

While TNC is granted considerable latitude in reconnaissance and preliminary landowner contacts for potential ACUB projects, the responsibility to recommend projects for ACUB funding will lie with an ACUB Implementation Review Team consisting of representatives from Fort Benning's DPTMS, EMD of DPW, and SJA. Recommendations will be made to the Garrison Commander, and will be informed by TNC's best available information on opportunity, leveraged funding, training benefit, conservation value, and the priority guidelines described below. Review of overall ACUB implementation success by the DA's ACUB Program management staff will be conducted annually, with a biennial in-depth on-site review.

5.8.3.2 Prioritization

Specific strategies identified in the ACUB Proposal are spatially explicit and include overlapping areas that share the distinct goals associated with each strategy. Figure 5.8.1 illustrates the intersection and overlap of these strategy areas, from which four separate priority zones can be designated. Each of the four priority zones provide opportunities to prevent or divert encroaching incompatible land use, and/or to protect, secure, or restore habitat that will ultimately benefit Fort Benning's training mission. The four zones can be described and ranked as follows:

1. **Northeastern Buffer with Fall-Line Habitat.** This zone is highest priority and represents the intersection of the No-Development Zone with the northeast Fall-Line corridor. Proximity to Hastings Range, likelihood of development associated with the Fall Line Freeway, and Fall Line habitat potential combine to make it high priority. This zone also offers opportunities to secure Gopher Tortoise viability, watershed protection, RCW viability, and other Fall Line conservation targets. It ranks highly also because of significant funding leverage available from conservation partners interested in protecting rare plant communities in this area.

2. **Western Buffer with RCW Habitat.** This zone is also high priority and represents the intersection of the No-Development Zone with the western RCW corridor. Opportunity to expand RCW habitat off-Post, potential for development associated with Phenix City and Fort Mitchell, and proximity to Lawson Army Airfield combine

to make it high priority. Probability of success is somewhat lower than for Zone 1, due to less connectivity to existing RCW habitat on Fort Benning.

3. **RCW Habitat Corridor (west of Zone 2).** This zone is primarily of conservation significance, offering further opportunity to expand RCW habitat (and other mature-pine habitat conservation targets) off-post. It is also included because of significant funding leverage available from conservation partners interested in protecting and connecting such habitat throughout east-central Alabama. It ranks lower than Zone 4 due to lower connectivity to existing RCW habitat on Fort Benning.

4. **Northern Noise Buffer.** This zone is high priority due to its association with noise from ranges in the northern part of Post, and other training activities, and its current rapidly-developing status off-Post. With a few notable exceptions, it lacks broad habitat significance and in some cases may be too-far developed already. Much of it is already a smoke-sensitive area. High land values make this a high-cost area for purchasing land interests.

Additional areas around Fort Benning may become suitable for the ACUB program in the future and added as a priority by Fort Benning. Other site-level prioritization efforts are being developed and utilized to guide the ACUB program. A GIS Model which considers both human and ecological factors has been developed and used to analyze protection strategies. Additionally, species specific models (RCW & Gopher Tortoise) are becoming available to evaluate the potential of ACUB properties to support endangered species populations on Fort Benning.

5.8.4 ACUB Administration

5.8.4.1 Funding

Fort Benning's ACUB program competes with all other DoD installations for annual REPI funding. Historically, funding through this process has been low. The majority of Fort Benning's ACUB funding has been received through Army and Installation sources. Fort Benning's ACUB partner TNC, has also provided cost-share through grants (e.g. National Fish and Wildlife Foundation) and corporate and private donations. In the future, the ACUB program will also depend on Fort Benning's engagement in the Chattahoochee Fall Line Conservation Partnership (CFLCP) and the Partnership's ability to leverage and bring additional non-DoD funding to the program. However, there is no guarantee of military funding in the future.

5.8.4.2 Personnel

Fort Benning personnel provide government oversight of the ACUB program, of which TNC is the primary participant. The ACUB program is implemented via a cooperative agreement between The US Army Research Development and Engineering Command (now transferred to the Mission and Installation Contracting Command) and The Nature Conservancy on behalf of Fort Benning, where funding is provided to TNC for land acquisition and land management activities. TNC is co-located on Fort Benning with FBCB.

5.8.5 Progress of ACUB Program

The following summarizes progress of the ACUB program from FY 2001-2013:

Funding: Fort Benning was obligated $60.5M from various DoD sources to implement ACUB strategies. Majority of the funds were from Army sources. TNC and the CFLCP have contributed over $5M in partner-share via grants and donations, and continue to increase contributions.

Land Protection: Fort Benning's ACUB program has protected over 23,000 acres, with 80% in fee ownership by TNC and the remaining with permanent conservation easements. Current land protected areas is depicted in Figure 5.8.2.

Land Stewardship: TNC and the CFLCP are just beginning to scale up restoration and management of ACUB lands. Over 2,000 acres of longleaf has been planted, 700 acres of sandpine removed, over 5,000 acres burned, and various understory restoration projects are underway.

The CFLCP was formally chartered in 2011 and is composed of a nine member Steering Committee (Fort Benning, TNC, GA DNR, Chattahoochee Valley Land Trust, Joseph W. Jones Ecological Research Center, Longleaf Alliance, USFWS, GFC, and NRCS) along with 16 other organizations and individuals. The CFLCP goal is to provide strategic coordination and leveraged resources for land conservation, including Fort Benning's ACUB priority areas.

The timeline provided here begins with the identification of encroachment threats. Going forward (2014 and beyond), it presumes an annual review and evaluation of current implementation priorities.

Initiatives and Future Goals

2014-2018

- Continue to develop capacity for the CFLCP to support the ACUB Plan.
- Protect approximately at total of 40,000 acres for buffering and natural resource objectives
- Scale up restoration and management on ACUB.
- Develop and pursue long-term disposition strategies for the ACUB landscape such as GA-DNR Wildlife Management Areas, City Parks, TNC Preserve and other conservation buyer models.
- Identify mechanisms and funding sources for establishing long-term stewardship funding for ACUB conservation lands.

- Continue to evaluate and pursue opportunities for demographically connecting RCW and Gopher Tortoise populations on Fort Benning to the ACUB landscape and the ability of Fort Benning to count off-Post properties toward the RCW recovery landscape.

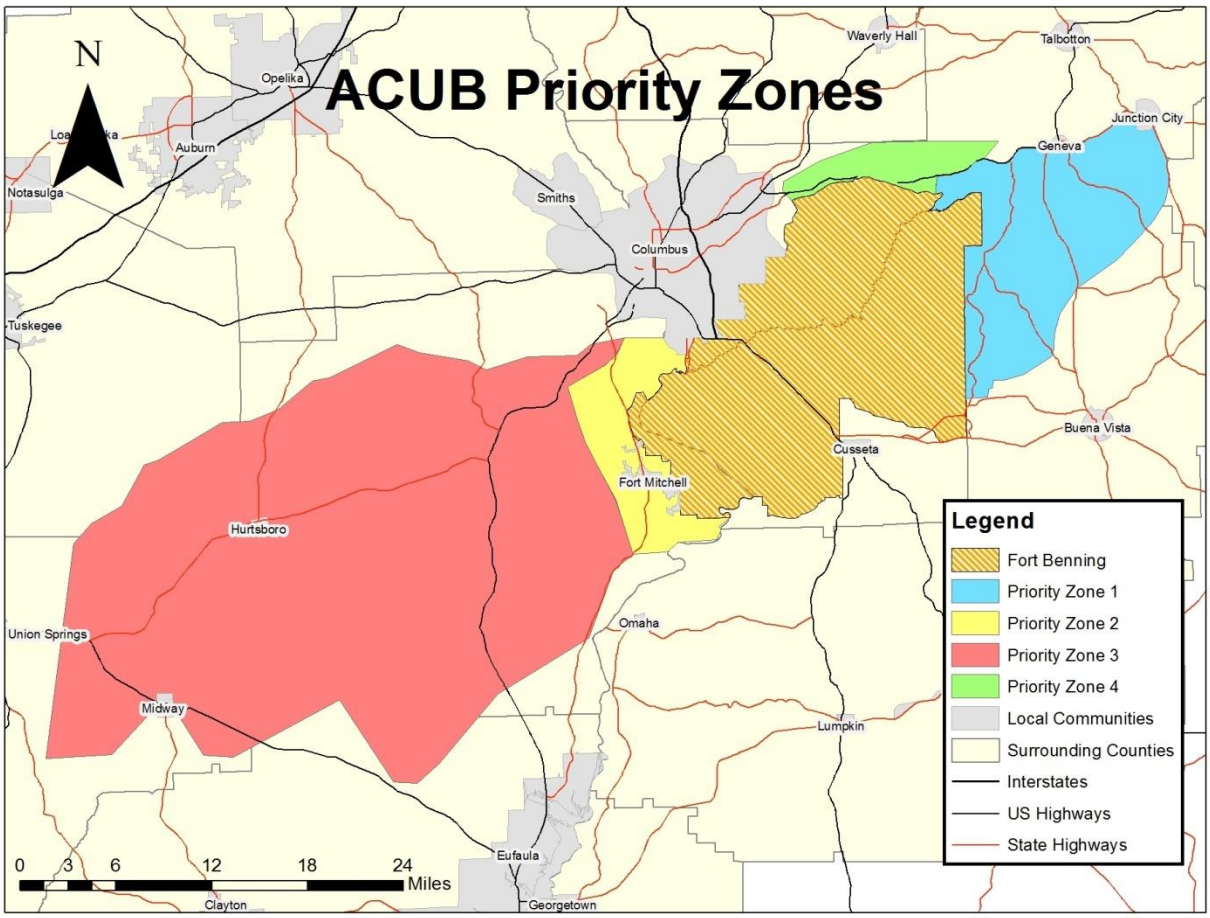


Figure 5.8.1. ACUB Priority Zones as of January 2014.

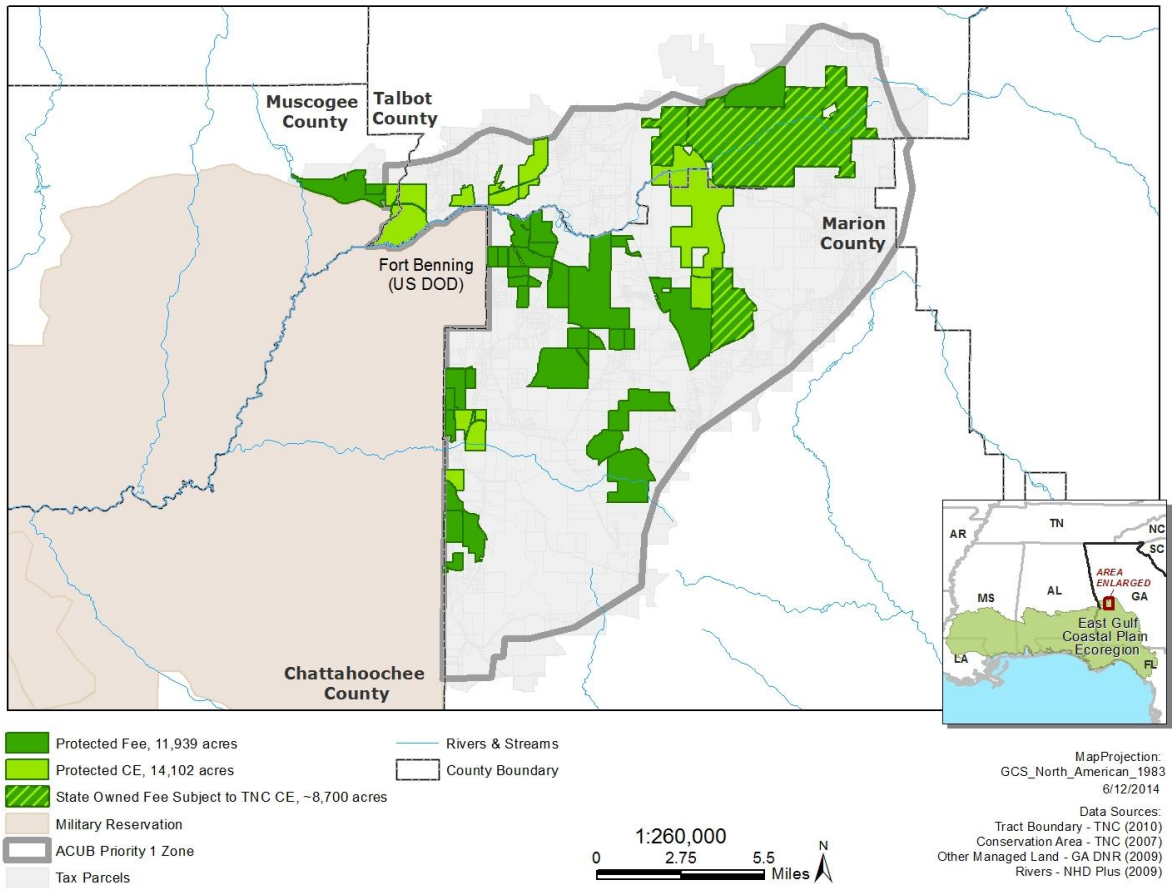


FIGURE 5.8.2 ACUB LAND PROTECTION AS OF JUNE 2014

CHAPTER 6 INRMP IMPLEMENTATION AND SUSTAINABILITY

To implement the INRMP effectively, priorities for projects, avenues for funding support, mechanisms for monitoring implementation of the INRMP and providing oversight, command support, coordination with conservation partners, and long-term strategies to achieve sustainability are needed. This chapter outlines the components, approaches, and strategies necessary for plan implemention. This chapter is devoted to describing how the INRMP will be implemented, especially what needs to be done, the desired end products, who will do it, how will it get funded, and how will our efforts be sustained into the future, as well as long-term strategies for sustainability of the military mission.

6.1 IMPLEMENTATION OF OPERATIONAL PLANS

Over the course of its implementation, the INRMP and its operational plans will:

- Enable Fort Benning to make progress toward achieving a sustainable natural resource base and a realistic training environment which is embodied in the diversity of the longleaf pine ecosystem
- Establish appropriate stewardship policies that serve to protect both natural and cultural resources
- Ensure compliance with environmental laws
- Provide a continuity of direction and effort that can accommodate changes in personnel and leadership
- Promote cost-effectiveness through better planning and coordination
- Promote good public relations by demonstrating the Installation's commitment to stewardship
- Make use of innovative strategies to accomplish specific management objectives

6.1.1 Needs and Responsibilities

Fort Benning is a huge land mass (approximately 182,000 acres) located in two states. There are 97 plants and animals on Fort Benning considered species of conservation concern due to some type of state or Federal designation (endangered, threatened, candidate, rare, at risk, etc). Under The ESA, Fort Benning is required to help recover the population of the RCW and relict trillium. For one of the Federally endangered species, RCW, Fort Benning has been designated as one of 13 recovery populations. In addition, relict trillium (*Trillium reliquum*), a Federally endangered plant species, depends on the continued viability of its populations at Fort Benning for its recovery. Fort Benning's forest resources are vast, including 137,000 acres of manageable forestland. Timber harvest, prescribed burning, and reforestation programs need to be substantial enough to ensure proper management of the timber resource and restoration of the longleaf pine system. Over 16,000 acres of wetlands are present that must be protected.

The Conservation and Land Management Branches of Fort Benning’s EMD have the primary role and responsibility for the implementation of the INRMP. The ITAM and the cultural resources program of EMD also are key players, as well as TNC. A large and diversified staff (described in Section 6.1.2) is necessary to support the training mission, to ensure environmental compliance, and to demonstrate to the American people that Fort Benning is a leader in environmental stewardship.

6.1.2 Human Resources

6.1.2.1 EMD Staffing

The Table of Distribution and Allownaces (TDA) approved staffing for the current natural resources organizations are presented in Figure 6.1 (Conservation Branch) and Figure 6.2 (Land Management Branch). The Conservation Branch has a TDA staff of 18 people addressing four program areas: Red-Cockaded Woodpecker, Threatened and Endangered Species, Soil and Wetlands Conservation, and Fish and Wildlife. Currently, there are 21 CB personnel (17 Government Civilian [GS] and 4 Contract Manpower Equivalents [CME]) —including the Chief, 12 RCW personnel (three biologists including a GS12 lead, nine technicians including two GS9 lead technicians), one soil conservationist, one soil conservation technician, one threatened and endangered species biologist, three threatened and endangered species technicians, one fish and wildlife biologist, and two fish and wildlife technicians.

The Land Management Branch has a staff of 16 personnel addressing three program areas: Forest Management, Fire Management, and Land Management Support. The current LMB staff of 17 includes a Chief, two lead foresters, one GIS forester, two foresters, 9 forestry technicians, and CME. Fort Benning will find it necessary to hire additional sources of temporary labor to assist in the completion of some projects. These temporary hires could include seasonal employees, university interns, Oak Ridge Institute for Science and Education (ORISE) hires, Student Conservation Association hires, and contractors. However, the core, permanent natural resources management professionals currently in-house provide the foundation and fulfill the supervisory roles necessary to continue the successful natural resources program at Fort Benning.

6.1.2.2 Outside Assistance

Despite a robust staff, the magnitude and complexity of the requirements are such that outside assistance often is necessary. The type of assistance can vary but usually takes the form of a partnership, which may involve funding, facilities to work in, support such as GIS, or simply an agreement on how two organizations will work with each other to achieve common goals. For example, a number of cooperative agreements have been established with TNC that provide a staff based at Fort Benning to assist with a variety of projects, including facilitation of the development of the INRMP, implementation of the INRMP, uneven-age sustainable forestry practices, and vegetation classifications. In addition, the TNC project director is able to work outside the boundaries of Fort Benning and address landscape-level conservation planning concerns.

A Memorandum of Understanding with the Natural Resources Conservation Service (U.S. Department of Agriculture) provides expertise and contract administration on soil conservation projects. The USFWS provides a satellite office co-located with natural resources personnel to facilitate coordination and consultation. The USFWS has the ability to work outside the boundary of Fort Benning and develop agreements with landowners concerning longleaf pine, RCWs, riparian area protection, and other issues. Many other players are involved, including USACE, the GADNR, ADCNR, the Georgia Environmental Protection Division, universities, contractors, and others facilitating numerous natural resources projects.

Figure 6.1.1 Conservation Branch Organization

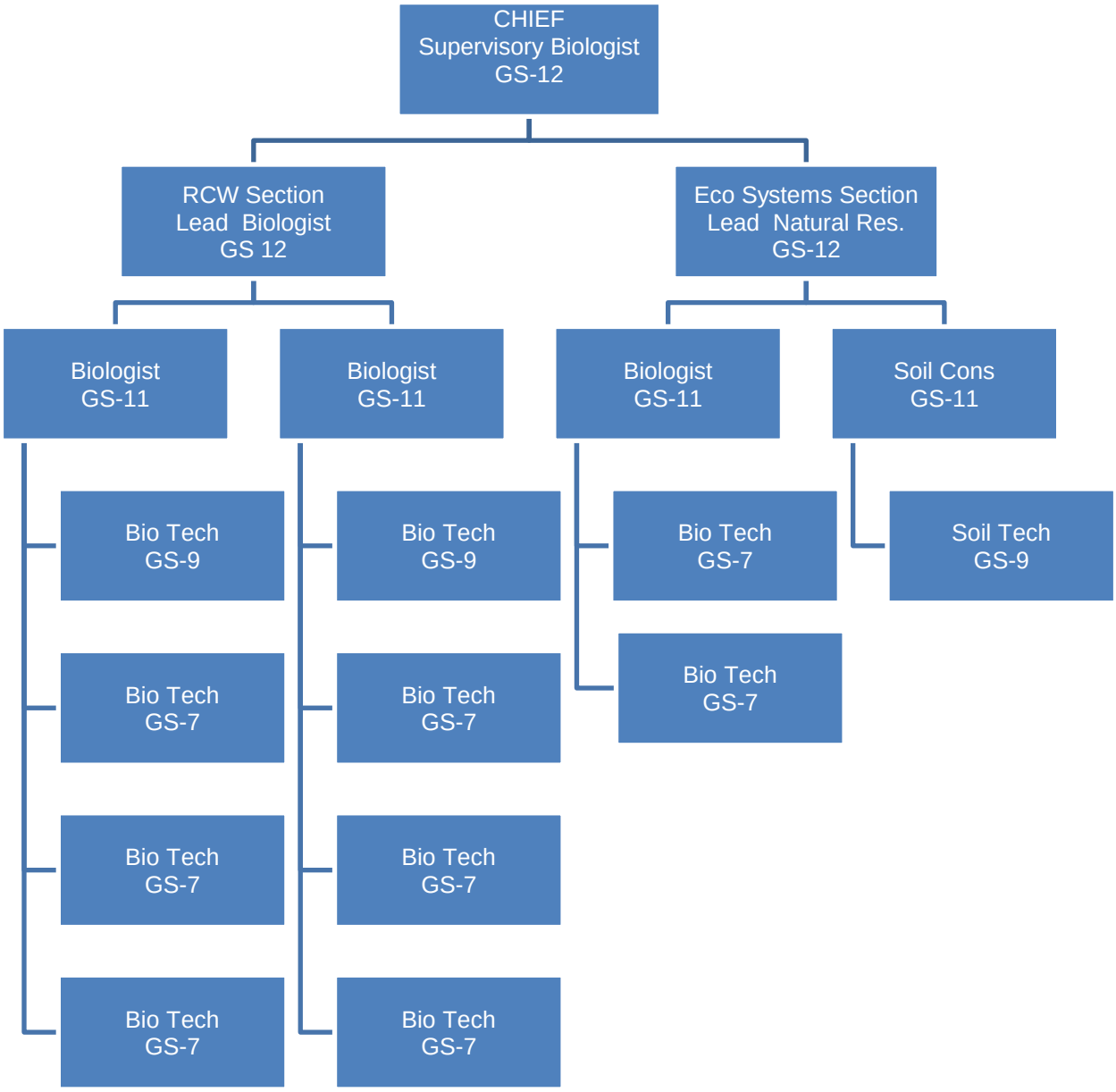
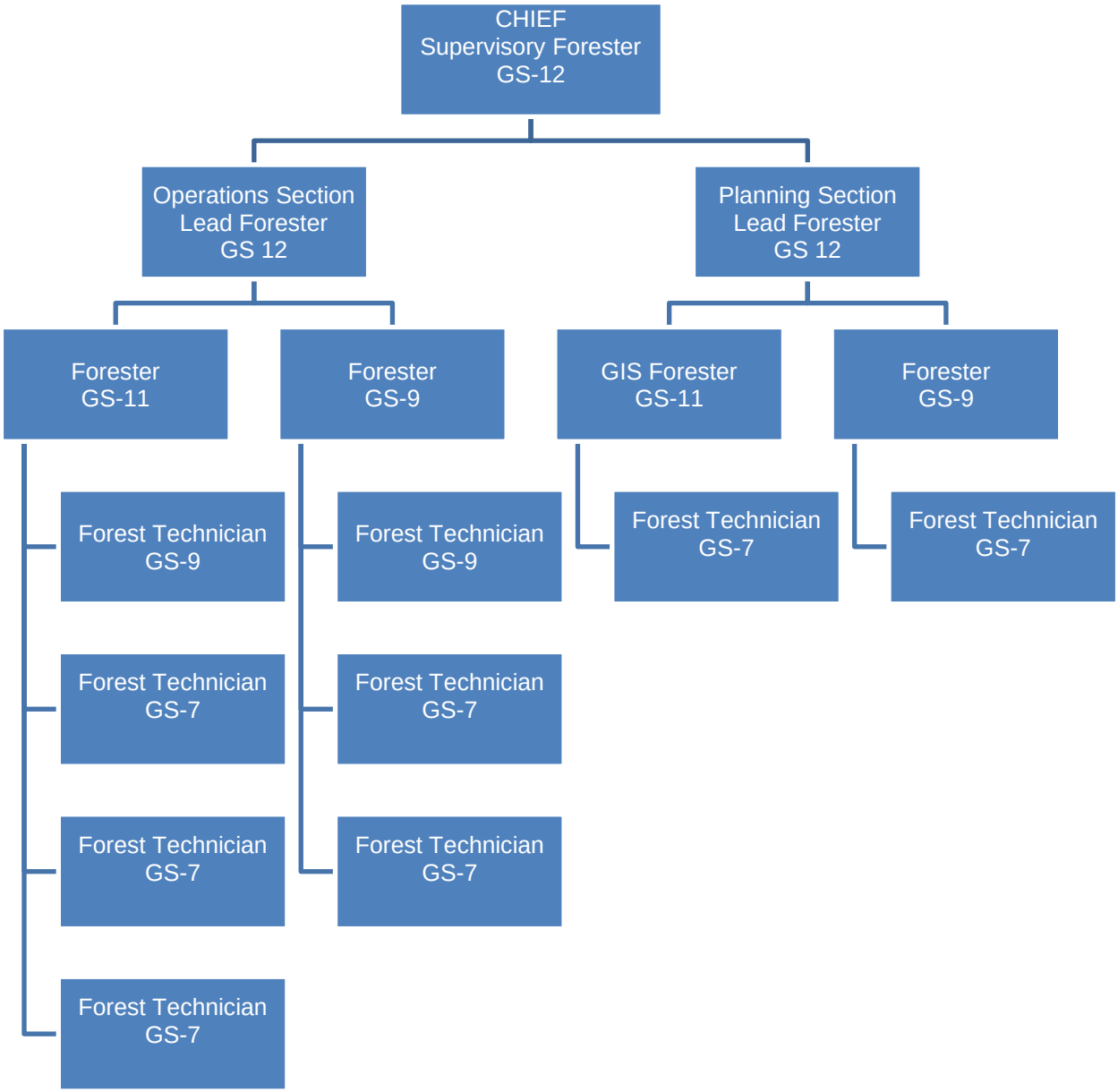


Figure 6.1.2 Land Management Branch Organization



6.1.3 Projects and Priorities

Fort Benning's identification and prioritization of current and future projects are guided by a number of interrelated elements, including a vision statement, mission statement, issues, goals and objectives, and desired future ecosystem conditions. Fort Benning's approach to natural resource management is captured in the Installation's vision of the relationship between its military mission and the natural resources upon which that mission depends. The Installation also has developed a natural resource management mission statement that provides an overarching premise for how Fort Benning will manage its lands. These statements are:

Fort Benning Natural Resource Vision Statement: Support the military mission while promoting the ecological integrity of the Fort Benning landscape.

Fort Benning Natural Resource Mission Statement: Through a collaborative effort between natural resources professionals and military personnel, Fort Benning will strive to promote the long-term ecological sustainability of its lands for multiple-use opportunities. Fort Benning will apply sound land management practices and adaptive management strategies that conserve ecological integrity through the restoration, maintenance, and preservation of natural biotic communities and otherwise promote the health of Installation ecosystems through rehabilitation and maintenance. This ecosystem management approach will encompass stakeholder interests, regulatory requirements, and fiscal constraints.

Issues: An issue is defined as a point of debate, discussion, or dispute. From a natural resources management perspective, an important step in the management planning process is the identification of issues. Issue development helps to identify a concern, explains why it is important, and provides direction in its resolution. Well-developed issues can serve as the basis for focused goals and objectives.

Goals and Objectives: The management goals and objectives define the broad, overall natural and cultural resources management direction for Fort Benning. In the context of this plan, goals are defined as the general target or end result desired to be achieved through integrated resource management. Objectives are defined as more specific targets of which attainment will contribute to the accomplishment of management goals. Tasks are the actual activities and projects that will attain the objectives. These goals, objectives, and tasks are presented throughout Chapter 5 (Operational Plans by Program Area).

Desired Future Ecosystem Conditions: A desired future ecosystem condition (DFEC) "is an attempt to envision all aspects of an ecosystem in the future, including human organization and needs, in measurable terms" (Leslie and others 1996). The DFEC is an end state that will be realized if goals and objectives are met. The DFECs are expressed in the context of a military training environment and are organized around the central theme of ecological integrity. Desired ecosystem conditions should be achievable and based on the natural or historic range of ecosystem variation as best as can be determined. Some key DFECs include in abbreviated form: The RCW population is recovered, landscape-scale native species richness are maintained, invasive species are controlled, at least 80,000 acres on Fort Benning are managed as pine and mixed pine/hardwood with longleaf as the predominant upland species, fire-adapted communities burn every one to three years, hardwood community diversity includes viable populations of all alliances, hydrologic regimes and erosion rates reflect natural rates, and ecotones are the result of dynamic ecosystem processes.

Operational plans (Chapter 5) are the implementation vehicle for management objectives. Operational plans describe what is being done, when it is being done, where it is being done, and how it is being done. Operational plans describe current management activities and list future potential projects (tasks) designed to meet the program objectives.

A project is defined as an activity that has a definable product, a time limit, and a cost associated with it and, that when completed, will assist in meeting a management objective. For example, projects include the development of a plan, a program, a strategy, a protocol, a model, a study, a research project, a construction project, a survey, or criteria to characterize something. These projects may be done in-house, by contract, or both.

Year-to-year congressional appropriations may affect the Army's mission or lead to changes in Fort Benning's mission. Mission changes and funding availability may affect the ability to conduct certain projects and the prioritization of those projects. Those projects which require funding will proceed only once funding is obtained. Nothing in this plan can be interpreted to violate the Anti-Deficiency Act. In every case, Fort Benning will ensure that constraints on the military mission are minimized and avoided whenever possible with a goal of being invisible to training

6.1.4 Funding Options

6.1.4.1 Environmental Program Requirements

Funds for most natural and cultural resource programs, (other than forestry, game and sportfish), are acquired through the annual GERB reporting system which requests Operations and Maintenance, Environmental Conservation Funds. Annual funding requests are submitted to IMCOM in the spring and projected for five years. In 2013, Fort Benning requested $2,555,438 from 26 GERB submissions addressing pest plants (kudzu), TES management (primarily RCW), soil conservation projects, and archeological support for endangered species. The legal driver for most GERB projects are the BOs of 2002 (RCW ESMP), 2004 (DMPRC), 2007 (BRAC/Transformation), and 2009 (MCoE). The projected natural resource GERB projects for Fort Benning from FY 2014-2018 are provided in Table 6.1.1

6.1.4.2 Forestry Funds

Fort Benning receives about $100 to $200K annually to fund the operation of the Forest Management Program. The Forestry Reimbursable Funds are received through IMCOM. The funds are derived from proceeds of forest product sales from all Army Installations. Fort Benning produces about $100K to $200K annually from timber sales, which indirectly help fund the account. By law the funds can only be used for reimbursement of expenses directly related to the economic production of timber products and its harvest.

6.1.4.3 Fish and Wildlife

Fish and Wildlife Conservation Funds are obtained from the sale of hunting and fishing permits. Ten percent of the funds collected go to DFMWR for administration related to permit sales while the other 90% is deposited to the Army account 21X5095. Current fees for hunting permits are $28 for Soldiers rank E1-E4 and $31 for all other hunters. Fishing permits are $12 for Soldiers rank E1-E4 and $15 for all other fishermen. Soldiers rank E1-E4 can purchase a combination hunting and fishing permit for $32 while all other sportsmen pay $37. The reduced fee for Soldiers rank E1-4 is allowed by AR 200-1. However, DODI 4715.03 states that everyone should be charged the same fees. This conflict is being reviewd by HQDA and until such time as the discrepancy is resolved Fort Benning will continue to provide reduced fees to junior

Table 6.1.1 Garrison Environmental Requirements Build (Dollars) FY 2014 – FY 2018

	FY14	FY15	FY16	FY17	FY18
1. DMPRC, BRAC/MCoE Conservation Compliance Support - ESA, C0	$188,849	194,514	200,349	206,360	212,550
2.TES Management Supplies and Equipment - ESA, C0	$84,000	$86,520	89,115	91,788	94,541
3. Endangered Species Mgt, Surveys, Monitoring - ESA, C0	$112,875	97,850	100,785	103,808	106,920
4. Endangered Species Heavy Maneuver Effects Vegetation Monitoring - ESA, C1	$90,000	92,700	95,481	98,345	101,295
5. Wetlands Protection - C1	$32,000	32,960	33,948	34,967	36,016
6. Endangered Species Heavy Maneuver Effects (Hayden Model) - ESA, C1		270,950		287,370	
7. EOD Support for RCW in A20 - ESA, C1	$90,000	92,700	95,481	98,345	101,295
8. Invasive Plant Control - C2	$110,800	85,800	86,374	91,025	93,755
9. Herbicide Midstory - ESA, C0	$70,000	72,100	74,260	76,490	78,784
10. Comply with BO Erosion Control Plan Implementation - ESA, C1	$315,000	324,450	334,180	344,170	354,500
11. Gopher Tortoise Monitoring - C0	$53,000	54,590	56,227	57,900	59,640
12. Endangered Species Planning Level Surveys - C2	$200,000	206,000	212,180	218,470	225,000
13. Wildfire Detection Services - ESA , C0	$15,102	$15,102	$18,000	$18,500	$19,000
14. Natural Resources Support-Fire/Habitat Management - ESA, C0	$85,806	$88,380	$91,031	$93,763	$96,575
15. Consultation with Federally Recognized Tribes- C0	$60,000	$61,800	$63,654	$67,530	$69,556
16. Historic Properties Projects Review- C1	$63,000	$64,890	$66,837	$68,842	$70,907
17. Architectural Historian- C1	$85,000	$87,750	$90,177	$92,882	$95,668
18. Forest management / Wildfire Suppression Operational Expenses - ESA,C0	$120,000	$123,600	$127,308	$131,127	$135,061
19. Aerial Photos for Natural Resources Management - ESA, C1	$0	$25,000	$0	$30,000	$0
20. Reforestation of Longleaf Pine - ESA, C1	$266,530	$274,526	$282,762	$291,245	$299,982
21. Endangered Species Habitat Protection -C2	$64,400	66,332	68,321	70,371	72,482
TOTALS	$2,106,362	$2,418,514	$2,186,470	$2,573,298	$2,323,527

*** ESA – Endangered Species Act Requirement*
**** C0 – Class Zero, C1 – Class One, C2 – Class Two*

enlisted personnel. Guest permits can be purchased in durations varying from 1 to 30 days with costs between $10 and $175. The goal is to generate about $100K annually from the sale of these permits to be used for management of game and sport fish. These funds are used to purchase supplies and support some manpower requirements to manage wildlife openings, stock, fertilize, and lime fishing ponds, print hunting and fishing regulations, purchase and maintain tractors and other equipment, and other related requirements. Generally, funds are not sufficient to cover all Fish and Wildlife funding requirements.

6.1.4.4 Integrated Training Area Management Funds

ITAM funding is obtained by annual submission to TRADOC of the Work Plan. The total Fort Benning requirement for fiscal years 2014 through 2018 totals $18.5M (Table 6.1.2). When adequately funded, the ITAM program helps sustain training lands via maintenance projects to correct soil erosion problems in heavy maneuver areas.

6.1.4.5 Other Funds

Other funds that may become available to complete projects include DoD Forestry Reserve Account, DoD Legacy Grant, construction project mitigation funds, U.S. Department of Agriculture (Pest Management Board) funds, DoD "Sustainable Forests, Protecting Our Future" funds, and end-of-fiscal-year funds (subject to availability of Funds).

6.1.4.6 Summary of INRMP Implementation Costs

The average annual costs of fully implementing the INRMP are presented below by funding category. These total annual costs represent an estimate of the cost of implementation: however, some variability from year-to-year can be expected. Average annual costs are presented in Table 6.1.2.

The total average annual funding necessary to fully implement this INRMP from FY 2014 through FY 2018 is approximately $9.4M. The total cost over five years of fully implementing this INRMP is approximately $19.5M (not including ITAM).

Table 6.1.2 Summary of Implementation Costs (Dollars)

PROGRAM	FY14	FY15	FY16	FY17	FY18
Garrison Environmental Requirements Build	2,106,362	2,418,514	2,186,470	2,573,298	2,323,527
DA Civilians	2,909,075	2,996,347	3, 086,237	3,178,824	3,274,188
Forestry	200,000	206,000	212,000	218,000	255,000
Fish and Wildlife	100,000	100,000	100,000	100,000	100,000
ITAM	3,000,000	3,500,000	4,000,000	4,000,000	4,000,000
TOTALS	8,315,437	9,220,861	9,584,707	10,070,122	9,952,715

6.1.5 Command Support

The Garrison Commander and other personnel on command positions at Fort Benning fully support this INRMP. The command is dedicated to ensuring the long-term sustainability of the natural resources and the management of those resources necessary to support the military mission. The Garrison Commander should lead in environmental stewardship by ensuring that personnel at all levels are fully engaged in the daily activities necessary for protection and enhancement of natural resources. To ensure top-down implementation of this INRMP, the command should project natural resources protection as a vital part of mission implementation. Leadership should impress upon all personnel the importance of each individual taking responsibility for his or her role in carrying out of the provisions of the INRMP. To put the need for appropriately managing our natural resources into perspective, the command should emphasize that natural resource protection is just as important as other mission fundamentals. General Dennis J. Reimer, former Chief of Staff, Army, said it best:

> "Environmental responsibility involves all of us. The environmental ethic must be part of how we live and how we train. By working as a team we can preserve both the natural diversity of military training areas and our opportunity to train the way we plan to fight now and in the future."

The command should hold each responsible individual accountable for actions required by this INRMP and other applicable environmental requirements, by use of the established disciplinary system.

The Garrison Commander should require integration of natural resource stewardship early in the planning process. Proponents of projects or training should coordinate with the appropriate environmental staff in sufficient time to incorporate any input or make any necessary changes to the planned activity. This can be accomplished by inviting environmental specialists to participate in project planning meetings and submitting requests for environmental evaluations early in the process.

Implementation efforts must be realistically evaluated and revised as needed. The Installation Commander has various committees tasked with duties that will assist with implementation of the INRMP, such as Environmental Quality Control Council (EQCC), Staff Assistance Visit, and specially designated Process Action Teams. Annual and periodic review processes such as the Installation Status Review (ISR), Environmental Performance and Assessment System (EPAS), Army Environmental Database – Environmental Quality, the annual BO update to USFWS, and the annual RCW status report to USFWS and DoD are all mechanisms to monitor the success of INRMP implementation.

6.2 LONG-TERM STRATEGIES FOR SUSTAINABILITY

The original development of EOs 13423 and 13514, their directives', Fort Benning's 25 Year Strategic Sustainability Plan, and the Army's Sustainability Program Guidelines have been incorporated into the DoD's new policy and guidance of "Net Zero Installations" - Energy, Water and Waste. As well these have been respectively integrated into Fort Benning's Long Term Sustainability Strategy including the Maneuver Center of Excellence "Key Tasks" and IMCOM's Lines of Effort. This most recent strategy of Net Zero has given increased focus to the Installation's sustainability planning initiatives that will help to reduce overall energy dependency and the Installation's carbon footprint.

Fort Benning remains focused in the support of its primary missions: military training, force projection, and providing a quality community for the Soldiers including their Families, and others living and working on the Installation. To achieve the Installation's Sustainability Initiative goals, Fort Benning is developing long-range objectives and targets that integrate these priorities. As the Army Strategy for the Environment explains, sustainability "meets current as well as future mission requirements worldwide, safeguards human health, improves quality of life, and enhances the natural environment." The biotic aspect of long-term sustainability planning is achieved by ensuring the ecological integrity of natural resources to make the land sustainable for future Soldiers and missions. Maintaining the quality of life for Soldiers, their Families, and Installation personnel requires safeguarding natural systems and working effectively with the community.

The long-range plans of the Sustainability Initiative are achieved through creation of first its measurable shorter-term goals that seek to decrease adverse impacts to the environment through such mechanisms as the INRMP and the Environmental Management System (EMS). The long term goals are as important though they may be considered more fluid with respect to the ever changing developments around the world and the Army's role in those developments. Fort Benning's EMS is based on the International Organization for Standardization 14001 Standard (ISO 14001) for EMS, which utilizes a "Plan, Do, Check, Act" cycle for continual improvement. The EMS reviews Fort Benning's activities and determines those that have a significant impact on the environment. Objectives and targets to decrease identified impacts are established, and Environmental Management Programs are formulated to achieve these objectives and targets.

The EMS, INRMP, and Installation Sustainability Initiative are closely linked. Sustainability is a cross-functional concept that encompasses both the natural and built environments and includes such components as operations and land management. Sustainability planning incorporates natural resource considerations into decision-making, and the INRMP provides the information needed to achieve those goals and objectives. The EMS also provides shorter-range, measurable objectives to help achieve the long-range goals of overall Installation sustainability of its infrastructure and economic, social aspects, as well as environmental components.

6.2.1 Installation Sustainability Initiative

Fort Benning has made significant strides by championing projects that curtail the Installation's overall carbon footprint, as is the case with maximum support in Virtual Training Simulators that conserve energy and reduce impacts on the environment, the introduction of advanced Waste to Energy Technologies reducing our energy dependency and carbon footprint, as well as minimal training expansion into forestry lands while planting thousands of additional acres in new trees that capture and sequester carbon. These on-going investments in sustainability benefit not only Fort Benning but the entire region in reducing the overall carbon footprint.

Fort Benning has over 137,000 acres of manageable forestland and approximately 16,900 acres of wetlands. For sheer scale and natural diversity, no place in the vicinity can rival Fort Benning. The Installation is known to shelter 340 species of wildlife—including the bald eagle, RCW, and gopher tortoise (Georgia's state reptile). This irreplaceable natural heritage is matched by Fort Benning's rich historic and cultural legacy. EMD consults with the Tribes that have historic ties to the Chattahoochee River Valley, and the Cultural Resource Management Program includes over 4,000 cultural resources sites that have accumulated over the past 12,000 years or more

including over 600 historic buildings and structures. Fort Benning also has one National Historic Landmark – Uchee Town, on the Alabama side of the reservation.

Fort Benning's Sustainability Program is in close planning and support EMD's efforts but alsohas responsibility for and expertise in, the following areas:

- Leadership in Energy and Environmental Design (LEED)
- Fort Benning's Net Zero Tracking Report
- Carbon Analysis of Production and Sequestration on the Installation
- Sustainability, Garrison and MCOE Plans Integration
- Environmental Management Systems Review
- Advanced Energy Technologies Analysis
- Sustainable Out Reach Program
- Public Public Shared Services Program

Fort Benning's Sustainability Program is committed to maintaining the Installation in a way that supports all the Army's missions, while safeguarding natural and cultural resources. Being a full partner with other communities in the region is essential to this effort and sustainability iskey.

6.2.1.1 Mission and Capabilities

To become a sustainable Installation, Fort Benning must manage its resources to support the present mission, which is to provide trained, adaptive, and ready Soldiers and Leaders for an Army at War, while developing future requirements for the Individual Soldier and the Maneuver Force, and providing a world class quality of life for our Soldiers and Army Families.

Fort Benning is an Army power projection platform with intense, realistic military training critical to its mission. At 283 square miles, the Installation is one of the largest in the world. Fort Benning's training areas consist of ranges, impact areas, drop zones, and maneuver areas. The training mission at Fort Benning requires intensive land use, and Fort Benning's training areas are used almost every day of the year by active, Reserve, and National Guard units.

Fort Benning proper is a city unto itself. In addition to barracks for thousands of single Soldiers, there are over 4,000 family housing units on the Installation for married officers, and enlisted Soldiers and their Families. The post has seven schools as well as a major hospital, childcare facilities, numerous chapels, banks, restaurants, post exchanges, service stations, campgrounds, swimming pools, and most other types of facilities found in a civilian city of equivalent size.

Fort Benning has a long and distinguished history supporting Army active and Reserve component units, Air Force, Marine Corps, Army civilians, military families, retirees, and veterans. It maintains combat ready forces through tough, realistic training that benefits from unrestricted access to the lands and resources on Fort Benning. How well Fort Benning takes care of its lands will define the Installation's legacy for future generations. In sum, Fort Benning has a responsibility to sustain its resources through the manner in which it designs, builds, transports, and otherwise performs its mission, as it transforms its weapons systems, tactics, infrastructure, and assets in the coming decades.

6.2.1.2 Strategic Approach

The Plans, Analysis and Integration Office (PAIO) realized the importance to manage, measure,

monitor, and continuously improve if Fort Benning is to forward energy independence and remain a significant carbon consumer and storage reservoir for our region. Currently, the Installation utilizes the "Fort Benning 2012 Net Zero Tracking Report" which has three main objectives that ensure continuous improvement in reducing the overall footprint on the Installation: 1) Baseline and Track Fort Benning's Energy, Water, and Waste Equivalent Carbon Production, 2) Baseline and Track Fort Benning's Carbon Capture, Sequestration and Offset, and 3) Advance the Net Zero Mission through informed planning while ensuring a continuous improvement path.

Other areas being quantified are the extensive tree stand verifications and basal concentration analysis, both in carbon consumption and storage above and below ground. Installation personnel manage and monitor forest stands through an active control plan to enhance tree growth, avoid deforestation that may be the result of improper planning, reforestation of thousands of acres through the planting of tree saplings, promote minimal impact on the environment with Soldier training by increasing the use of virtual simulators, and by promoting all sustainable tools available such as ensuring LEED in all construction projects. By producing the Net Zero Tracking Report Fort Benning is continuously improving with proper analysis and planning that promotes Sustainability.

A shrinking Army, dwindling resources, and increased commitments present daunting challenges for Fort Benning. These challenges will require the Installation to better manage for the future to accomplish its mission, safeguard people's quality of life, and protect human health and the environment. By applying the principles of sustainability, Fort Benning will become a "flagship" Installation capable of supporting Army operations throughout the world.

Fort Benning initiated its planning for sustainability with a commitment to balancing the "Triple-Bottom Line" of mission, environment, and well-being. Using the Natural Step Framework, Fort Benning conducted its first sustainability workshop in June 2004 when it encouraged participants to identify major focus areas into which all Installation activities fall, as well as potential impacts that affect its mission and the surrounding communities. Additionally, workshop participants evaluated interactions they have with Fort Benning's environment. Ultimately, this process produced both 5 Year and 25-year sustainability goals for Fort Benning.

6.2.1.3 Climate Change and Strategies for Adaptive Management

The updated guidance for INRMPs (DoDI 4715.03, March 2011) added a requirement to consider climate change in INRMPs. Natural resources managers may use models to predict climate changes and evaluate needed research, data collection, and potential future management strategies as they make changes in ecosystem structure; however, due to their uncertainty, these models should be used to support and not guide environmental planning and natural resources management decisions.

Scientific research indicates that climate change will have long-term, irreversible, adverse consequences on natural resources, including terrestrial and aquatic habitats. Currently, models are the only way to project future changes for Benning and the surrounding region, and to evaluate needed research, data collection, and potential management strategies. A range of scenarios is possible using accepted models, and local data sets need to be developed and integrated through collaboration and consensus.

Key questions for NEPA analysis include whether the proposed action is expected to cause climate change effects, whether the proposed action combined with other past, present, and

reasonably foreseeable actions would cause such effects, and whether sufficient information is available to describe the nature and extent of the proposed action's effect. Developing mitigation for climate change should be included in NEPA analysis, and support the sustainability of natural resources and military mission. Mitigation of the potential adverse effects of climate change should be focused on adaptive management to achieve annual and long-term planning goals for conservation and sustainability.

Strategies for adaptive management to mitigate potential adverse effects of climate change are summarized as follows:

1) Identify data and research needs for ensuring an effective response to the impacts of climate change:

- Identify species and communities resilient/vulnerable to climate change impacts by conducting climate change vulnerability assessments
- Improve the application of models through data collection and validation (as feasible and needed) and for using such science-based models in environmental and natural resources management planning
- Improve the graphical depiction of the potential impacts of climate change on species ranges and population abundances in climate change vulnerability assessments

2) Adapt and mitigate the adverse impacts of climate change, including stresses on infrastructure, aquatic vegetation, erosion, and shifts in distributions of terrestrial endemic species ranges and population abundances, and plant communities:

- Ensure that species/community conservation priorities and expenditures reflect climate change risks, such as those on the margins of their distribution patterns
- Identify restoration projects to provide habitat elements for specific species, which could be altered by climate change
- Provide for the management of threatened, endangered, and other special status species to avoid or minimize impacts from climate change
- Monitor plant community composition and productivity for changes in status, or condition attributed to climate change and implement management strategies to address these concerns
- Monitor intertidal and near shore environments for changes in status, or condition attributed to climate change and implement management strategies to address these concerns

3) Address the impact of human use of resources by emphasizing preventative technologies:

- Improve water conservation
- Improve storm water management through use of low impact development technologies
- Improve coordination between natural resources and development project proponents to ensure more energy-efficient design features.

4) Ensure that Benning personnel have access to climate change education and outreach in order to help minimize effects of climate change through modification of individual behavior and lifestyle consumption patterns that contribute to climate change.

6.2.2 Fort Benning's Sustainability Management System

Fort Benning began its Sustainability Program at the Installation's Sustainability Goal Setting Conference in May 2005. Fort Benning, HQDA, and members of the local and regulatory communities convened to establish aggressive, realistic, and quantifiable goals; develop a reporting mechanism to keep leadership informed and ensure planners stay the course; and work with community stakeholders to ensure Fort Benning's history of proud service to the nation and the local area continues. Even today many years later this effort has played a significant part in overall Installation planning and will continue to do so. Fort Benning continues to develop and institute EMS for the Installation and its lands to help ensure mission requirements continue to be met.

An EMS is a management system that integrates environmental accountability in both daily and long-term decision making. It provides an explicit structure to manage activities and processes and decrease negative impacts to the environment. The measurable goals, objectives, and targets of the EMS are reviewed and updated yearly per the guidance found in the 1998 *Environmental Management Systems Primer for Federal Facilities*.

The Army had based its EMS procedures under EOs 13148 and 13514 and on ISO 14001. ISO 14001 is an internationally accepted standard, not an environmental compliance system, that allows Fort Benning to develop the most effective way to manage its unique environmental activities. Many entities around the world, including Fort Benning, use the approach of "Plan, Do, Check, Act," to establish an Environmental Policy. Fort Benning's Environmental Policy establishes the overall direction for the Installation's EMS and a commitment to execute the mission while being environmentally responsible.

The "Plan" phase occurs when Fort Benning reviews all of its operations to identify those that may have a significant impact on the environment and ascertain what legal requirements apply. With this information, the installation creates objectives and targets to reduce impacts and improve upon the identified operations.

The "Do" phase occurs when Fort Benning implements activities to achieve the objectives and targets that were established in the Plan phase. Implementation occurs through developing a structure of responsibilities and establishing lines of communication, as well as by training personnel and documenting current and future EMS activities for reducing environmental impacts.

The "Check" phase occurs when Fort Benning is monitoring and measuring its activities and correcting deficiencies. In addition, the EMS team will periodically audit the EMS to ensure that it is working properly and that legal requirements are being met.

The "Act" phase occurs when Fort Benning's top management within an organization meets to review records and audit results to verify that the EMS is being implemented and is functioning correctly. During this phase, methods to improve the existing system are developed and evaluated.

Implementing Fort Benning's EMS will help to ensure long-term mission viability and preserve Fort Benning's resources for its Soldiers and future generations.

APPENDIX A

FORT BENNING LANDSCAPE

APPENDIX A1 PHYSICAL SETTING

A.1.1 TOPOGRAPHY

Most of Fort Benning is located south of the Fall Line; however, there is a small area of the Piedmont Province located in the northeastern part of the reservation. The Fall Line is defined by the overlap of Coastal Plain strata on top of Piedmont rocks. This is also the area where the Piedmont basement rocks are first exposed in streams flowing to the Atlantic Ocean and the Gulf of Mexico (Gulf South Research Corporation 1999).

The location of Fort Benning in relation to the Fall Line makes the Installation unusual. The result is the overlapping diversity of Piedmont and Coastal Plain habitats and the associated occurrence of ecotonal plant and animal communities. The effect is not limited to terrestrial communities, but also is reflected in the physical features and biotic composition of the streams that pass through or arise within the installation. The predominately rolling terrain is highest in the east, rising approximately 740 feet above sea level, and lowest in the southwest along the Chattahoochee River, about 190 feet above sea level (Figure A.1.1).

Along the Fall Line Sandhills, crystalline rocks of the Piedmont are overlain by marine or fluvial sediments. The crystalline and sedimentary deposits may be exposed in relatively close proximity. For this reason Fort Benning contains a varied topography. Upland slopes range from steep to gently sloping and comprise most of the land on the installation. The remaining area consists of relatively flat uplands or terraces adjacent to or near the Chattahoochee River (Benson 1997).

A.1.2 SURFACE GEOLOGY

The surface geology at Fort Benning is depicted in Figure A.1.2. The sedimentary sequences of the Coastal Plain that overlie the crystalline basement rocks at Fort Benning consist of materials deposited during the Cretaceous, Tertiary, and Quaternary Periods. The Cretaceous Period sediments form the uplands and consist of the five following geologic formations. Descriptions are taken from Reinhardt and others (1994).

- Kr - Ripley Formation (Upper Cretaceous): Fine to very fine, calcareous quartz sand, massive burrowed to bioturbated, greenish-gray, weathers to dusky yellow, contains abundant muscovite, glauconite, and locally abundant carbonaceous debris; local clean quartz sand lenses. Ledge-forming, carbonate-cemented sand beds and calcareous concretions are common in upper part of unit. Thickness ranges from 133 to 250 feet. The Ripley Formation is found only along the southeastern boundary of Fort Benning. This area is also where the highest elevations on the installation are found.

Figure A.1.1 Topography and Drainage Network

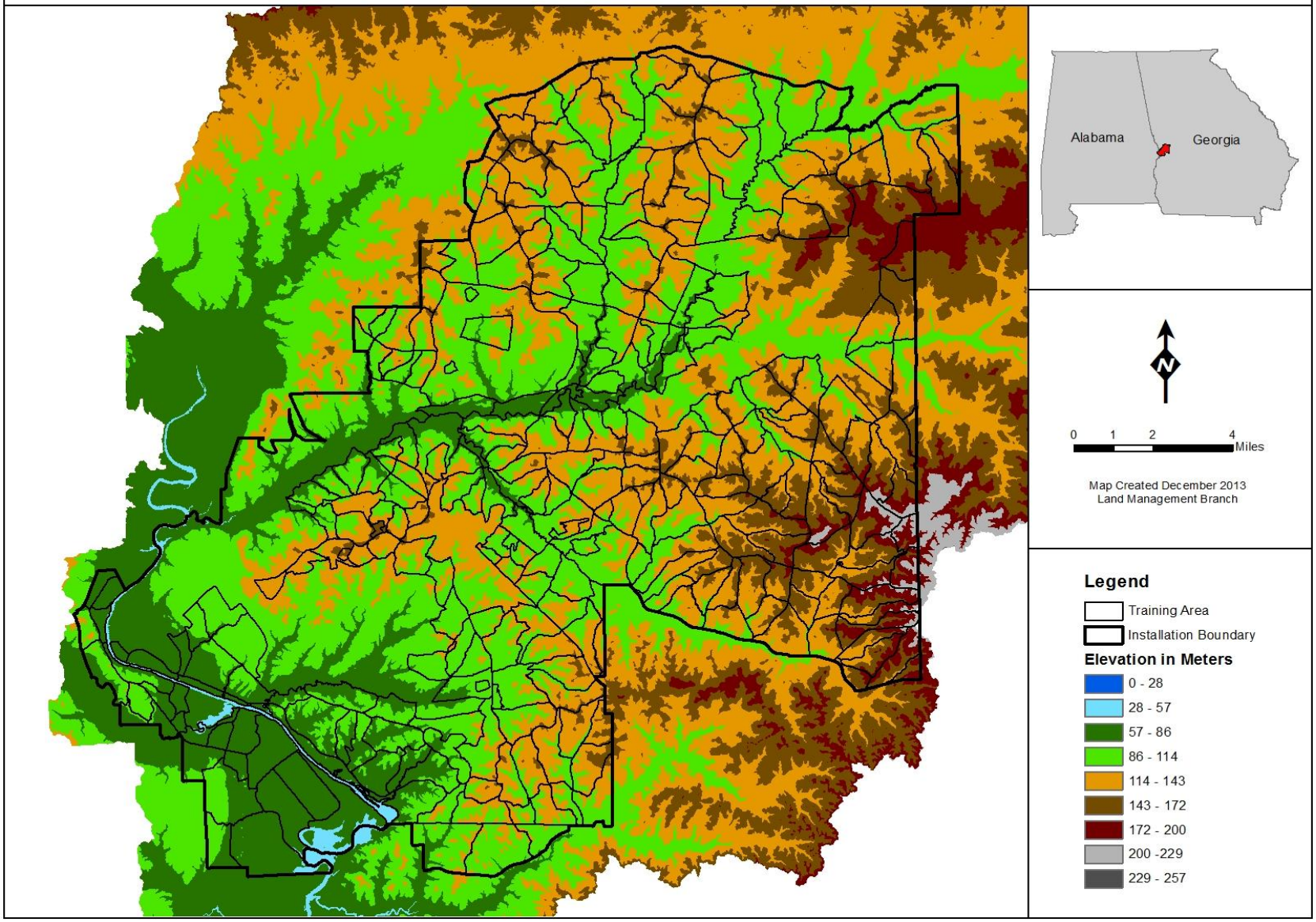


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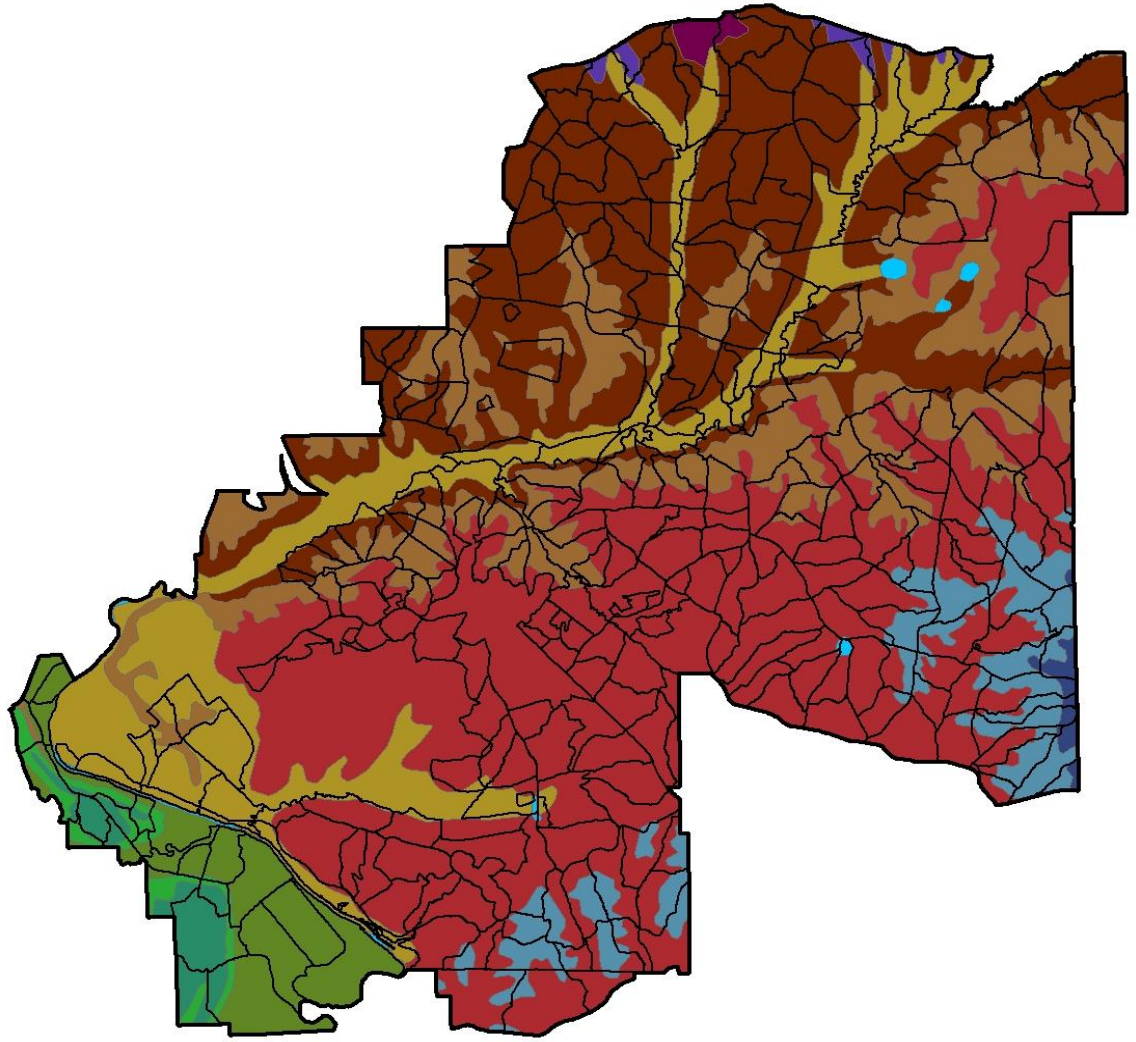
Figure A.1.2 Geology



0 1 2 4 Miles

Map Created December 2013
Land Management Branch

Legend

- Installation Boundary
- Training Area

Geology

- Alluvial, coastal and low terrace deposits
- Biotite Gneiss
- Blufftown Formation
- Cusseta Sand
- Eutaw Formation
- Granitic Gneiss undifferentiated
- High terrace deposits
- Ripley Formation
- Selma Group; Ripley Formation
- Stream alluvium
- Tuscaloosa Formation
- Water

- Kc - Cusseta Sand (Upper Cretaceous): Medium to coarse quartz sand, pale yellow to light olive gray, thinly bedded to laminated clay, medium olive-gray to brownish-black, and micaceous fine sand, light olive-gray. Formation thickness ranges from 150 to 233 feet.

- Kb - Blufftown Formation (Upper Cretaceous): Fine sand to sandy clay, calcareous, glauconitic, and micaceous, light brownish-gray to olive-gray, interfingers with medium to coarse sand, quartzose, pale yellow. Locally abundant carbonaceous debris, shell beds, and calcareous concretions. Formation thickness ranges from 200 to 433 feet.

- Ke - Eutaw Formation (Upper Cretaceous): Fine to very coarse sand, very pale orange to yellow, and clay, brownish -gray. Thickness of the unit ranges from 100 to 280 feet.

- Kt - Tuscaloosa Formation (Upper Cretaceous): Fine to very coarse sand, pale yellowish-green to pale orange, crossbedded, quartzose and containing abundant potassium feldspar, interbedded with massive sandy clay, pale olive to reddish-brown, locally mottled. Gravelly and poorly bedded deposits at base difficult to distinguish from residuum on underlying crystalline rocks. Thickness ranges from 165 to 500 feet.

A.1.3 SOILS

There are two basic soil provinces on Fort Benning: the Georgia Sand Hills and the Southern Coastal Plains. The Georgia Sand Hills is a narrow belt of deep sandy soils with rolling to hilly topography. These soils are primarily derived from marine sands, loams, and clays. South of the Sand Hills are the Southern Coastal Plain soils, which are divided into nearly level to rolling valleys and gently sloping to steep uplands. Southern Coastal Plain soils in this area have a loamy or sandy surface layer and loamy or clayey subsoil (Cooperative Extension Service 1993).

The soil surveys by the U. S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) for Fort Benning on the Georgia side are for Chattahoochee and Marion Counties (Green 1997) and Muscogee County (Johnson 1983). The soil survey for Russell County, Alabama, was updated and published in 2003. Table A.1.3 includes the NRCS soil survey findings for those soils series found on Fort Benning.

A.1.3.1 GENERALIZED SURFACE SOIL TEXTURES

A soil texture map for Fort Benning is provided in Figure A.1.3. Features on this map represent the relative proportions of sand, silt, and clay in a soil. The dud areas of A20 and K15 are not mapped in the modern method of soil surveying as these areas have restricted access. As a result, data from a 1928 soil survey (U.S. Department of Agriculture 1928) was manually digitized to fill in the gaps.

Table A.1.1 Soil Series from Natural Resources Conservation Service Classification, (in descending order of acreage).

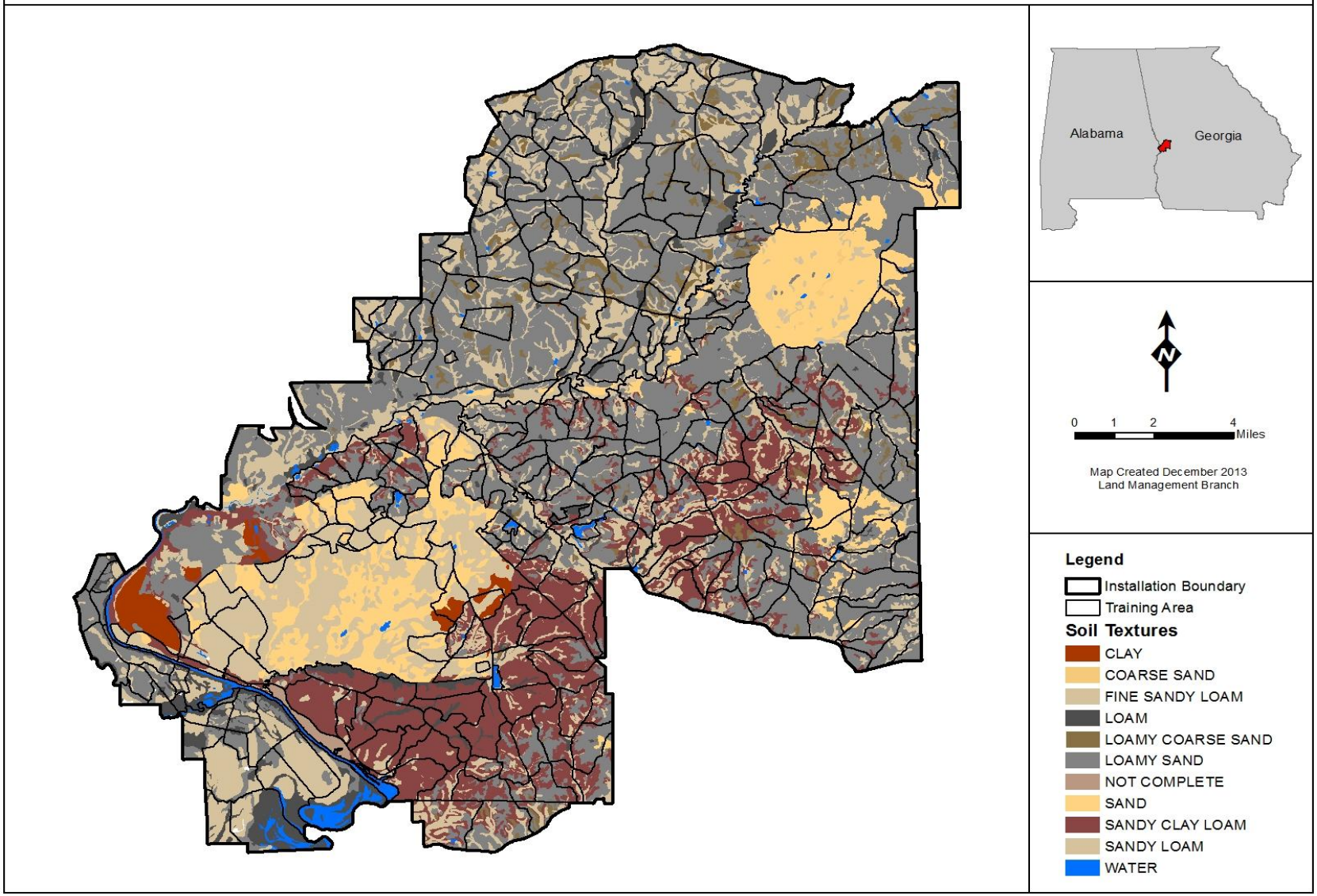
Series	Acres
Unclassified	26,537
Nankin sandy clay loam	26,244
Troup loamy sand	22,332
Cowarts and Ailey soils	15,376
Bibb sandy loam	10,087
Troup, Vaucluse, and Pelion loamy sands	8,863
Ailey loamy coarse sand	5,897
Nankin sandy loam	5,453
Wagram loamy sand	5,077
Troup loamy fine sand	4,490
Lakeland sand	4,321
Vaucluse sandy loam	4,315
Water	3,021
Congaree-Toccoa complex	2,372
Pelham loamy sand	2,288
Toccoa sandy loam	2,198
Udorthents-Urban land complex	2,193
Ochlockonee sandy loam	2,134
Eunola sandy loam	2,125
Wickham fine sandy loam	1,909
Chastain loam	1,530
Troup and Esto loamy sands	1,509
Esto and Troup loamy sands	1,446
Esto sandy loam	1,386
Esto, Fuquay, and Ailey loamy sands	1,238
Stilson loamy sand	1,089
Troup-Springhill-Luverne complex	1,064
Orangeburg-Urban land complex	1,049
Maxton loamy sand	1,005
Dothan loamy sand	1,003
Udorthents, loamy	914
Fuquay loamy sand	910
Susquehanna sandy loam	900
Orangeburg loamy sand	808
Bigbee-Ochlockonee complex	793
Lucy loamy sand	745
Chewacla loam	740
Urban land-Orangeburg complex	700
Dothan-Urban land complex	639
Urban land	639
Kolomoki fine sandy loam	525

Series	Acres
Dothan fine sandy loam	524
Fuquay loamy fine sand	313
Springhill sandy loam	294
Ocilla loamy fine sand	293
Kinston, Mantachie, and Iuka soils	285
Bladen loam	256
Annemaine fine sandy loam	243
Uchee-Cowarts complex	242
Fluvaquents	218
Wahee fine sandy loam	205
Orangeburg fine sandy loam	196
Red Bay sandy loam	178
Hydraquents	152
Blanton loamy sand	149
Congaree loam	143
Iuka sandy loam	140
Dogue fine sandy loam	106
Esto-Urban land complex	98
Pits	80
Gritney fine sandy loam	72
Psamments	71
Lynchburg loamy fine sand	68
Riverview loam	60
Dogue loam	56
Orangeburg sandy loam	51
Urban land-Troup complex	41
Eunola-Urban land complex	37
Vance sandy clay loam	7
Udorthents, clayey	5
Wahee-Bladen complex	3
Total Acres	182,447

A.1.3.2 HIGHLY ERODIBLE SOILS

Based on the available soil survey data, most of Fort Benning's soils are identified as highly erodible (Figure A.1.4). The degree of erodibility is determined by factors such as drainage, permeability, texture, structure, and percent slope. The dudded impact areas of A20 and K15 were not mapped because of access restrictions.

Figure A.1.3 General Surface Soil Texture



A.1.4 CLIMATE

Fort Benning is located about 170 miles north of the Gulf of Mexico and 225 miles west of the Atlantic Ocean, with a climate classified as humid temperate. The seasons are well defined, with hot, humid summers and mild winters. The coldest month is usually January and the warmest month is usually July. Most summer days have high temperatures over 90ºF, with many reaching 95ºF, but seldom approaching 100ºF. The highest recorded temperature is 107ºF. The mean low temperature from November through February is 37ºF, but seldom drops below 20ºF. The lowest recorded temperature is 0ºF. Annual precipitation averages about 51 inches. Heaviest rainfall occurs in March, July, and December and the lightest in September, October, and November. Snow occurs occasionally, but usually quickly melts (National Climatic Data Center 1999).

A.1.5 HYDROLOGY

A.1.5.1 STREAM NETWORK AND IMPOUNDED WATER

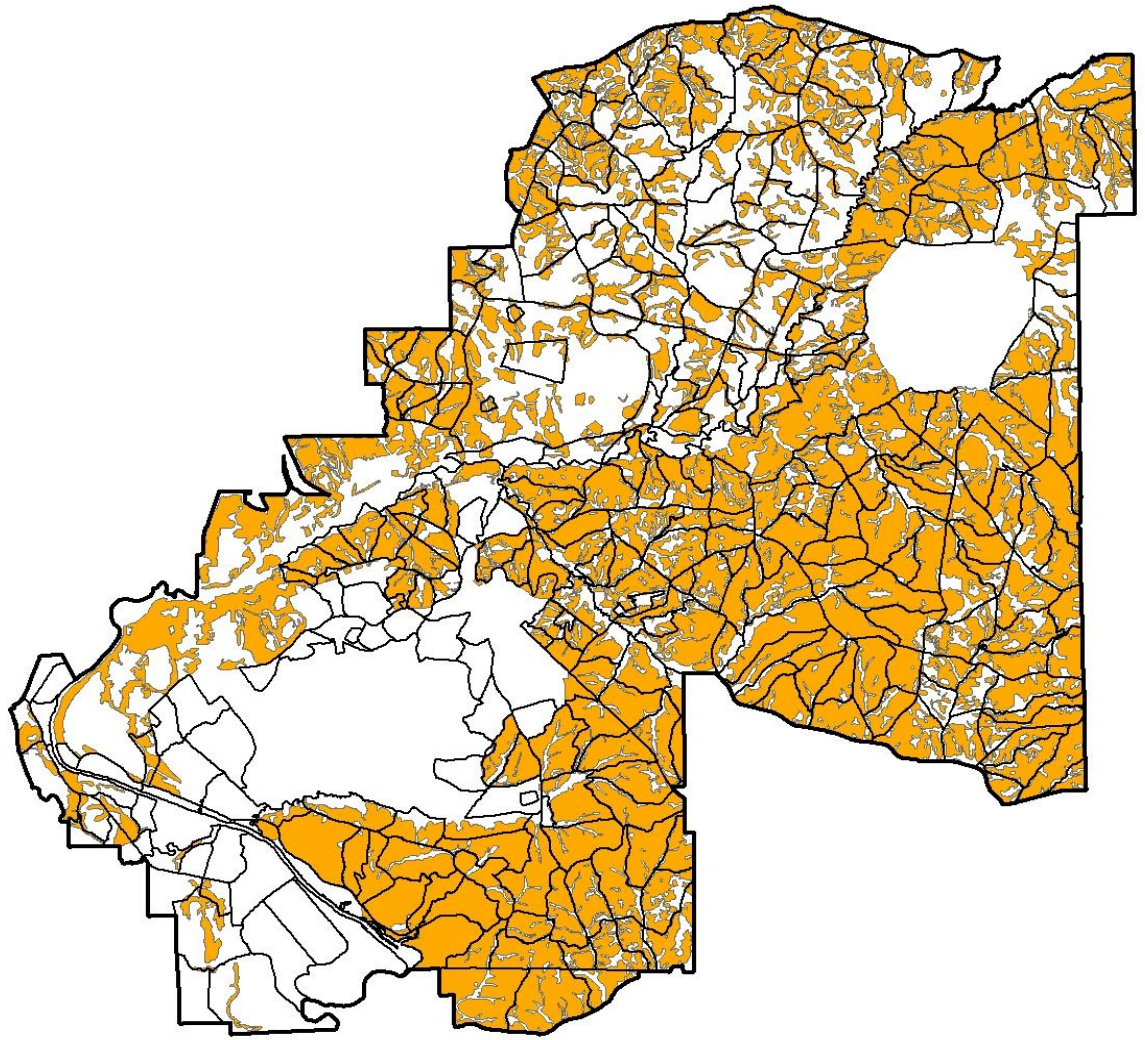
The Chattahoochee River, along with the Flint River to the east, is a major component of the Apalachicola River drainage basin of eastern Alabama, western Georgia, and the Florida Panhandle. Most streams found within the installation drain into the Chattahoochee River through Upatoi Creek on the Georgia side and Uchee Creek on the Alabama side. The most southern portion of Fort Benning drains directly into the Chattahoochee River, and the northwest portion of the Installation drains into Bull Creek. A very small area in the southeast corner of the Post drains into the Flint River Basin to the east. The proximity of Fort Benning to the Piedmont, Fall Line Sand Hills, and the Chattahoochee River increases diversity of streams within the installation (Figure A.1.5).

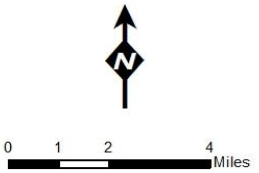
The streams at Fort Benning are referred to as either Piedmont or Coastal Plain in origin. Piedmont streams originate in the Piedmont and generally flow in a southerly direction on Fort Benning. Major Piedmont streams include Baker, Cox, Dozier, Kendall, Randall, Uchee, and Upatoi Creeks, as well as the Chattahoochee and Tar Rivers. Coastal Plain streams originate in the Coastal Plain and generally flow from east to west on the Georgia side and west to east on the Alabama side. Ochillee, Pine Knot, Little Pine Knot, Sally Branch and Bonham Creeks are the major Coastal Plain streams on Fort Benning. Oswichee Creek has intermediate characteristics between Piedmont and the Coastal Plain streams.

The Chattahoochee River is a major river that flows through approximately 20 miles of the Installation, separating it into its Alabama and Georgia portions. Several dams have been built on the Chattahoochee River upstream and downstream of Fort Benning to regulate river flow and produce hydroelectric energy. The northern portion of Lake Walter F. George, on the Chattahoochee River, extends into the southwest portion of the installation. The River Bend area, which is part of the Lake Walter F. George impoundment, constitutes the only lake on the installation. Numerous oxbows, abandoned meander channels, isolated ponds, and wetland areas are found along the Chattahoochee River.

On Fort Benning there are 14 man-made ponds that range in size from one to 72 acres. Additionally, numerous natural ponds such as beaver ponds are present.

Figure A.1.4 Highly Erodable Soils



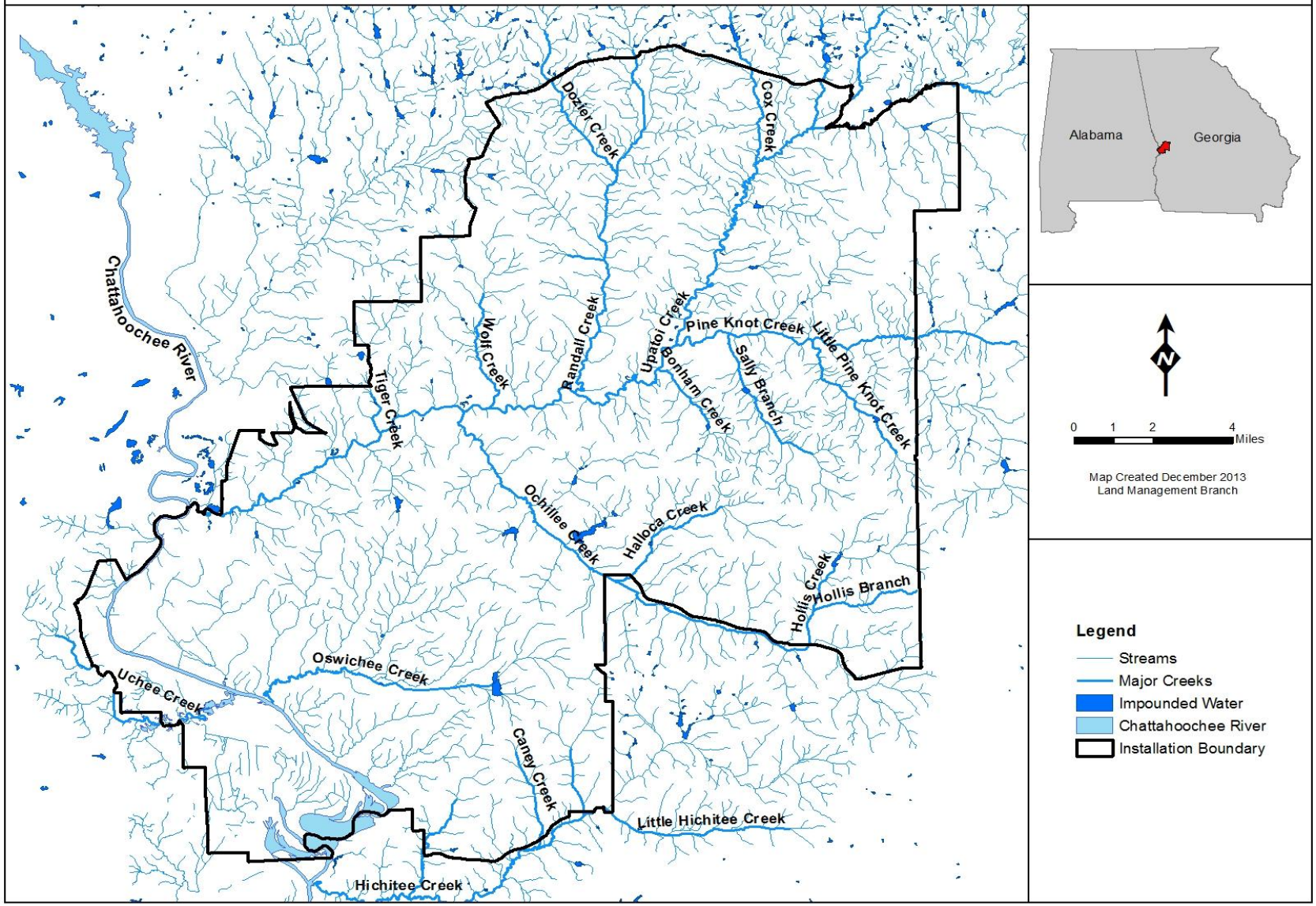


Map Created December 2013
Land Management Branch

Legend

- Installation Boundary
- Training Area
- Highly Erodable Soils

Figure A.1.5 Stream Network and Impounded Water



A.1.5.2 WETLANDS

The National Wetlands Inventory (NWI) conducted by the USFWS in 1982 shows that Fort Benning contains about 16,926 acres of wetlands (Figure A.1.6). The inventory described lacustrine, riverine, and palustrine systems. On Fort Benning wetlands include impounded water, flowing water, river floodplains, stream floodplains, small stream swamps, wooded seepage bogs, herbaceous and shrub seepage bogs, and gum/oak ponds.

The wetland delineations were produced through stereoscopic interpretation of 1:58,000 scale color infrared photography. The majority of the photography was taken during the winters of 1980 through 1982. Field checks of the areas were made prior to the actual delineation. Distinctive characteristics seen in the photos were identified in the field using vegetation and soil types, as well as additional input from field personnel. These maps are useful for planning purposes, but they do not meet the criteria of the delineation of wetlands for regulatory purposes, and in accordance with the Clean Water Act. Further surveys and wetland boundary delineations are often required prior to the USACE Regulatory Office concurring with the wetland delineation.

A.1.5.3 GROUNDWATER

Fort Benning is in the Coastal Plain hydrologic province of Georgia and Alabama, whose principal ground water source is the Cretaceous aquifer system. The aquifer systems are directly related to the various geologic formations. The Georgia Geologic Survey identifies these Cretaceous aquifers in the Fort Benning area as the A-3 through A-6 aquifers. Aquifer A-6 is part of the upper Tuscaloosa and the overlying Lower Eutaw formations. Aquifer A-5 is part of the basal sedimentary sequence of the Blufftown Formation. Aquifer A-4 is in the upper sedimentary sequence of the Blufftown Formation. The A-3 aquifer correlates with the Cusseta Sand Formation. The recharge area for these aquifers is the Sand Hills area, which includes Fort Benning (GA DNR 1986).

A.1.5.4 FORT BENNING AREA HYDROLOGIC UNIT

Fort Benning lies completely within the USGS Hydrologic Unit Code 03130003 (Figure A.1.7). This hydrologic unit is located in parts of both Alabama and Georgia. This is a level of classification known as a cataloging unit and it represents all or part of a surface drainage basin, a combination of drainage basins, or a distinct hydrologic feature (Seaber, et. al. 1987).

A.1.5.5 WATERSHED MANAGEMENT UNITS

Watershed management units were delineated at Fort Benning to use as a framework for monitoring water quality and erosion, watershed restoration projects, and for other management activities. The watershed management units at Fort Benning were created by considering both the stream surface drainage network and a appropriate unit size for management purposes. The units had to be large enough for planning purposes, yet small enough to monitor. The watershed delineation for Fort Benning also includes those areas outside the installation boundary that have close hydrologic connection to the installation. Fort Benning is composed of 29 Watershed Management Units (WMU) (Figure A.1.8). Seventeen of the WMUs occur completely or almost completely within the boundaries of the installation and 12 of the WMUs are partially within the boundaries of Fort Benning.

Figure A.1.6 Wetlands

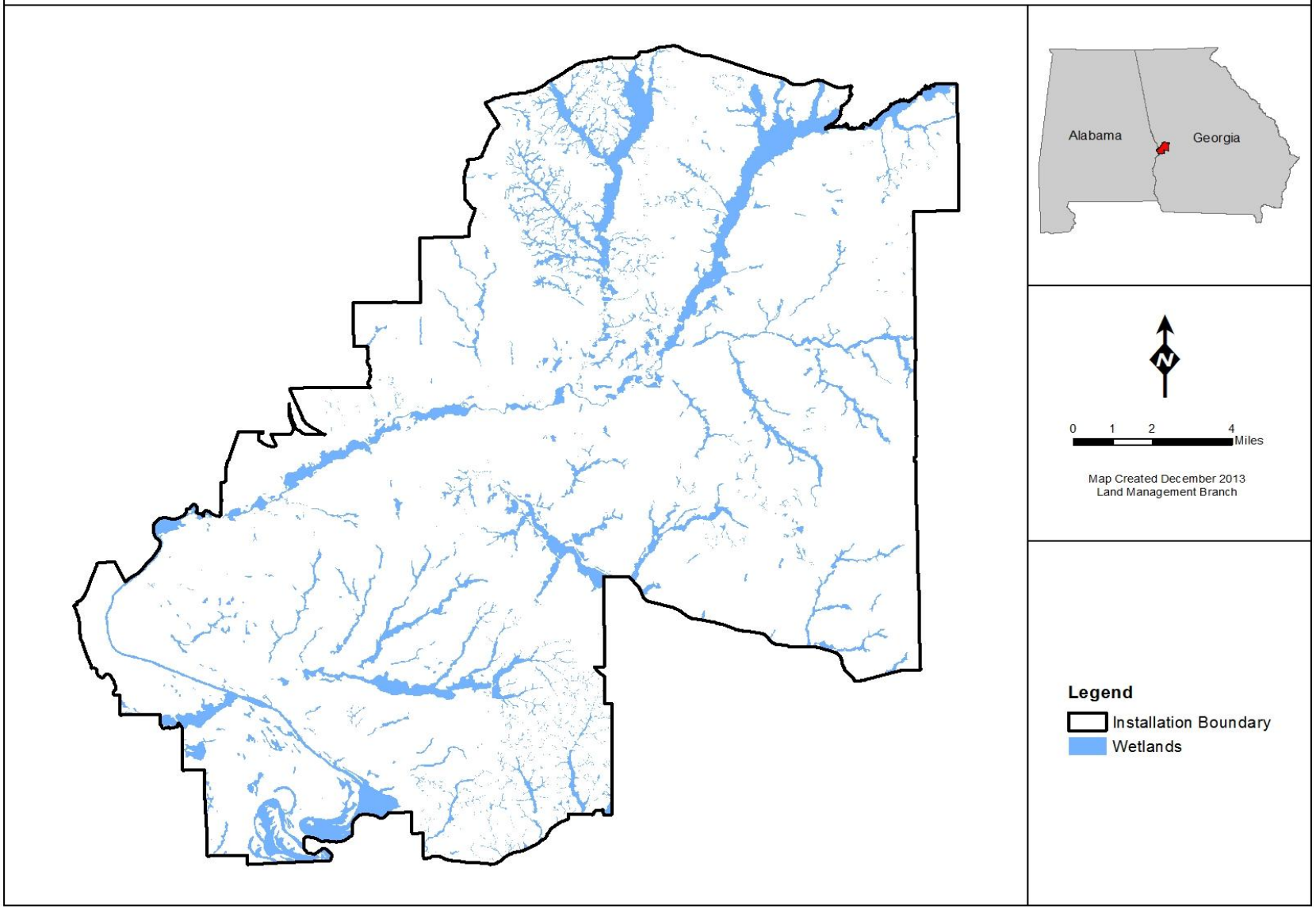


Figure A.1.7 Fort Benning Area Hydrologic Unit

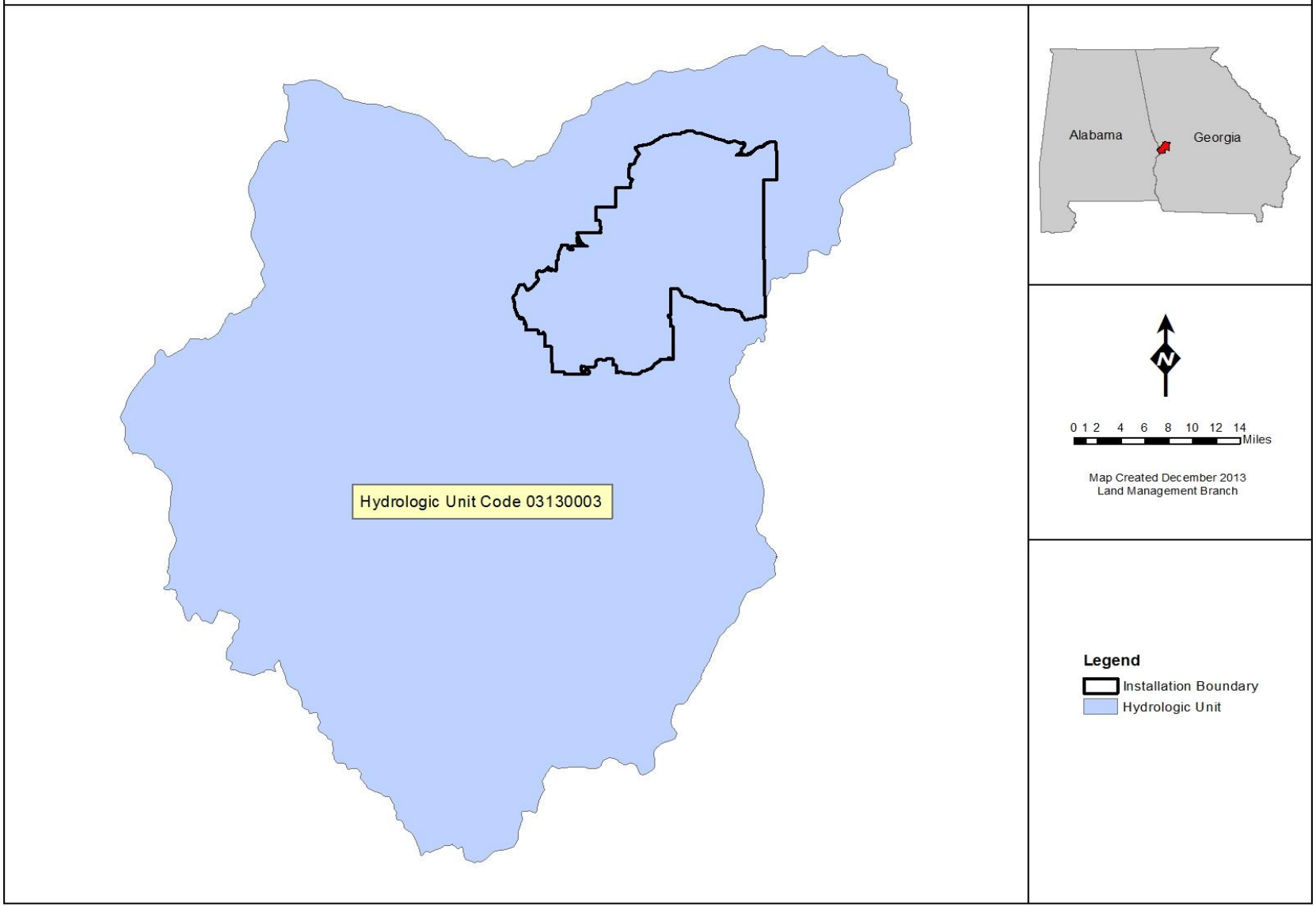
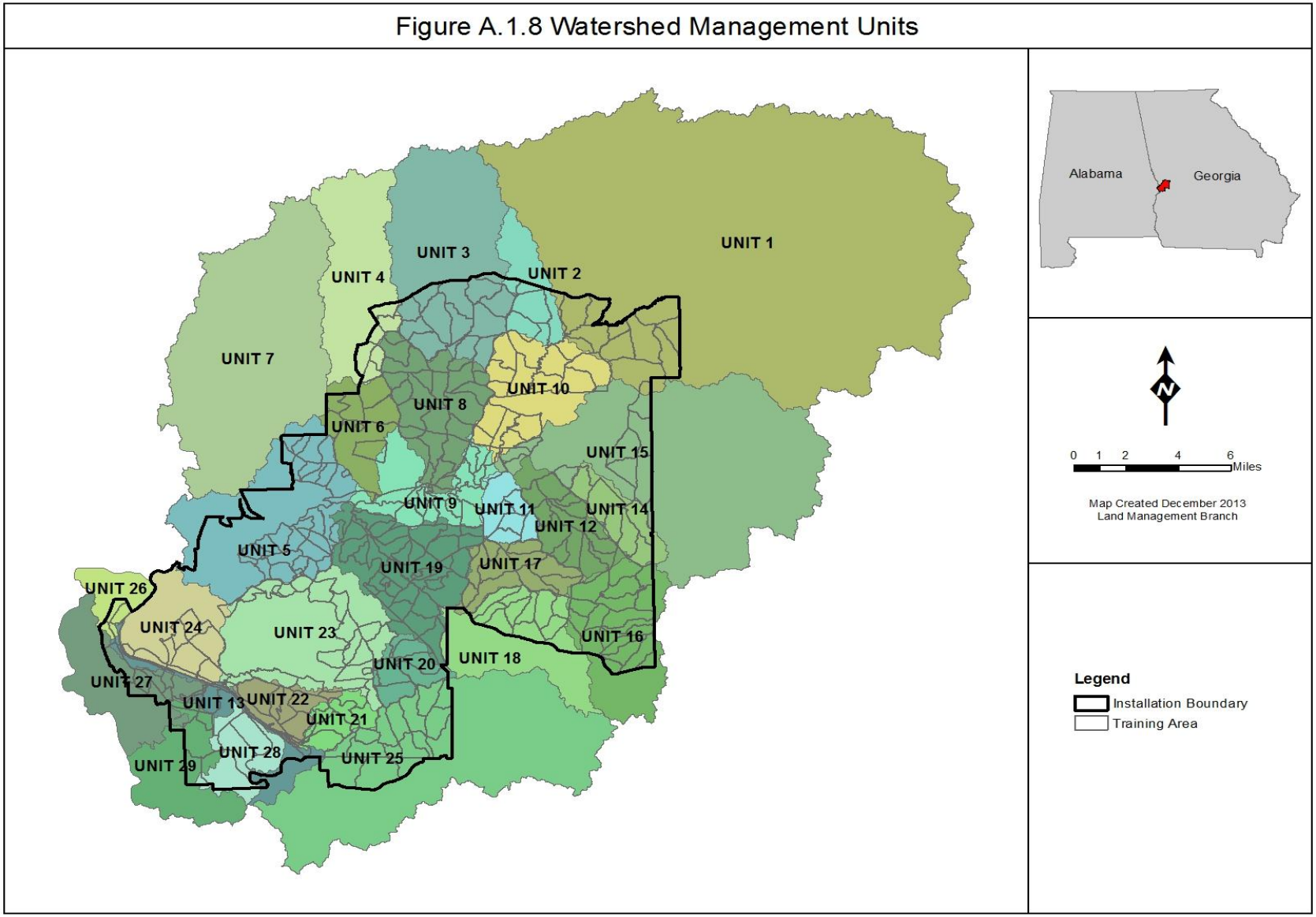


Figure A.1.8 Watershed Management Units



APPENDIX A2 UNIQUE ECOLOGICAL AREAS AND SPECIES OF CONSERVATION CONCERN

Certain natural resources—because of their rarity, uniqueness, vulnerability, or ecological significance—achieve a prominent conservation status and, as a result, require focused monitoring and management. At Fort Benning, such resources are separated into two categories: Unique Ecological Areas (UEA) and species of conservation concern. Designation and management of UEAs and consideration of all species of conservation concern (including but not limited to Federally listed species) in management plans represent proactive approaches to natural resources management. Moreover, designation of UEAs demonstrates a shift from the single-species focus of the past to a community- / ecosystem-based approach.

A.2.1 Unique Ecological Areas

Unaltered ecosystems are highly evolved, interactive associations of abiotic and biotic components. They cannot be duplicated artificially and, once highly disturbed, are virtually impossible to restore. They constitute storehouses of natural diversity and provide research and educational opportunities that may prove invaluable to future generations. In the southeastern United States, intact representatives of native plant communities and habitats (e.g., rock outcrops, sandhill communities) are rare. Aggregations of these communities and habitats form natural areas. To conserve the native biodiversity of a landscape, political entity, or region, identification and preservation of such natural areas is an important conservation tool.

Designation of natural areas is used by both Federal and state agencies to track areas of conservation significance; however, the availability of standardized criteria for designation differs by geographic location. No specific criteria are presently available that assess the degree to which the area is representative, current ecological condition, potential long-term viability, and regional conservation significance for various components of natural areas for Fort Benning's geographic location. Fort Benning is designating within this INRMP areas of conservation significance. Such areas will be referred to in this plan as UEAs. Association-level descriptions and condition ranking criteria for occurrences of plant communities have been developed for UEAs. Once standardized criteria are available, their appropriate designation as natural areas or some other type of conservation designation then can be determined.

A.2.1.1 AUTHORITY FOR DESIGNATION

DoD 4715.03 (Natural Resources Conservation Program, dated 18 March 2011) provides the primary authorization for the designation of areas of conservation significance (specifically referred to as special natural areas). The Special Designation section of the instruction states:

> "Areas on DoD installations that contain natural resources (e.g., ecological, scenic, recreational, or educational) that warrant special conservation efforts may be designated as special natural areas, where such conservation is consistent with the military mission. Such areas should be reassessed if mission requirements change or if the property becomes excess and requires disposal. The INRMP shall address special management provisions necessary for the conservation of each area."

A.2.1.2 DESIGNATION OF FORT BENNING'S UNIQUE ECOLOGICAL AREAS

In accordance with DoD Instruction 4715.03, Fort Benning natural resource managers identified several areas that have unique or rare ecological characteristics or that represent the best example on Fort Benning of a particular habitat or plant community type. These areas were chosen based on characteristics of their soil type, topography, slope, aspect, elevation, hydrology, flora, fauna, and other biotic and abiotic features. Many areas apparently contain remnant native plant communities that have experienced minimal disturbance relative to other similar communities. As a result, at least a few areas, or portions thereof, may require little or no active management to maintain their condition. Such areas can serve as reference sites for the biodiversity and ecological processes associated with natural communities. Additionally, each area seems to have experienced in the past and is experiencing now only relatively minimal impacts, if any, from military training activities. To conserve the ecological integrity of these areas, Fort Benning will use their designation as UEAs to ensure now and in the future that land-use planning and training activities account for their presence and their preservation requirements.

The 19 UEAs identified to date are shown in Figure A.2.1. In total, including designated buffer zones for the Piedmont Interface area, they encompass almost 21,400 acres. At present, most boundaries and acreages are approximate representations and will be refined as the areas are further studied. Each UEA was identified initially by Fort Benning staff or by USFWS, TNC, or Georgia Natural Heritage Program staff who evaluated their condition in the field and made a preliminary determination that each area deserved consideration as an area of conservation significance.

A.2.1.3 MANAGEMENT CONSIDERATIONS

Management efforts for UEAs are geared toward maintaining and restoring these areas to preserve their "naturalness." As part of the implementation of this INRMP, management guidelines for each area include the types of military training that are expected to not adversely impact the ecological integrity of each area.

In 2005, TNC completed a report for Fort Benning that summarized management issues and recommendations for UEAs on Fort Benning. This report was a culmination of efforts by TNC, Fort Benning Conservation and Land Management Branches to identify ecological groups based on vegetation characteristics. This report initially identified 15 UEAs, with another four areas proposed for designation as UEAs. Since 2005, the four proposed UEAs have been formally adopted as UEAs for a total of 19 as discussed throughout this INRMP. A detailed description of the designated UEAs on Fort Benning is included in Appendix A3, "Fort Benning Unique Ecological Areas: Management Plans."

A.2.2 Species of Conservation Concern

There are 97 species (four amphibians, eight birds, seven fishes, four mammals, four mussels, nine reptiles, and 61 plants) of conservation concern found on Fort Benning (Table A.2.1). A species is listed as of conservation concern if it is listed by the USFWS or by the states of Alabama or Georgia as threatened (T) or endangered (E) or is otherwise identified as a candidate (C) species, species of special concern, state protected species, rare species, unusual species, or a watch-list species. Several Federally listed threatened and endangered species occur at Fort Benning. These include the RCW (E), wood stork (E), American alligator (T [S/A], in which S/A means due to similar appearance), and relict trillium (E). Other notable

species include the bald eagle, gopher tortoise, gopher frog, osprey, sweet pitcher plant, Indian olive, croomia, Georgia rockcress, and Pickering's morning glory.

Figure A.2.1 Unique Ecological Areas

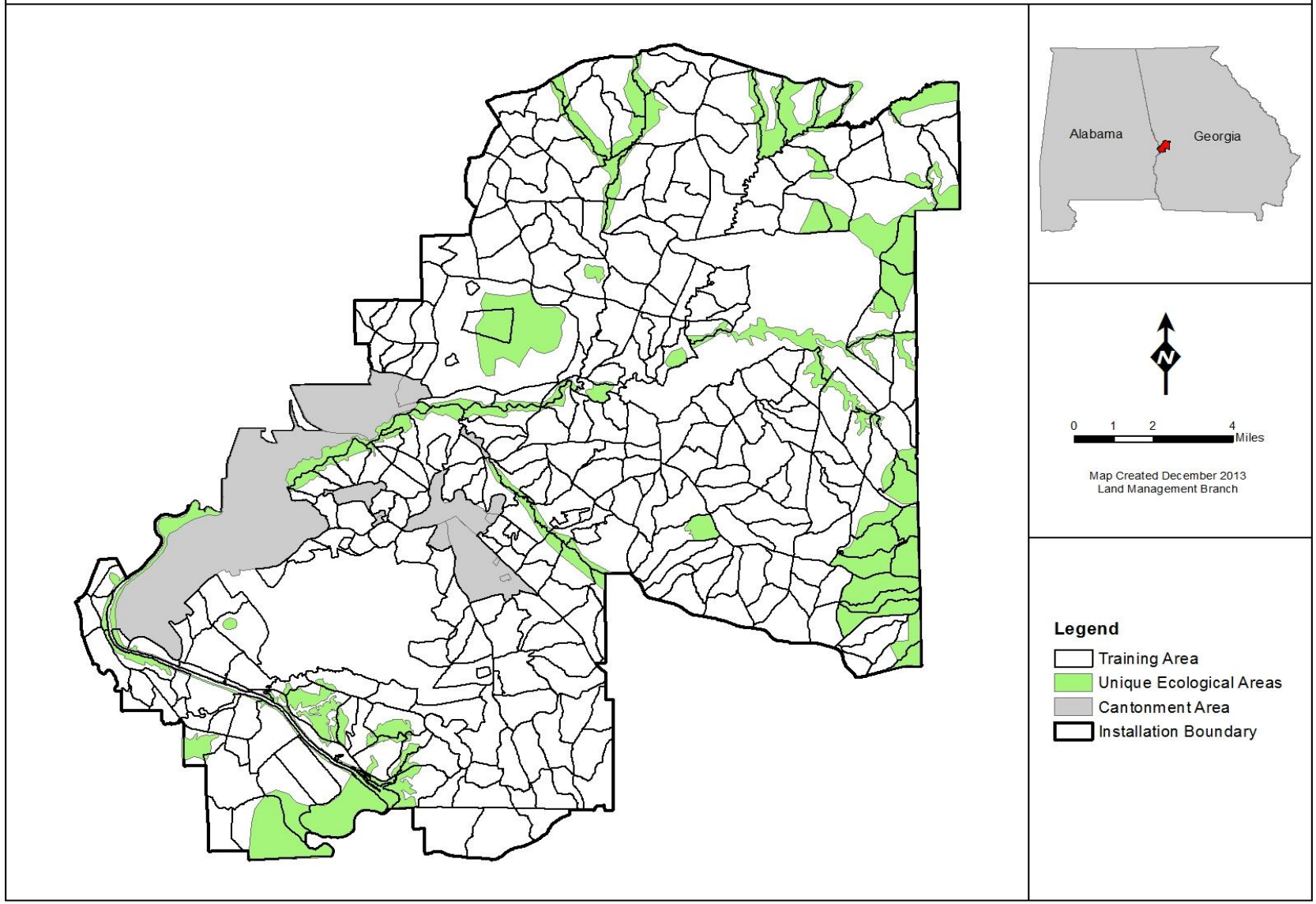


Table A.2.1 Threatened, Endangered, and Species of Conservation Concern Known to Occur on Fort Benning

Updated: 20 May 2013

Scientific Name	Common Name	Federal[1]	Georgia[1]	Alabama[1]
AMPHIBIANS				
Ambystoma tigrinum[2]	Eastern tiger salamander			SC
Desmognathus apalachicolae	Apalachicola dusky salamander		SC	SC
Eurycea longicauda guttolineata	Three-lined salamander		SC	
Rana capito	Gopher frog		SC	
BIRDS				
Aimophila aestivalis	Bachman's sparrow		R	SC
Columbina passerina	Ground dove			SP
Falco sparverius paulus	Southeastern American kestrel		SC	SC
Haliaeetus leucocephalus	Bald eagle	FP	T	SP
Lanius ludovicianus migrans	Migrant loggerhead shrike		SC	
Mycteria americana	Wood stork	E	E	SP
Pandion haliaetus	Osprey		SC	
Picoides borealis	Red-cockaded woodpecker	E	E	SP
FISHES				
Ameiurus serracanthus	Spotted bullhead		R	SC
Cyprinella callitaenia	Bluestripe shiner		T	SC
Etheostoma parvipinne	Goldstripe darter		R	
Etheostoma swaini	Gulf darter		SC	
Ichthyomyzon gagei	Southern brook lamprey		SC	
Lepisosteus oculatus	Spotted gar		SC	
Pteronotropis euryzonus	Broadstripe shiner		R	
MAMMALS				
Geomys pinetis	Southeastern pocket gopher			SP
Lasiurus seminolus	Seminole bat			SC
Myotis austroriparius	Southeastern myotis		SC	SP
Tadarida brasiliensis	Brazilian free-tailed bat			SC
MUSSELS				
Anodonta heardi	Apalachicola floater		SC	
Elliptio complanata	Eastern elliptio			SC
Villosa lienosa	Little spectaclecase			SC
Villosa vibex	Southern rainbow			SC

Table A.2.1 Threatened, Endangered, and Species of Conservation Concern Known to Occur on Fort Benning (continued)

Scientific Name	Common Name	Federal[1]	Georgia[1]	Alabama[1]
REPTILES				

Alligator mississippiensis	American alligator	T (S/A)	SC	
Crotalus adamanteus	Eastern diamondback rattlesnake			SC
Eumeces egregius	Mole skink		SC	
Gopherus polyphemus	Gopher tortoise	C	T	SP
Graptymys barbouri	Barbour's map turtle		T	SP
Heterodon simus	Southern hognose snake		SC	SP
Macroclemys temminckii	Alligator snapping turtle		T	SP
Micrurus fulvius	Eastern coral snake		SC	SC
Pituophis melanoleucus mugitus	Florida pine snake		SC	SP
PLANTS				
Aesculus parviflora	Bottlebrush buckeye		SC	
Arabis georgiana	Georgia rockcress	C	T	SC
Agrimonia incisa	Incised agrimony		SC	SC
Aster surculous[2]	Colonizing Aster			SC
Baptisia megacarpa	Apalachicola wild indigo		SC	SC
Brachiaria platyphylla[2]	Broad-leaf signalgrass			SC
Brickellia cordifolia	Flyr's nemesis		T	SC
Buchnera americana	Bluehearts		SC	
Burmannia capitata2	Blue threads			SC
Carex lupuliformis	Hop sedge		SC	
Carex stricta	Tussock sedge		SC	
Castanea pumila	Allegheny chinkapin			SC
Chrysoma pauciflosculosa	Woody goldenrod		W	
Cirsium virginianum	Virginia thistle		SC	
Coreopsis gladiata2	Alternate-leaved tickseed			SC
Croomia pauciflora	Croomia		T	SC
Echinacea pallida2	Pale purple coneflower			SC
Gentiana catesbaei2	Catessby's gentian			SC
Gymnopogon brevifolius	Broad-leaved beardgrass		SC	
Halesia carolina2	Carolina silverbell			SC
Helenium brevifolium	Bog sneezeweed		SC	SC
Helianthemum canadense	Canadian frostweed		SC	
Helianthus smithii	Smith's sunflower		SC	SC
Hexastylis shuttleworthii var. harperi	Harper's Wild ginger		U	SC

Table A.2.1 Threatened, Endangered, and Species of Conservation Concern Known to Occur on Fort Benning (continued)

Scientific Name	Common Name	Federal[1]	Georgia[1]	Alabama[1]
Hypericum canadense	Canada St. John's wort		SC	

Hypericum nudiflorum[2]	Bractless St. John's wort			SC
Iris brevicaulis	Lamance iris		SC	
Isoetes melanopoda	Black-footed quillwort		SC	SC
Lillium superbum[2]	Turk's-cap lily			SC
Melanthium latifolium	Broadleaf bunchflower		SC	SC
Mirabilis albida[2]	White four-o'clock			SC
Myriophyllum laxum	Lax water-milfoil		T	SC
Nestronia umbellula	Indian olive		T	SC
Oldenlandia boscii	Bosc's Mille graines		SC	
Panax quinquefolium	American ginseng		SC	
Phacelia dubia var *georgiana*	Georgia scorpionweed			SC
Phaseolus polystachios sinuatus	Sandhills bean		SC	
Plantago sparsiflora	Pineland plantain		SC	
Platanthera flava var. *flava*[2]	Green wood-orchid			SC
Platanthera lacera[2]	Green fringed-orchid			SC
Prunus alabamensis2	Alabama black cherry			SC
Quercus arkansana	Arkansas oak		SC	SC
Quercus georgiana	Georgia oak		W	SC
Quercus prinoides	Dwarf chinkapin oak		SC	
Rhapidophyllum hystrix2	Needle palm			SC
Rhododendron minus2	Dwarf rhododendron			SC
Rhynchospora scirpoides	Bullrush baldrush		SC	
Rhynchospora stenophylla	Narrow-leaved beakrush		SC	SC
Salix humilis2	Tall prairie willow			SC
Sarracenia rubra	Sweet pitcherplant		T	SC
Sarracenia psittacina	Parrot pitcherplant		T	SC
Spiranthes ovalis	Oval ladies-tresses		SC	
Stylisma pickeringii pickeringii	Pickering's morning-glory		T	SC
Trepocarpus aethusae	Trepocarpus		SC	
Triadenum tubulosum	Broadleaf marsh St. John's wort		SC	
Tridens carolinianus	Carolina redtop		SC	SC
Trillium decipiens	Mimic trillium		W	SC

Table A.2.1 Threatened, Endangered, and Species of Conservation Concern Known to Occur on Fort Benning (continued)

Scientific Name	Common Name	Federal[1]	Georgia[1]	Alabama[1]
Trillium reliquum	Relict trillium	E	E	SC
Trillium underwoodii	Dwarf mottled trillium		W	

Utricularia floridana[2]	Foxtail bladderwort			SC
Verbesinia aristata	Serrate crownbeard			SC

[1]**Legend:** E = Endangered; T = Threatened; C = Candidate: FP = Federally Protected; SC = Special Concern; S/A = Due to Similar Appearance; P = Proposed; R = Rare; U = Unusual; SP = State Protected (Alabama no longer lists species as threatened or endangered. The state designates a species as SP if it is protected under state regulations or SC if it is not protected under state regulations, but its conservation status is still of concern to the state.); W = On the Georgia Plant Watch List, (which means plants needing additional documentation to determine conservation status.)

Occurrence data are from: USFWS and unpublished data* from the Fort Benning Threatened and Endangered Species Survey; Fort Benning Conservation Branch. (**Conservation Branch last performed a threatened and endangered species survey in 2010. Surveys were also performed for site specific construction projects associated with BRAC and MCoE, and will continue to be performed as funding is available or as new construction projects are proposed.*)

Conservation status based on: USFWS. 1997. Endangered and Threatened Wildlife and Plants. 50 CFR [Code of Federal Regulations) 17.11 and 17.12, as amended 14 November 2013. Georgia Natural Heritage Program. 2011. Special Concern Animals and Plants / Plant Watch Lists of Georgia. Georgia Department of Natural Resources, Natural Heritage Program, Social Circle, Georgia. Lists: Special Concern Animals of Georgia (7 March 2011); Tracking List of Special Concern Plants of Georgia (77 March 2011); and Georgia Plant Watch List (7 March 2011). Alabama Natural Heritage Program. 2011. Inventory List: The Rare, Threatened and Endangered Plants, Animals of Alabama. Alabama Natural Heritage Program, Montgomery, Alabama. June 2011. The preceding document summarizes the information on state protected status species as identified by the Nongame Species Regulation (section 220–2.92) of the Alabama Regulations on Game, Fish, and Fur Bearing Animals, Alabama Department of Conservation and Natural Resources, Division of Wildlife and Freshwater Fisheries, Montgomery, Alabama.

[2]Species was found only in Georgia, but species is not tracked by Georgia; however, species is tracked by Alabama.

A.2.2.1 FEDERALLY LISTED SPECIES

Fort Benning has one of the largest RCW populations in the southeastern United States; more information on its management can be found in the RCW ESMC (Appendix E1). The other Federally listed species occur as transients (wood stork), are present in small numbers (American alligator), or are found in a few localized areas (relict trillium).

Wood storks are seen mainly on the Alabama portion of the Installation during late summer. Usually one to 20 birds are seen each year. They use shallow water ponds or Chattahoochee backwater areas depending on available food supplies and appropriate water levels. A management plan for the wood stork can be found in Appendix E4.

Fort Benning is located on the extreme northern limit of the American alligator's range. Large adults up to 13 feet have been observed. Habitat available to the alligator is limited and consists of fish ponds and beaver ponds on the Georgia portion of the Installation and the backwaters of the Chattahoochee River in Alabama. A management plan for the American alligator can be found in Appendix E2.

There are seven known locations of relict trillium located in the northern-most areas of the Installation. These areas range up to several acres in size and in some cases contain several thousand individuals. These areas are critical to the recovery of the relict trillium population. Current management activities for all these species consist of surveys, monitoring efforts, and protection of sensitive areas. A management plan for the relict trillium can be found in Appendix E5.

A.2.2.2 OTHER NOTABLE SPECIES

The Bald Eagle (Federally Protected, Georgia Threatened, Alabama State Protected) prefers forested areas adjacent to large bodies of water, such as lakes, rivers, and reservoirs. Although the bald eagle was removed from the federal list of threatened and endangered species list in 2007, it is Federally protected under the Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, and the Lacey Act. There two know nesting pairs on Fort Benning located in training compartments E-1 and AA-04. A management plan for the bald eagle can be found in Appendix E3.

The gopher tortoise (Federal Candidate, Georgia Threatened, Alabama State Protected, and considered a "Species at Risk" by DoD) occurs in sandy soil habitats found only in the northern two thirds of the Installation. Over 8,200 gopher tortoise burrows have been documented to date. The gopher tortoise is a critical component of the longleaf pine—scrub oak community. A management plan for the gopher tortoise can be found in Appendix E7.

The gopher frog (Georgia Species of Special Concern) is found in a few ephemeral ponds in the Hastings Relict Sandhills Community UEA. The gopher frog is a burrow commensal of the gopher tortoise. The gopher frog uses the gopher tortoise burrow primarily for shelter and in some cases for food. The preferred breeding habitat includes seasonally flooded grassy ponds within areas that support gopher tortoises. The gopher frog is of conservation concern primarily because of loss of suitable habitat. The Fort Benning population represents a disjunct population. The gopher tortoise burrows that they inhabit are in decline due to the declining populations of gopher tortoises throughout the range of the species. The loss of habitat for both species is due primarily to urbanization and agriculture.

The sweet and parrot pitcher plants (Georgia Threatened, Alabama Species of Special Concern) are found in usual wetlands on the Installation. The sweet pitcher plant is found within the cane brakes of M6, O3, O4 and O19 where clay pans under the soil surface have created favorable growing conditions. The species is found in high soil-moisture sites, such as seepage slopes, acidic swamps, wet savannas, or bogs. It is found usually in areas exposed to full sun or light shade, and it may be crowded or shaded out by invading shrub and tree species unless an opening is maintained by manual thinning or periodic fire. Mechanical site disturbances, such as drainage or logging, tend to destroy populations. Parrot pitcher plant was discovered in 2010 in the clear creek beaver swamp (in the T11 training area). Parrot pitcher plant was only recently discovered in the Fall Line Sand Hills and the population on Fort Benning represents the only exclusive population. All other known populations in the Fall Line Sand Hills co-occur with sweet pitcher and significant hybridization between the two species has been documented.

These species are considered threatened in Georgia because of wide-scale habitat destruction. Management efforts include eliminating invading woody vegetation and yearly population surveys. TNC developed recommended management plans for each of Fort Benning's populations of the sweet pitcher plant (Streich and Kemp 1994a, b).

Indian olive (Georgia Threatened, Alabama Species of Special Concern) is found primarily in dry, open, upland forests of mixed hardwood and pine. The species is rare throughout its range and has sustained significant habitat loss due to the clearing of forest land. Many of the remaining populations are of only a single sex (the species is dioecious) and thus are able to reproduce only asexually (i.e., via root sprouts). Dioecious species are especially vulnerable to fragmentation of their habitat.

Georgia rockcress (Federal Candidate, Georgia Threatened, Alabama Species of Special Concern) habitat is restricted to rocky bluffs and slopes along watercourses, as well as along sandy, eroding stream banks. The species occurs from south-central Alabama to western Georgia. On Fort Benning, it can be found along both banks of the Chattahoochee River. These populations are threatened by soil disturbance from the rooting of feral hogs. Federal listing of Georgia Rockcress under the ESA is moving forward. The proposed rule has been submitted and the published listing as Threatened is forthcoming in 2014. A management plan for the Georgia Rockcress can be found in Appendix E6.

Pickering's morning-glory (Georgia Threatened, Alabama Species of Special Concern) is found in areas of coarse, white sand near the Fall Line. These are scrub habitats with scant litter accumulation, sparse ground cover, and little canopy cover (the latter consisting mostly of scattered scrubby oaks and pines). On Fort Benning, the species is found scattered throughout the sandhills in seven different populations. The species is in decline due to habitat destruction.

Croomia (Georgia Threatened, Alabama Species of Special Concern) is found in rich, moist, deciduous woodlands, ravines, and river bluffs. On Fort Benning, the species is found on two sites. It is rare throughout its range and has sustained significant habitat loss due to the clearing of forests for conversion to agriculture or pine plantations.

FORT BENNING UNIQUE ECOLOGICAL AREAS: MANAGEMENT PLAN

July 2005

A report to the Department of Defense

In partial fulfillment of Phase III
of the Vegetation Characterization Project
Cooperative Agreement DAMD17-00-2-0017

by:

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

in conjunction with:

NatureServe
A Network Connecting Science With Conservation

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PREFACE AND ACKNOWLEDGEMENTS

This report satisfies Task 13, Deliverable 1 associated with Phase III of the Department of Defense – The Nature Conservancy Vegetation Characterization Project, Cooperative Agreement DAMD17-00-2-0017. This report should be cited as:

Prior, C.E., Govus, T.E., Addington, R.N., Pyne, M., and Harrison, W.C. 2005. Fort Benning Unique Ecological Areas: Management Plan. A report to the Department of Defense under Cooperative Agreement DAMD17-00-2-0017. The Nature Conservancy of Georgia, Fort Benning, GA. 56 p.

Funding for this work was provided by the Department of Defense. We appreciate the support of Fort Benning's Environmental Management Division (EMD), including John Brent (EMD Chief), Pete Swiderek (Conservation Branch Chief), and Bob Larimore (Land Management Branch Chief). Several members of the Conservation Branch and Land Management Branch staff were integral to the synthesis of this work and we appreciate their input and cooperation. This includes Mark Byrd, Michael Fuller, Gary Hollon, Ben Miley, James Parker, and Mark Thornton. We also thank Laurie Gawin, Tom Greene, Sharon Hermann, Kevin Hiers, Maureen Mulligan, Randy Tate, and Judy Teague for thoughtful discussions, review, and help in planning.

INTRODUCTION

This report provides a summary of management issues and recommendations that have been identified for the fifteen existing Unique Ecological Areas (UEAs) on Fort Benning and four sites being proposed as UEAs. Information presented in this report was gathered from the installation's Integrated Natural Resources Management Plan (INRMP) and two previous reports produced for Phase II of the Vegetation Characterization Project at Fort Benning by The Nature Conservancy in cooperation with NatureServe. The first of these reports describes the ecological significance and condition of Fort Benning's Unique Ecological Areas (UEAs); the second report provides an overview of the vegetation as a whole organized by ecological groups and identifies specific characteristics and species that should be present. These reports should be used as references to support and provide depth and detail for the issues discussed in this document; their full citations are listed on page 56.

It is important to consider that for many of the UEAs the background management practices for the installation as a whole are sufficient to maintain the biological integrity of these natural areas. For these sites, no special management actions are necessary. The focus of this report, therefore, is on instances where special management actions may be required, such as where rare plant populations are threatened by some form of habitat disturbance or would benefit from alteration of the prescribed fire regime. Information pertaining to special management actions was compiled from several different sources, beginning in 2001 with photo-interpretation for the UEA plant association mapping effort, followed by subsequent field work performed to classify these communities. During spring and summer of 2005, additional information on each UEA was gathered by (1) interviewing Conservation Branch and Land Management Branch staff about their knowledge of invasive species infestations, erosion, forest decline syndrome, and feral swine rooting or other forms of habitat disturbance within the UEAs, (2) additional photo-interpretation based on high-resolution aerial imagery taken in 2003, and (3) field visits. Field visits were planned and undertaken to target areas identified by (1) and (2) above, and effort was made to revisit and verify the presence of documented rare plant populations. Meander searches were also conducted to locate additional areas where special management action may be necessary. A formal monitoring program tailored specifically to UEAs is not proposed; however, monitoring needs are identified for several individual UEAs and should be addressed as part of the installation's overall ecological monitoring program.

EXISTING UNIQUE ECOLOGICAL AREAS

1. PIEDMONT INTERFACE

UEA Overview, Ecological Significance and Condition

This area occupies about 3364 acres and is located primarily along small stream floodplains associated with tributaries of Upatoi Creek near the northern boundary of the installation within the O and K training areas. Included here are portions of Upatoi, Baker Creek, the Tar River, Kendall Creek, Cox Creek, Randall Creek, and Dozier

Creek. These streams are basically north to south trending and enter the installation just a few miles after leaving the Piedmont from ravines dissecting the Fall Line. Despite being mapped within the Coastal Plain physiographic province, this area has a decided Piedmont character and includes high quality examples of mesic, temporarily flooded, and saturated hardwood forests.

Over thirty-six distinct plant communities have been identified in this UEA and of these, fourteen are of conservation concern. Five vascular plant species of conservation concern have been located within this UEA, including Flyr's nemesis (*Brickellia cordifolia*) and slender bunchflower (*Melanthium latifolium*). Of greatest significance is the presence of at least five occurrences of relict trillium (*Trillium reliquum*), which is federally listed as Endangered. Fort Benning's INRMP states: "The Fort Benning populations of relict trillium may comprise a significant portion of the protected populations and are essential for the recovery of the species." In addition to rare plants, three species of freshwater mussels have been found in the streams of this UEA, including eastern elliptio (*Elliptio complanata*), little spectaclecase (*Villosa lienosa*), and southern rainbow (*Villosa vibex*). The pristine streams, high quality hardwood bluffs, and rich floodplain forests present in this UEA provide the bulk of the habitat for these special concern species and should be the focus of management concerns.

For the most part, the temporarily flooded hardwood forests and adjacent mesic bluff forests within this UEA are of high quality. These can be considered self sustaining and in no need of special management actions beyond monitoring and control of feral swine and invasive plant species. By contrast, some sections of the floodplain located near the northeastern boundary (along the north side of the junction of the Tar River and Upatoi Creek) are dominated by degraded successional communities and have been further damaged by feral swine. Much of the upland portion of this UEA also consists of modified, successional communities.

Management Issues, Goals, Recommendations and Other Considerations

Feral swine represent the greatest threat to this UEA. Extensive rooting and disruption of the soil by feral swine may directly impact rare plant populations, and may increase erosion and consequent sedimentation in local streams. Such soil disturbance also creates opportunity for non-native, invasive plant species. A systematic and sustained effort to reduce and/or eliminate swine populations should be the highest management priority for this UEA. Fencing around some of the relict trillium populations currently protects these populations and should be considered for all trillium populations where feral swine are perceived to be an immediate threat.

Maintenance and expansion of existing rare plant populations, particularly relict trillium, is another high priority goal for management of this UEA. Trillium populations are currently monitored on an annual basis following protocol finalized in 2002 by Fort Benning's Threatened and Endangered Species biologist. Monitoring for feral swine disturbance in the vicinity of these populations is conducted on a biweekly basis February through June each year, and monthly from July to January. Prescribed fire is excluded from these areas and all timber harvest activity must be no closer than 200 feet from the population edge, as described in Fort Benning's Endangered Species Management Plan for this species. These practices should continue. Japanese honeysuckle (*Lonicera japonica*) also threatens these populations of relict trillium.

Herbicide was recently applied while the trillium was dormant to control honeysuckle. Common chickweed (*Stellaria media*) was also found at this site during a visit in February 2005. Due to its growth form and temporal concurrence with the relict trillium, chickweed could represent another significant threat and should be evaluated further. The timing of the honeysuckle herbicide treatment (dormant season) would not affect chickweed. Threat from invasive species should be an ongoing concern, and vigilance should be maintained to ensure the viability of all special concern plants.

Restoration of degraded upland areas to longleaf pine is another worthwhile objective for this UEA. Nearly 400 acres of modified vegetation occurs in the uplands here, mostly dominated by various combinations of successional species such as *Pinus taeda, Liquidambar styraciflua, Quercus nigra* and *Quercus hemisphaerica.* These areas were presumably formerly occupied by longleaf pine. Current longleaf restoration practices occurring elsewhere on the installation appear suitable for these areas.

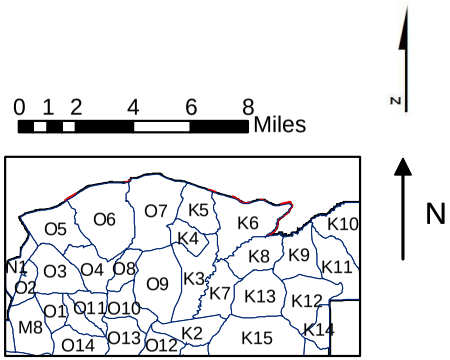
Use of prescribed fire is appropriate for the upland areas of this UEA, particularly for longleaf restoration, and fire should occasionally be allowed to creep into ecotonal areas between upland and slope hardwood communities to benefit the plant associations found here. A meander survey of several slope areas on 7/18/05 confirmed the presence of high quality hardwood communities. Fire should be excluded, however, from hardwood bottoms to the extent possible by either restricting upland fire to the dormant season, or burning under mild conditions such as after rain.

Military range and road construction from the development of MCOE has posed some significant disturbance to this UEA, in particular the O training areas along Randal Creek. Portions of the relict trillium populations along Randal Creek have been impacted and conservation measure such as increased monitoring for invasive species and erosion have been implemented by the Conservation Branch. This UEA's proximity to the installation's northern boundary also represents a threat. Off-post development in this area is of concern. The Army Compatible Use Buffer program has established a no-development conservation buffer along the K training areas of this UEA. The streams of this UEA in particular would benefit from the protection of upstream hydrologic processes afforded by establishment of this conservation or no-development buffer.

Management Issue	**Management Goal**	**Mgt Recommendation***
Feral swine disturbance	Minimize impact to bottomland hardwood forests and rare plant populations	Reduce or eliminate swine population
Invasive plant species	Minimize impact to rare plant populations	Eradicate in the vicinity of rare plant populations
Degraded upland plant communities	Longleaf pine restoration on uplands	None
Fire	Maintain natural composition and structure of rich herbaceous component of hardwood forests	Avoid burning fire-sensitive rare plant populations and minimize encroachment of fire into

		hardwood areas
Adjacent off-post land use	Protect upstream hydrologic processes	Establish a conservation buffer

* “None” implies that the installation’s existing land management practices are adequate to address the needs of this UEA.



Location

- UEA Boundary
- Training Area Boundaries
- Fort Benning Boundary

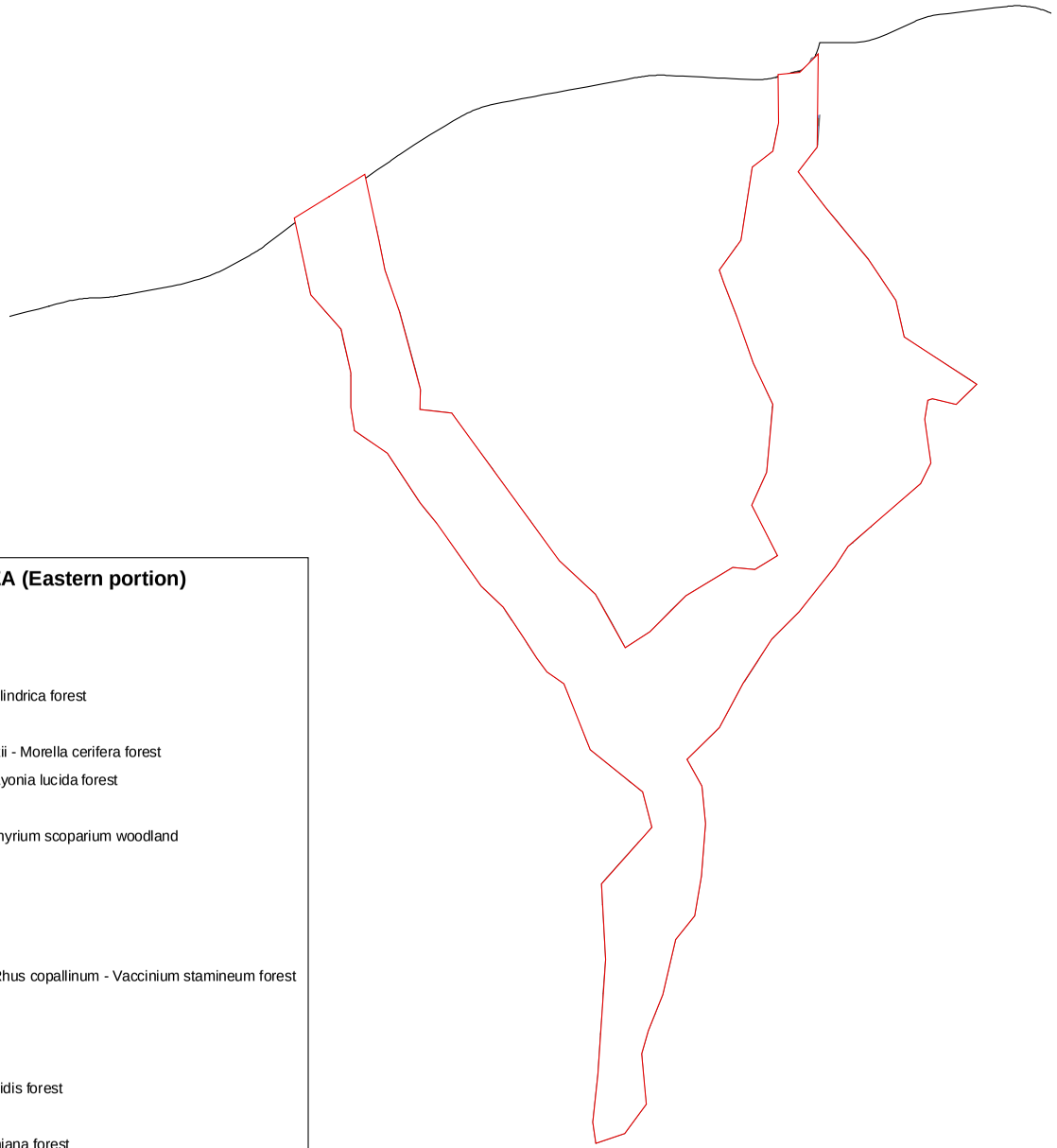


Figure 1a. Plant Associations of the Piedmont Interface UEA (Eastern portion)

- Piedmont Interface UEA Boundary
- Fort Benning Boundary
- Associations comprising less than 25 acres
- Fraxinus pennsylvanica - Ulmus americana / Carpinus caroliniana / Boehmeria cylindrica forest
- Liquidambar styraciflua - Liriodendron tulipifera / Onoclea sensibilis forest
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Nyssa biflora - Acer rubrum var trilobum - Liriodendron tulipifera / Ilex coriacea - Lyonia lucida forest
- Nyssa biflora - Acer rubrum var. rubrum / Lyonia lucida forest
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus palustris planted forest
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Liquidambar styraciflua - Nyssa biflora temporarily flooded forest
- Pinus taeda - Liquidambar styraciflua semi-natural forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda - Quercus nigra forest [placeholder]
- Pinus taeda planted forest
- Pinus taeda temporarily flooded forest
- Platanus occidentalis - Liquidambar styraciflua - Ulmus americana / Crataegus viridis forest
- Quercus alba - Carya glabra - Carya alba / Aesculus pavia forest
- Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana forest
- Quercus nigra forest
- Quercus pagoda - Quercus nigra / Halesia diptera - Ilex decidua / Chasmanthium sessiliflorum - Dicliptera brachiata forest
- water

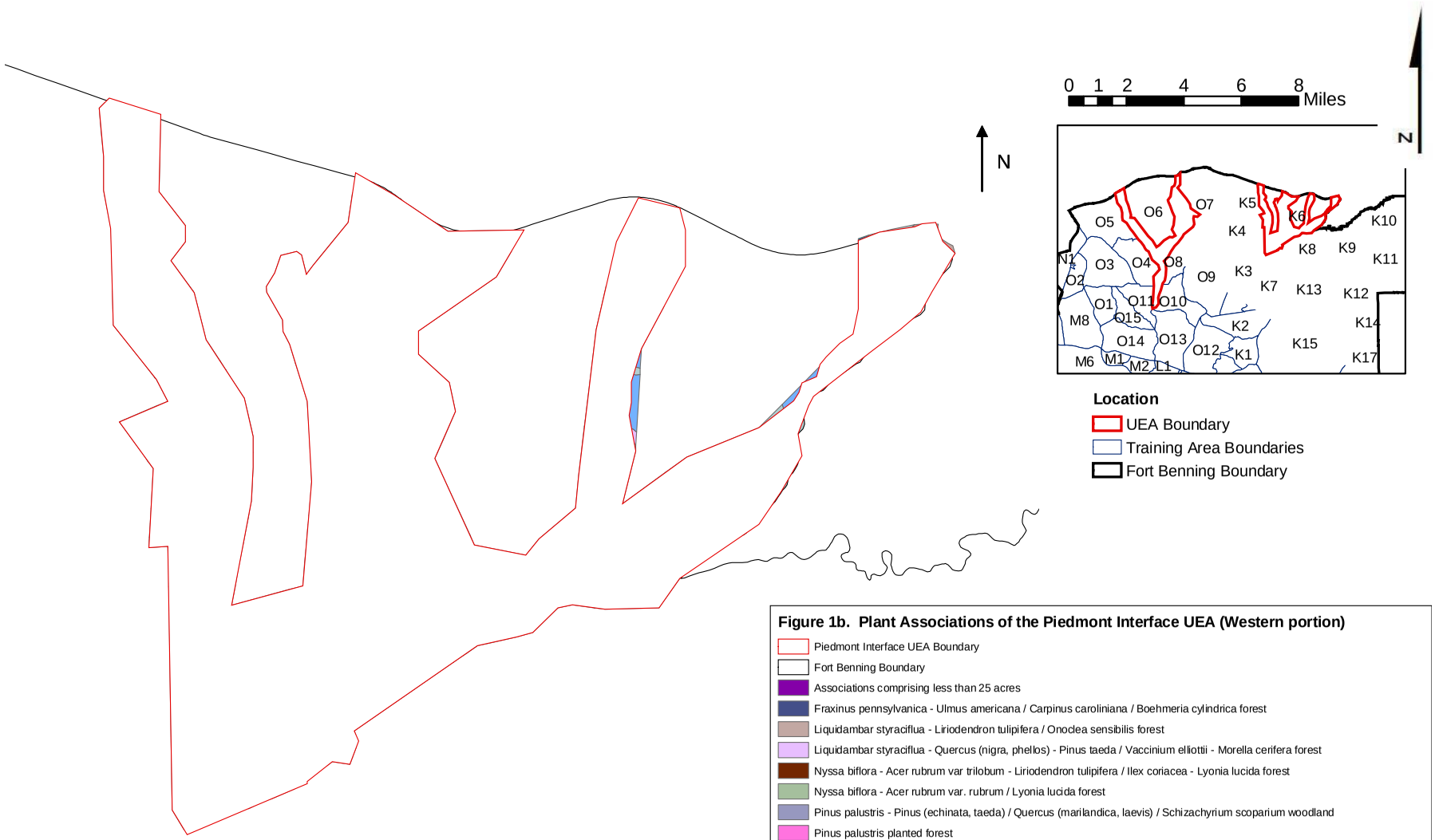


Figure 1b. Plant Associations of the Piedmont Interface UEA (Western portion)

- Piedmont Interface UEA Boundary
- Fort Benning Boundary
- Associations comprising less than 25 acres
- Fraxinus pennsylvanica - Ulmus americana / Carpinus caroliniana / Boehmeria cylindrica forest
- Liquidambar styraciflua - Liriodendron tulipifera / Onoclea sensibilis forest
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Nyssa biflora - Acer rubrum var trilobum - Liriodendron tulipifera / Ilex coriacea - Lyonia lucida forest
- Nyssa biflora - Acer rubrum var. rubrum / Lyonia lucida forest
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus palustris planted forest
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Liquidambar styraciflua - Nyssa biflora temporarily flooded forest
- Pinus taeda - Liquidambar styraciflua semi-natural forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda - Quercus nigra forest [placeholder]
- Pinus taeda planted forest
- Pinus taeda temporarily flooded forest
- Platanus occidentalis - Liquidambar styraciflua - Ulmus americana / Crataegus viridis forest
- Quercus alba - Carya glabra - Carya alba / Aesculus pavia forest
- Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana forest
- Quercus nigra forest
- Quercus pagoda - Quercus nigra / Halesia diptera - Ilex decidua / Chasmanthium sessiliflorum - Dicliptera brachiata forest
- water

*** White spaces represent areas where vegetation was not mapped to the association level**

2. HASTING RELICT SANDHILLS

UEA Overview, Ecological Significance and Condition

This UEA (over 2600 acres) is located in the northeastern portion of the installation within several of the K training areas and also includes parts of Hastings Range. Most of the site is occupied by modified longleaf pine forests occurring over excessively drained sands. The principal ecological significance of this area is the habitat it provides to numerous amphibian, reptilian, and avian species of conservation concern.

At least nine animal species of special concern are located within this UEA. The site provides habitat for the densest concentration of gopher tortoise (*Gopherus polyphemus*) on the installation. Consequently, it is also important for the large suite of species that utilize the burrows of this keystone reptile. Clay based depression ponds further contribute to the significance and uniqueness of this site. These globally rare, seasonal flooded herbaceous wetlands are important breeding sites for the state listed dusky gopher frog (*Rano capito*). In addition, there is substantial habitat provided here for the federally endangered red-cockaded woodpecker (*Picoides borealis*), which depends upon the condition and extent of longleaf pine and modified pine forests in the upland portions of this UEA.

While a large amount of acreage within the UEA (800 acres) is dominated by a natural longleaf pine association (*Xeric Upper East Gulf Coastal Plain Longleaf Pine Woodland* - CEGL008491), a larger portion is dominated by modified vegetation (over 900 acres) and cultivated forests (700 acres). These modified or cultivated forests lack the natural integrity and functionality that longleaf woodlands provide in terms of habitat for special concern species within this UEA.

The wetland associations found within this site are of high quality and integrity. In particular, the three herbaceous association types making up the depression pond vegetation are excellent examples of this globally rare but ecologically critical habitat.

Management Issues, Goals, Recommendations and Other Considerations

Forest stands within this UEA have lower than desirable longleaf pine density, likely due to past removal of longleaf. Restoration of longleaf pine, therefore, is the primary management goal for this area. A significant scrub oak component also occurs here, particularly where longleaf density is lowest. Dominant oak species include turkey oak (*Quercus laevis*), blackjack oak (*Q. marilandica*), post oak (*Q. stellata*), and bluejack oak (*Q. incana*), and in some cases these species form thick stands. Longleaf restoration is desirable for these areas but should not come at the wholesale expense of the oak species. The 2003 U.S. Fish and Wildlife Service Red Cockaded Woodpecker Plan points this out and goes on to say that “such species are integral components of the southern pine ecosystem and should not be cut in the name of red-cockaded woodpecker management (p. 39).” Recent research at Eglin Air Force Base, Florida, further indicates that understory herbaceous community quality and longleaf pine

establishment in oak-dominated stands is related more to oak litter accumulation and depth than to understory light environment, meaning that management goals to increase understory quality and longleaf pine recruitment may be met primarily by use of frequent prescribed fire as opposed to aggressive oak removal (K. Hiers personal communication to R. Addington). Under a frequent fire regime, oak-dominated stands should naturally tend toward longleaf over time, assuming some overstory longleaf seed trees are present. Moderate underplanting of longleaf should be considered in areas where seed trees are absent.

Any management activity within this UEA, particularly timber harvests and use of herbicides, should carefully consider potential impacts to the ponds. Appropriate buffers should be established around the ponds to minimize impact to these important features. Several of the ponds were visited in May 2005. Although most ponds appear in good condition, in some cases hardwood encroachment along pond edges may be an issue. A thick stand of short-stature sweetgum (*Liquidambar styraciflua*) was noted along the boundary of one pond. Species such as these tend to use a lot of water during the growing season and may draw down pond water levels. Some invasive species were also present, including Japanese honeysuckle (*Lonicera japonica*) and chinaberry tree (*Melia azedarach*). Both hardwood encroachment and invasive species should be monitored in the vicinity of ponds and appropriate management actions such as prescribed fire or removal by hand should be undertaken where ponds appear impacted.

Some areas within this UEA are used for intensive mechanized training, which can impact the erodible Lakeland sands and Troup loamy sands present here. However, judging from the large number of element occurrences of special concern animals found here, this does not appear to represent a significant threat to this UEA. Restriction of tracked vehicles to designated trails and their exclusion from sensitive areas can ensure minimal impacts on animals and plant associations that are of primary concern here.

This UEA is located on the eastern boundary of Fort Benning. The adjacent land uses currently include agriculture, timber production, and an increasing amount of development. The ability of land managers to apply prescribed fire may be hindered due to increased air-quality regulations and public concern about smoke as the Columbus-Fort Benning area continues to grow and develop. Establishment of a no-development or conservation buffer on adjacent private lands through the Army Compatible Use Buffer program is a proactive step towards relieving some of these pressures. Such a buffer will also benefit special concern animals by protecting additional habitat that they might utilize.

Management Issue	Management Goal	Mgt Recommendation
Degraded upland plant communities	Restore longleaf pine associations	Consider underplanting of longleaf pine
Hardwood encroachment	Reduce along pond edges	Monitor and remove where necessary

around ponds		
Military training	Reduce impacts to erodible sands and special concern areas	Restrict tracked vehicles to designated trails and exclude from sensitive areas
Adjacent off-post land use	Minimize smoke-sensitive areas and protect habitat for special concern animals	Establish a conservation buffer

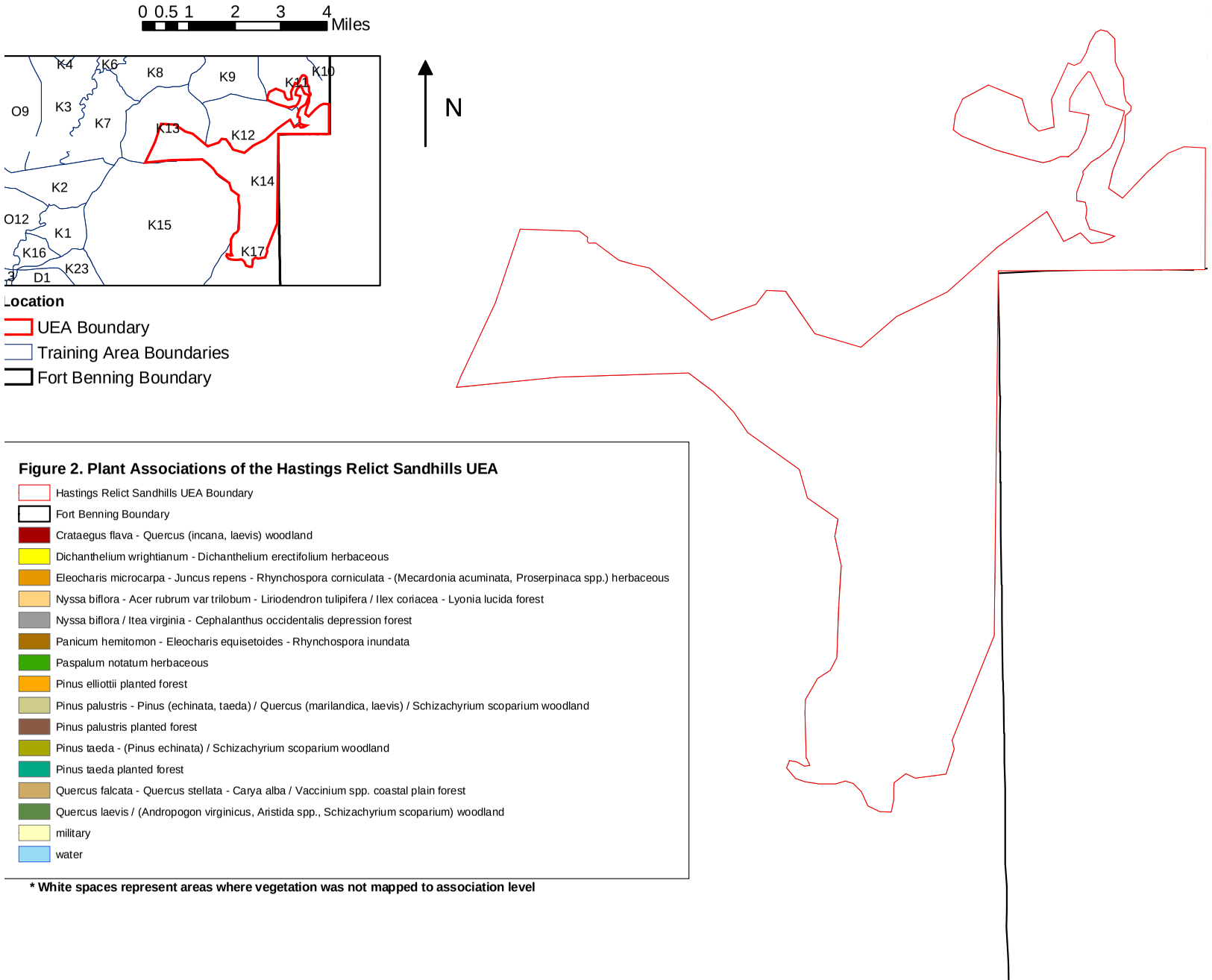


Figure 2. Plant Associations of the Hastings Relict Sandhills UEA

- Hastings Relict Sandhills UEA Boundary
- Fort Benning Boundary
- Crataegus flava - Quercus (incana, laevis) woodland
- Dichanthelium wrightianum - Dichanthelium erectifolium herbaceous
- Eleocharis microcarpa - Juncus repens - Rhynchospora corniculata - (Mecardonia acuminata, Proserpinaca spp.) herbaceous
- Nyssa biflora - Acer rubrum var trilobum - Liriodendron tulipifera / Ilex coriacea - Lyonia lucida forest
- Nyssa biflora / Itea virginia - Cephalanthus occidentalis depression forest
- Panicum hemitomon - Eleocharis equisetoides - Rhynchospora inundata
- Paspalum notatum herbaceous
- Pinus elliottii planted forest
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus palustris planted forest
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda planted forest
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest
- Quercus laevis / (Andropogon virginicus, Aristida spp., Schizachyrium scoparium) woodland
- military
- water

*** White spaces represent areas where vegetation was not mapped to association level**

3. PINE KNOT CREEK BLACKWATERS

UEA Overview, Ecological Significance and Condition

This UEA (1630 acres) is located in training areas L and K and transects the Digital Multipurpose Range (DMPRC) along the east-central portion of the installation and includes most of Pine Knot and Little Pine Knot Creeks. Its purpose as a UEA is to capture the ecological values of a blackwater stream, including two special concern fish species: broadstripe shiner (*Pteronotropis euryzonus*) and southern brook lamprey (*Ichthyomyzon gagei*). One plant of conservation concern, bog sneezeweed (*Helenium brevifolium*), also occurs here. A mosaic of globally ranked, seasonally flooded and saturated wetland hardwood forests occur along the floodplain here. The bottomland plant associations are generally pristine and of high quality. The upland forests within this UEA are also typically of good quality with the *Xeric Upper East Gulf Coastal Plain Longleaf Pine Woodland* (CEGL008491) making up the majority of the acreage (280 acres). Modified plant associations make up a smaller portion of the uplands (185 acres).

Management Issues, Goals, Recommendations and Other Considerations

Because of the remoteness of the wetland forests here, management issues identified for this UEA are limited to stream crossings used by tracked vehicles. Impacts to water quality and special concern animals (primarily fish) should be monitored in the vicinity of these crossings. Of relevance here is protocol for monitoring low water stream crossings developed in 2002 by Fort Benning's Land Condition Trend Analysis program. Aquatic monitoring by the Department of Defense Strategic Environmental Research and Development Program (SERDP) Ecosystem Characterization and Monitoring Initiative (ECMI) should also be evaluated in this regard.

A second potential impact is the Digital Multiple Purpose Range Complex (DMPRC). Aquatic monitoring should be conducted during construction phases and should continue once the range is operational. Monitoring in the vicinity of the DMPRC is currently conducted by SERDP.

Concerns about the effects of beaver impoundments on stream flow rates of Little Pine Knot Creek have also been raised. It is unclear if this is a serious problem and whether or not it is practical to remove beaver dams, as they are generally quickly re-established.

The eastern edge of this UEA falls along the eastern boundary of the installation. Some of this area is developed, but the predominant land use is timber production. The Army Compatible Use Buffer program has established a conservation buffer within the Pine Knot and Little Pine Knot Creeks watershed off-post that helps protect the hydrologic processes associated with these streams.

Management Issue	Management Goal	Mgt Recommendation
Military training	Ensure stream water quality for special concern fishes	Minimize erosion impacts of tracked vehicle crossings
Digital Multipurpose Range Complex	Reduce impacts on water quality	Evaluate results of ongoing monitoring
Beaver impoundments	Ensure unimpeded stream flow for special concern fishes	Dam removal and beaver trapping
Adjacent off post land use	Protect upstream hydrologic processes	Establish a conservation buffer

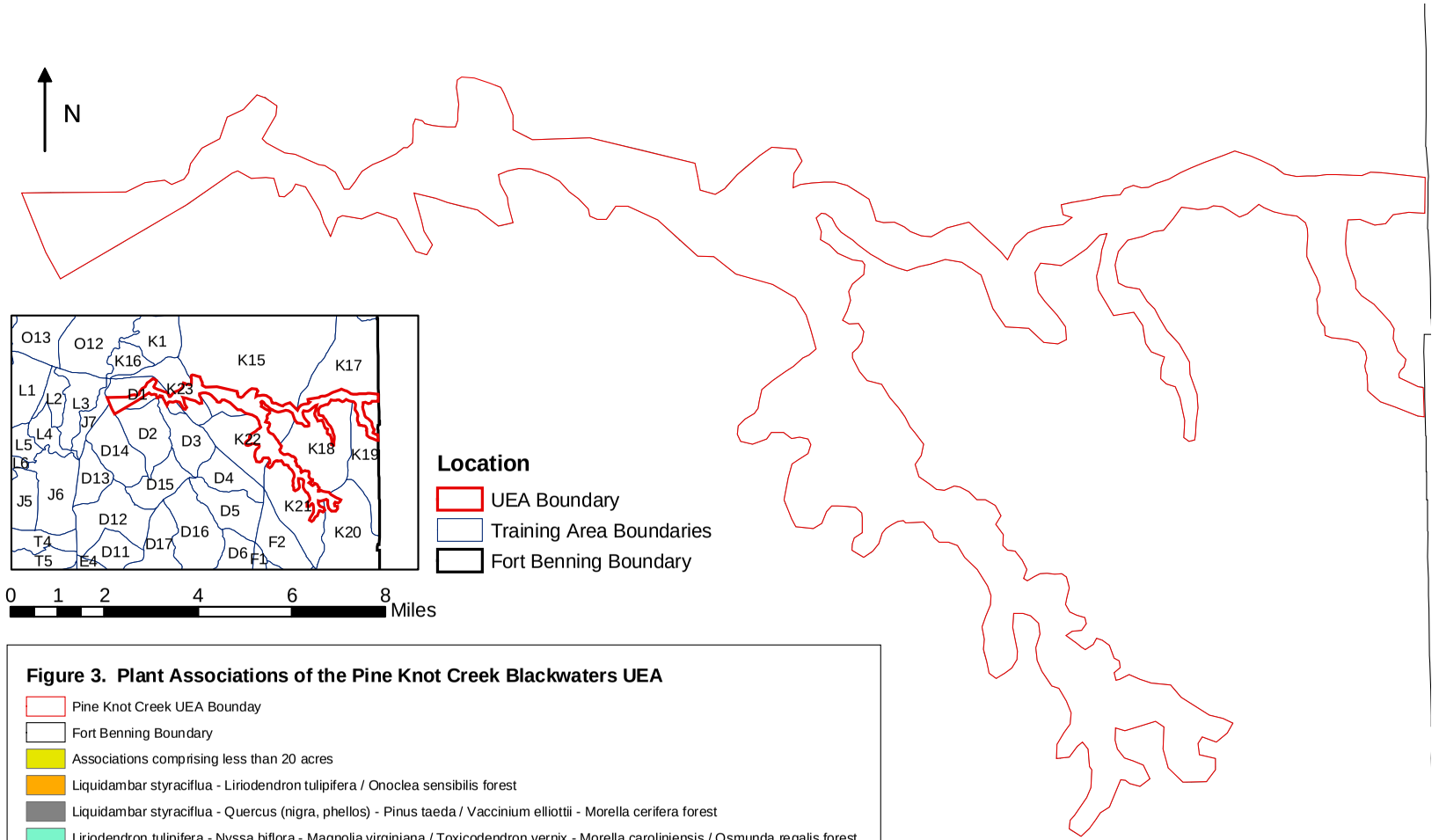


Figure 3. Plant Associations of the Pine Knot Creek Blackwaters UEA

- Pine Knot Creek UEA Bounday
- Fort Benning Boundary
- Associations comprising less than 20 acres
- Liquidambar styraciflua - Liriodendron tulipifera / Onoclea sensibilis forest
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Liriodendron tulipifera - Nyssa biflora - Magnolia virginiana / Toxicodendron vernix - Morella caroliniensis / Osmunda regalis forest
- Nyssa biflora - (Acer rubrum) / Ilex opaca / Leucothoe axillaris / Carex atlantica ssp. capilliaceae forest
- Nyssa biflora - Acer rubrum var trilobum - Liriodendron tulipifera / Ilex coriacea - Lyonia lucida forest
- Nyssa biflora - Acer rubrum var. rubrum / Lyonia lucida forest
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Liquidambar styraciflua semi-natural forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium staminium forest
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest
- Quercus nigra forest
- Quercus phellos - Quercus nigra - Quercus alba / Chasmanthium (laxum, sessiliflorum) forest

*** White spaces represent areas where vegetation was not mapped to association level**

4. LAKELAND SANDHILLS

UEA Overview, Ecological Significance and Condition

This UEA (128 acres) is located in the central part of the installation and includes the best example of ultra-xeric sandhills on Fort Benning. The extremely deep Lakeland soils here provide a unique habitat for some plant species that are extremely rare in Georgia but more frequent in the Florida scrub oak forests of the Lake Wales Ridge area. More than half of this area is occupied by *Atlantic Coastal Plain Xeric Sandhill Scrub* (CEGL003590) a G2 (extremely rare) plant association that is unusual in this geographic setting. Two plant species rare in Georgia are also found here: Pickering's morning-glory (*Stylisma pickeringii*), an S2 species, and woody goldenrod (*Chrysoma pauciflosculosa*), an S3 species. A number of other plants occur here that are not of special concern but are of interest botanically because they are restricted to these types of ultra-xeric sands and indicative of the extreme environment. Included here are wireplant (*Stipulicida setacea*), sandhill beaksedge (*Rhynchospora megalocarpa*), spiny spikemoss (*Selaginella acanthonota*), and coastalplain nailwort (*Paronychia herniarioides*). A total of 36 gopher tortoise burrows were also documented within this area by the U.S. Fish and Wildlife Service (FWS) as part of the FWS-Fort Benning Terrestrial Resources Inventory 1995-1998.

The location of this UEA on the top of a steep and narrow sand ridge along Hourglass Road was historically favored by the military for mechanized vehicle training. Although sensitive area signs are currently in place and the area is no longer subjected to the types of disturbance that have occurred in the past, some residual impact remains. This includes deep trails and large areas of exposed sand where erosion is the primary concern. Other impacts include historical land management practices that likely favored removal of canopy longleaf pine trees, and the current density of mature longleaf in this area is probably lower than what this area historically supported. It is not known how long xeric sandhills take to recover from disturbances such as these, but the assumption is that a long period of time is needed due to the extreme nature of the environment and the resulting slow pace of biological processes.

Management Issues, Goals, Recommendations and Other Considerations

This UEA was visited on 4/19/05. A fairly complete meander survey of the entire UEA was possible due to its small size. The population of woody goldenrod was flourishing at this time. Pickering's morning glory was not found, but this species tends to emerge later in the season. A follow-up visit on 6/29/05 confirmed the presence of this species and noted that it was abundant at this time. Both of these species appear to be doing best in areas characterized by a very open canopy with exposed mineral soil and little to no leaf litter accumulation. Not much is known about specific habitat requirements for either of these species, but current management practices seem to be appropriate for maintenance of the existing populations.

Some disturbance features, primarily erosion, were noted throughout the UEA, but in general these appeared to be localized and not a significant threat to rare plant populations or the integrity of the UEA as a whole. No evidence of feral hog rooting was found, and no invasive, non-native plant species were documented. Longleaf pine in the overstory appeared healthy, and natural regeneration of longleaf was noted in several areas, but was generally confined to the eastern and southern boundary of the UEA. Understory vegetation in the vicinity of gopher tortoise burrows appeared suitable for tortoise forage. This included several species of asters, legumes, prickly pear (*Opuntia* sp.), and blueberry (*Vaccinium* sp.). Yet, no burrows were

observed to be active on the 4/19/05 visit. Burrow surveys were not conducted on the 6/29/05 visit.

No immediate management actions are necessary for this UEA at this time. Some portions of the UEA would benefit from more frequent and more complete application of prescribed fire, particularly to reduce litter accumulation in some areas and to increase natural regeneration of longleaf pine. Low intensity fire is recommended. The western portion of the UEA located in training compartment J7 is currently not in the prescribed burn rotation and would benefit from the reintroduction of fire. Due to the patchy nature of the understory fuels, fire behavior and burn pattern throughout the UEA is likely heterogeneous. Ignition patterns should be tailored in such a way to ensure that "islands" of unburned fuel and litter accumulation get burned. Duff does not seem to be an issue in this UEA, however. Moderate underplanting of longleaf pine should be considered for some areas to create a more continuous fuels structure. Again though, these activities should avoid the vicinity of the Pickering's morning glory and woody goldenrod populations as these species appear to be flourishing under current management.

The current vegetation composition and structure of this UEA does not suggest the need for vegetation control measures other than prescribed fire. However, should herbicide use be deemed appropriate in the future (e.g. to control invasives or for some other reason not now foreseen), an herbicide type which binds to soil particles should be used, given the extremely well-drained nature of the soils in this UEA.

Management Issue	**Management Goal**	**Mgt Recommendation**
Rare plant populations	Maintain or increase population size of Pickering's morning glory and woody goldenrod	Maintain open canopy and minimize leaf litter accumulation
Erosion	Ensure integrity of plant association and rare plant populations; prevent opportunities for non-native, invasive species	Monitor erosion in the vicinity of rare plant populations; implement soil stabilization projects as necessary
Sparse longleaf pine component in canopy	Increase natural recruitment and longleaf pine density in some areas	More thorough application of prescribed fire; consider moderate underplanting in select areas

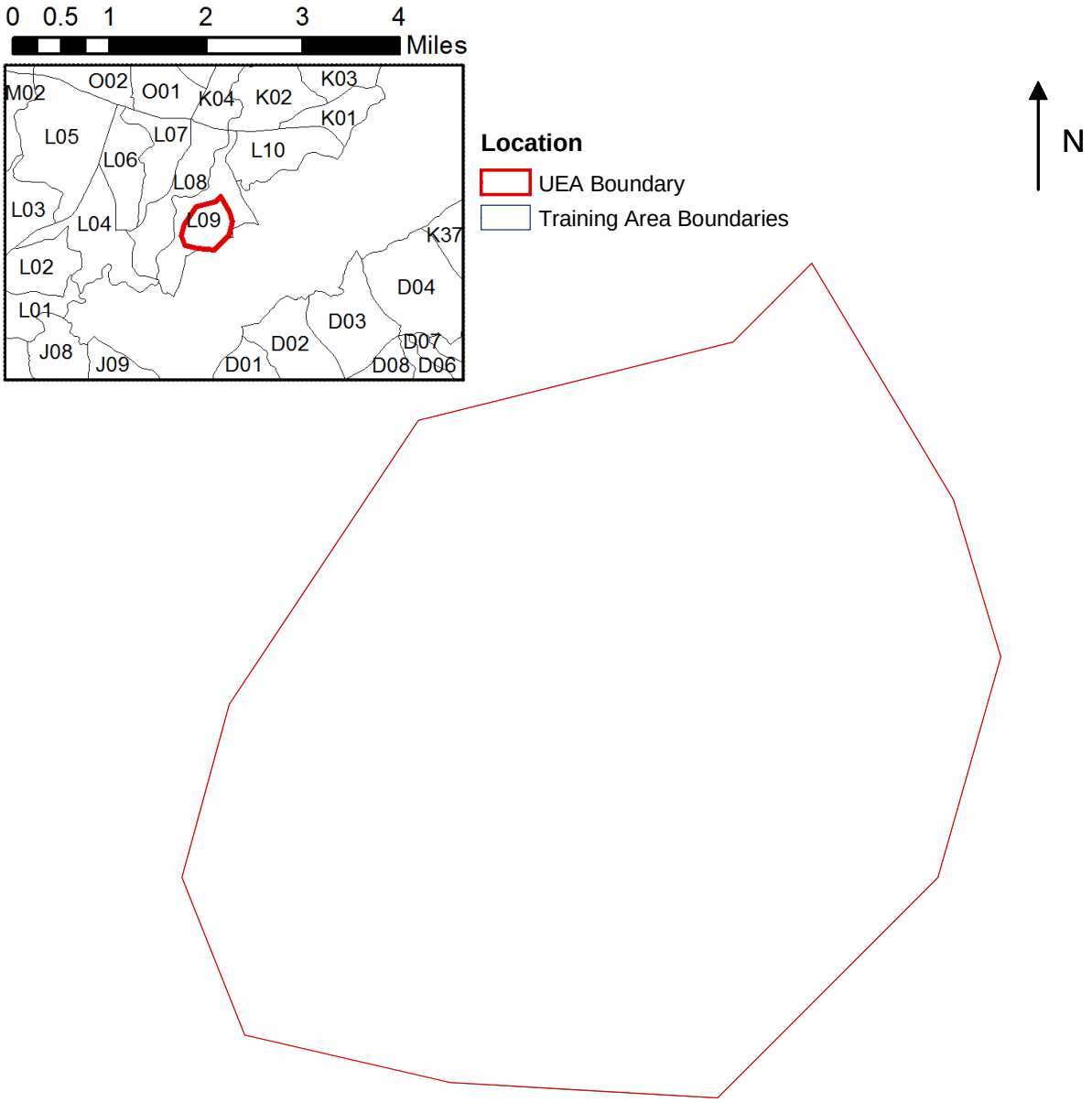


Figure 4. Plant Associations of the Lakeland Sandhills UEA

- Lakeland Sandhills UEA Boundary
- Nyssa biflora - Acer rubrum var trilobum - Liriodendron tulipifera / Ilex coriacea - Lyonia lucida forest
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus palustris / Quercus laevis / Aristida purpurascens - Stipulicida setacea - (Rhynchospora megalocarpa, Selaginella acanthonota) woodland
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest

5. MALONE CANEBRAKES

UEA Overview, Ecological Significance and Condition

This is arguably one of the most significant ecological areas recognized so far at Fort Benning. It is located in the west-central portion of the installation in the M6 Training Area and is highly influenced by the Malone Range Complex. Its high quality condition is the result of the frequent fires that occurred here historically and presently due to training activities at Malone Range. The central feature of this site is the occurrence of the globally imperiled (G1) *Saturated Switch Cane Shrubland* (CEGL003843). These saturated peatlands typically occur in a mosaic of rolling longleaf pine habitat and are dependent upon frequent and intense fires. This community is believed to have been widespread in the Southeast in presettlement times, but few occurrences are currently documented or protected. This association only occupies a little over 40 acres out of a total of 2100 acres within the UEA, but greatly enhances and forms the core of its ecological significance.

The largest concentration of sweet pitcherplants (*Sarracenia rubra*), a globally rare and state listed species, occurs here in association with these canebreaks and the closely related saturated pond pine woodland and shrubland plant communities (CEGL003860 and CEGL003846), which are also infrequent and ecologically significant. Other notable plant species that occur here include pine lily (*Lilium catesbaei*), grass-pink orchid (*Calopogon tuberosa*), coastal bog asphodel (*Tofieldia racemosa*), and large spreading pogonia (*Cleistes divaricata*). These species are more typical of Coastal Plain longleaf pine savannas and are uncommon on Fort Benning.

A substantial amount (over 800 acres) of high quality *Xeric Upper East Gulf Coastal Plain Longleaf Pine Woodland* (CEGL008491) also occurs within this matrix of uplands and saturated stream bottoms. This, together with the presence (165 acres) of the more restricted *Upper East Gulf Coastal Plain Loamhill Longleaf Woodland* (CEGL008452), results in a very diverse and important UEA.

This area is quite heterogeneous, and overall statements regarding its ecological condition are difficult to make. While it has many high quality saturated wetlands and extensive longleaf pine woodlands, it also has a substantial amount of human influenced and successional upland areas. Roughly 700 acres consist of upland forests in various stages of succession. This includes large areas that have been modified primarily by silvicultural practices (principally *Loblolly Pine - Shortleaf Pine Managed Woodland* -CEGL003618). A smaller amount of the area consists of young successional wetland forests.

Management Issues, Goals, Recommendations and Other Considerations

Some 1400 acres out of a total of 2100 acres (66%) of the landscape within this UEA support significantly rare plant communities of high quality and integrity. Current management practices appear to be sufficient to maintain the ecological processes that

are important here. The frequent fires associated with ordinance explosions at Malone Range are vital to the canebrake and saturated pond pine plant associations. Monitoring of these plant communities should be a regular task, and special measures may be necessary (i.e., limited scope prescribed fire) in the event of woody plant encroachment. The saturated pond pine woodland and shrubland associations (CEGL003860 and CEGL003846) are linked to the canebrake community in a dynamic relationship based on hydrology and fire. If fire frequency is reduced in this UEA, the pond pine woodland and shrubland associations can be expected to increase in abundance, reducing the canebrake and threatening the associated unique herbaceous species. Intense application of site specific fire may be required to remedy such a situation.

The greatest opportunity for improving this UEA is to address the modified upland forests that make up about 560 acres of this site. In the past, these areas probably supported longleaf pine woodlands. Most now have forests dominated by loblolly in combination with shortleaf pine or are woodlands dominated by scrub oak species such as turkey oak (*Quercus laevis)*. Restoration to longleaf pine would improve the functionality of this area, particularly in regard to fire continuity and the ability to move fire effectively through the globally rare plant associations found here.

Management Issue	**Management Goal**	**Mgt Recommendation***
Degraded upland plant communities	Restore longleaf pine associations	None
Fire	Maintain intense fire regime and functionality of pyrogenic and globally rare plant associations	Monitoring of significant plant associations for hardwood encroachment

* "None" implies that the installation's existing land management practices are adequate to address the needs of this UEA.

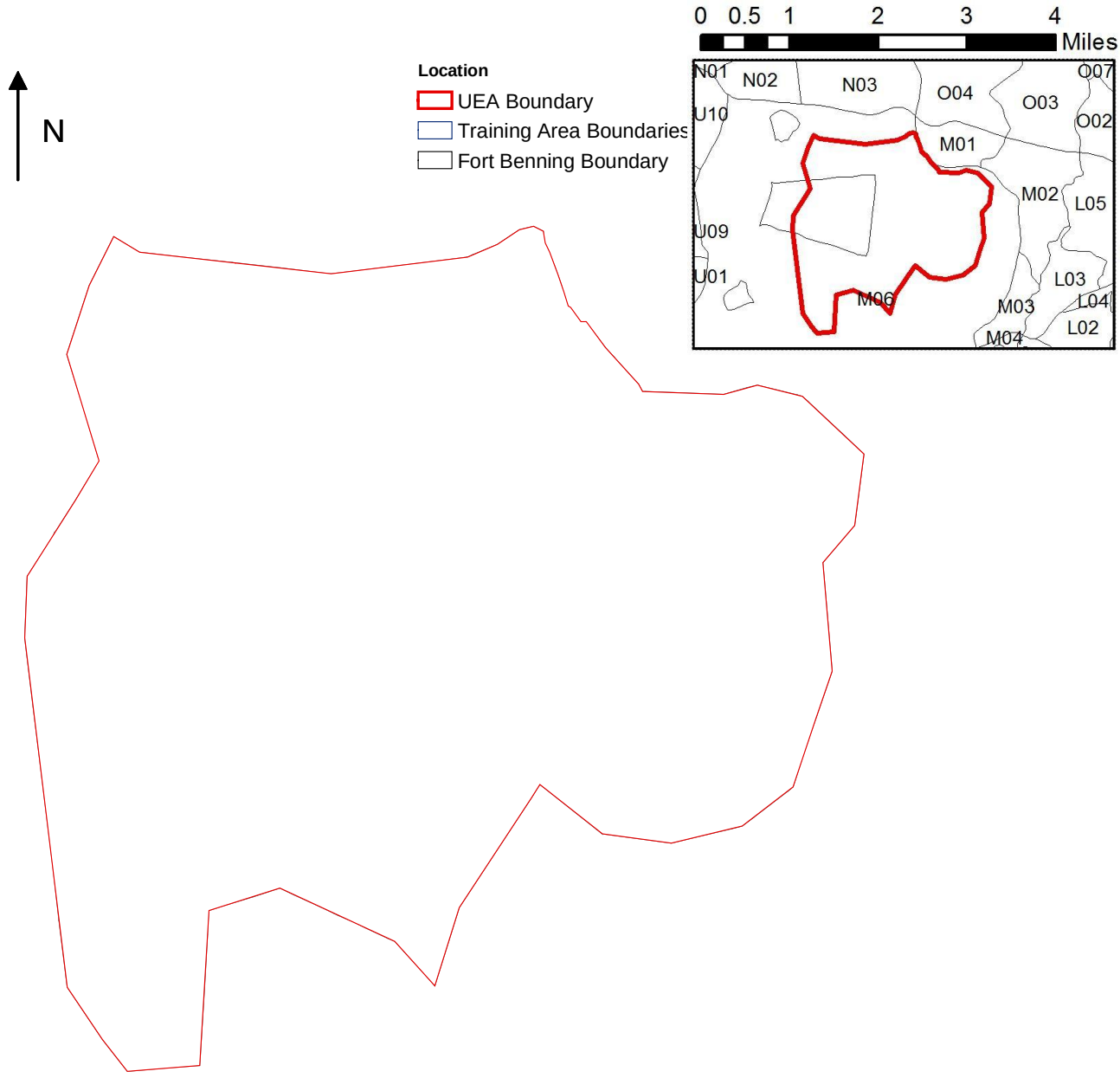


Figure 5. Plant Association of the Malone Canebreaks UEA

- Malone Canebreaks UEA Boundary
- Associations with less than 30 acres
- Arundinaria gigantea ssp. tecta shrubland
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Nyssa biflora - Acer rubrum var trilobum - Liriodendron tulipifera / Ilex coriacea - Lyonia lucida forest
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus palustris - Pinus serotina / Ilex glabra - Lyonia lucida / Ctenium aromaticum woodland
- Pinus palustris / Schizachyrium scoparium / Verbesina aristida loamhill woodland
- Pinus serotina / Lyonia lucida - Ilex glabra - (Cyrilla racemiflora) shrubland
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Liquidambar styraciflua semi-natural forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest
- Quercus margarettiae - Quercus stellata - Quercus marilandica / Schizachyrium scoparium woodland
- military

6. UPATOI BLUFFS

UEA Overview, Ecological Significance and Condition

As currently delineated, this UEA is composed mostly of rich hardwood bluff forests on the southeast side of Upatoi Creek near the west-central boundary of the installation. The steep slopes on which these mesic hardwood forests occur have served to protect them from disturbances common to forests on more gentle topography in the vicinity. In addition, nutrient rich soils associated with the Blufftown Formation form much of the substrate for these plant associations, resulting in a very lush herbaceous component. This formation includes a mixture of calcareous sands and clays with high shell and fossil content. Six plant species of regional conservation significance occur here, including croomia (*Croomia pauciflora*), American ginseng (*Panax quinquefolius*), white four-o'clock (*Mirabilis albida*), Carolina silverbell (*Halesia carolina*), Flyr's nemesis (*Brickellia cordifolia*), and broadleaf bunchflower (*Melanthium latifolium*). Although no globally rare plant associations are included within this UEA as currently defined, a proposed inclusion of the Upatoi Creek floodplain would add at least three wetland forest and herbaceous communities of conservation concern: *Depression Pond (Spikerush – Creeping Rush Subtype* - CEG L004748), *Diamondleaf Oak Atlantic Brownwater River Floodplain Terrace and Ridge Forest* (CEGL004678), and *East Gulf Coastal Plain Oak-Sweetgum Small Stream Floodplain Forest.* These are associated with a series of oxbow lakes and depressions found on the floodplain adjacent to the bluffs, and if included would greatly improve the conservation significance of this UEA.

The overall condition of this UEA is generally good. There are small areas of successional and fire sheltered forest (*Sand Laurel Oak - (Southern Red Oak, Water Oak) / American Holly - Farkleberry / Tread-softly Forest* - CEGL007751), but these are mature, not highly disturbed, and merit no special management or restoration needs.

Management Issues, Goals, Recommendations and Other Considerations

Military training in this UEA is rare and infrequent and mostly limited to rappelling from the bluffs in training areas J3 and J4. Land management of this area is also passive. Fire is not an important component of these mesic hardwood forests and need not be used as a management tool. If applied, it should be infrequent.

A meander search was conducted along the bluffs on 6/9/05 and 7/14/05. Rappelling sites were visited and do not appear to be significantly disturbed. The population of croomia was also visited and appears to be doing well. There was, however, a large patch of basket grass (*Oplismenus hirtellus*) growing very close to this area. There are differing opinions on whether this plant is native or introduced, but based on its observed growth characteristics and its proximity to croomia, eradication seems appropriate. Autumn olive (*Eleagnus umbellata*) was also found in this area, and is scattered throughout the UEA. Large patches of kudzu (*Pueraria montana* var. *lobata)* also occur along the Upatoi adjacent to Hwy. 280 and Cusseta Road. The condition of the UEA would benefit from the removal of these invasive exotics.

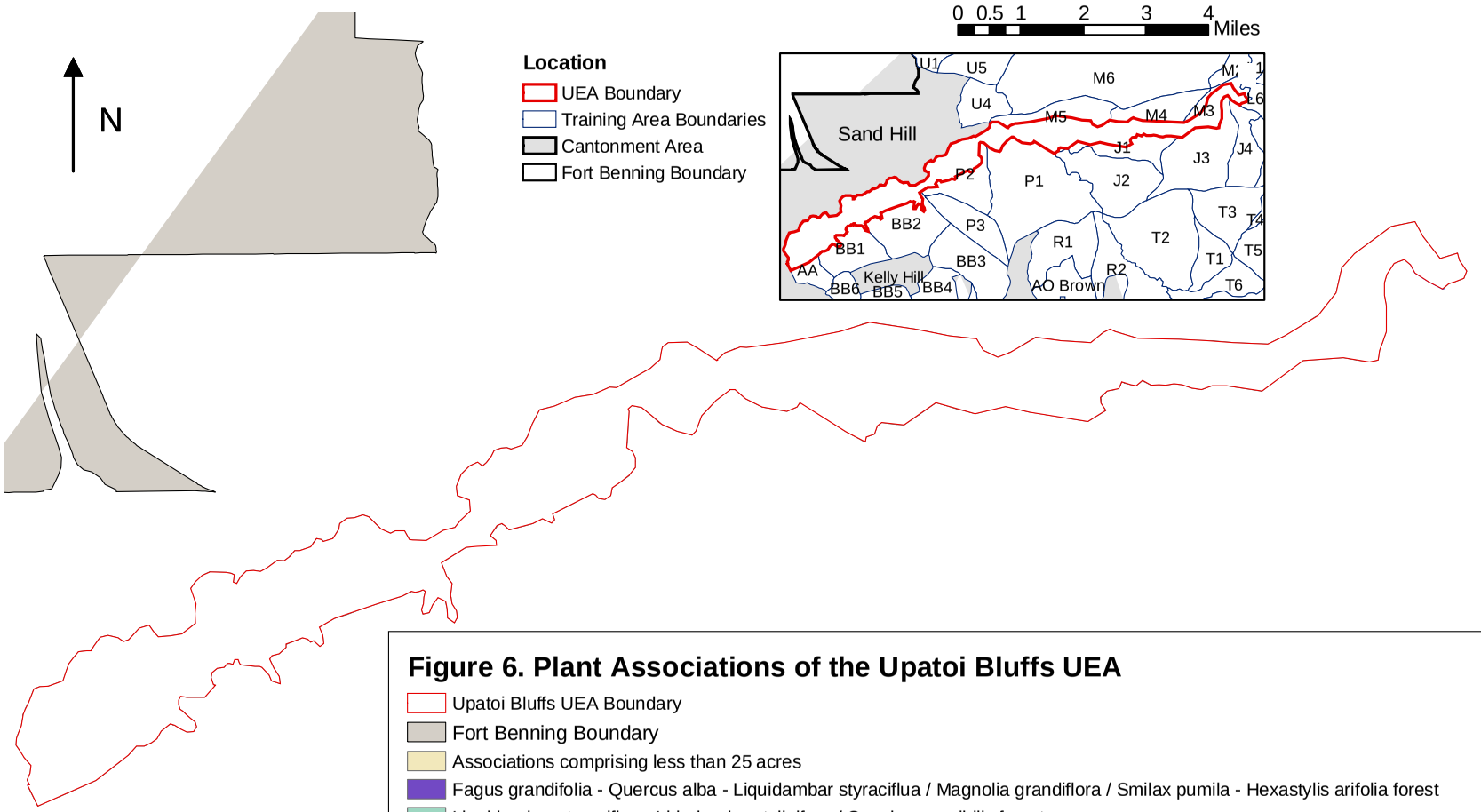


Figure 6. Plant Associations of the Upatoi Bluffs UEA

- Upatoi Bluffs UEA Boundary
- Fort Benning Boundary
- Associations comprising less than 25 acres
- Fagus grandifolia - Quercus alba - Liquidambar styraciflua / Magnolia grandiflora / Smilax pumila - Hexastylis arifolia forest
- Liquidambar styraciflua - Liriodendron tulipifera / Onoclea sensibilis forest
- Liquidambar styraciflua - Quercus (laurifolia, nigra) - (Pinus taeda) / Arundinaria gigantea / Carex abscondita forest
- Nuphar lutea ssp. advena - Nymphaea odorata herbaceous
- Pinus taeda - Liquidambar styraciflua - Nyssa biflora temporarily flooded forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda planted forest
- Pinus taeda temporarily flooded forest
- Quercus hemisphaerica - Quercus (falcata, nigra) / Ilex opaca - Vaccinium arboreum / Cnidoscolus stimulosus forest
- Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana forest
- Quercus pagoda - Quercus nigra / Halesia diptera - Ilex decidua / Chasmanthium sessiliflorum - Dicliptera brachiata forest
- Quercus phellos - Quercus nigra - Quercus alba / Chasmanthium (laxum, sessiliflorum) forest
- water

7. PROSPERITY CHURCH OAK-HICKORY FOREST

UEA Overview, Ecological Significance and Condition

This area is located near the south central portion of the installation in training compartment E5. Its designation as a UEA was based primarily on the presence of outstanding examples of upland oak-hickory forests, which are not widespread at Fort Benning. In total, it comprises 272 acres, with some additional acreage also proposed, and its significance as a natural area relates more to its local uniqueness rather than to its value on a global scale.

Although this area likely burned historically, fire was not as frequent here as in the surrounding longleaf pine woodlands and succession to oak-hickory was allowed. Exclusion of frequent fire in this area could be a natural consequence of topography and fire shadows, or it could be an artifact of historical land use and the existence of Prosperity Church. Whatever the historical influence on forest development, the area currently is dominated by high quality *Basic Mesic Coastal Plain Oak - Hickory Forest* (CEGL007225). This association comprises a total of 172 acres. Only two species of special concern occur within this UEA: American ginseng (*Panax quinquefolius*) and croomia (*Croomia pauciflora*). About 60 acres of this site consist of modified vegetation that is disturbed, successional, and of low ecological value.

Management Issues, Goals, Recommendations and Other Considerations

Mechanized and dismounted training is conducted in the vicinity of this UEA, and impacts from this could be of concern along the UEA perimeter but likely do not affect the UEA as a whole. Sensitive area signs are posted and should prevent any extensive, large scale disturbance. The scarcity of special concern plant species and general natural resilience of oak and hickory forests further abates concerns about this threat.

A second management issue in this UEA is prescribed fire and its application at appropriate return intervals and intensity. Development and maintenance of oak-hickory communities relies on some exposure to fire, particularly for oak regeneration, improved stem form, and to retard succession to other hardwood species such as red maple (*Acer rubrum*) and yellow poplar (*Liriodendron tulipifera*). Yet, the frequency of fire in these communities is much less than that required for maintenance of upland longleaf pine communities. This particular dry-mesic forest, occurring on a somewhat exposed low knob, would benefit from an infrequent and low intensity fire regime, perhaps every 5-10 years consistent with recommendations for upland hardwood management in the Southern Appalachians. In general, the herbaceous component of this plant association is sparse and should not be impacted by a moderate prescription of fire.

A small portion of this UEA (6 acres) has been clearcut and replanted in longleaf pine. Although the character of this UEA is defined by the upland oak-hickory associations,

longleaf pine restoration is appropriate in some areas and should be considered for additional sites that are currently planted in loblolly pine. Other small inclusions of modified forest in this UEA should generally be allowed to undergo natural succession to upland oak-hickory, using fire to promote these species over less desirable hardwoods such as sweetgum, particularly where overstory oaks are present. Timber harvests to remove less desirable hardwood species or loblolly pine are permissible. No particular large infestations of non-native, invasive plant species are known from this UEA that would serve as targets for eradication.

Management Issue	**Management Goal**	**Mgt Recommendation***
Military training	Protect upland plant associations	None
Fire	Maintain and restore upland oak-hickory forests	Low intensity, long return interval fire regime
Degraded upland plant communities	Restore appropriate and/or desirable natural associations	Where overstory oak and hickory are present, restore to oak-hickory forest; otherwise restore to longleaf

* "None" implies that the installation's existing land management practices are adequate to address the needs of this UEA.

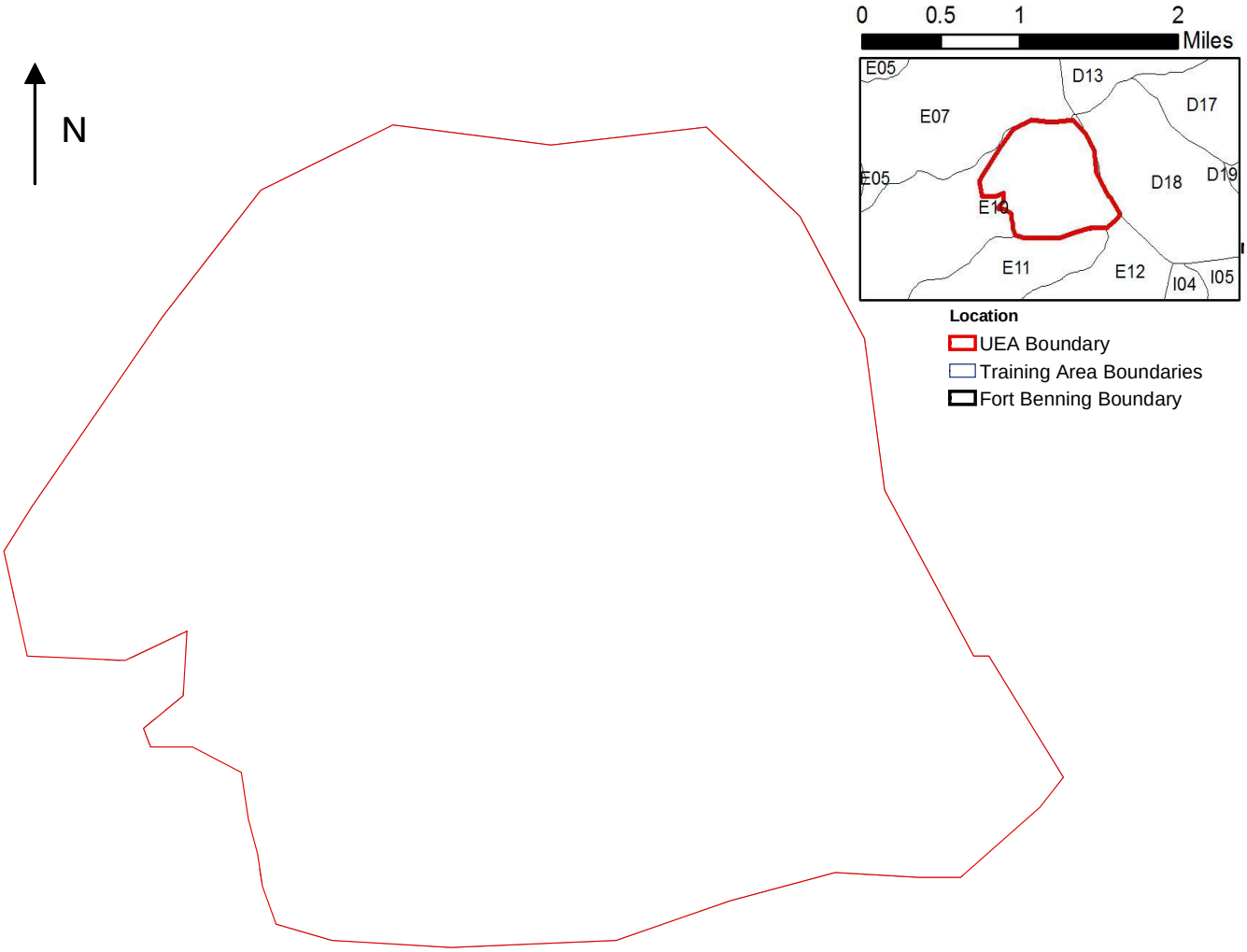


Figure 7. Plant Associations of the Prosperity Church Oak Hickory Forest UEA

- Prosperity Church UEA Boundary
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Nyssa biflora - Acer rubrum var trilobum - Liriodendron tulipifera / Ilex coriacea - Lyonia lucida forest
- Nyssa biflora - Acer rubrum var. rubrum / Lyonia lucida forest
- Pinus palustris planted forest
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Liquidambar styraciflua semi-natural forest
- Pinus taeda - Quercus nigra forest [placeholder]
- Pinus taeda planted forest
- Quercus alba - Carya glabra - Carya alba / Aesculus pavia forest
- Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium staminium forest
- Quercus nigra forest
- Quercus phellos - Quercus nigra - Quercus alba / Chasmanthium (laxum, sessiliflorum) forest
- Quercus rubra - Quercus alba - Carya glabra / Geranium maculatum forest

8. CHATTAHOOCHEE BACKWATERS

UEA Overview, Ecological Significance and Condition

This area consists of a very large (3400 acres) and diverse assemblage of islands, ponded areas, swamps, wetland depressions, riparian areas and adjacent upland forests associated with the Chattahoochee River where it makes a broad and expansive east to west turn in the southwestern corner of the installation. It includes the largest amalgamation of wetland areas present at Fort Benning and provides habitat for a wide array of plant and animal species of special concern. A breeding pair of bald eagles forages and nests in these wetlands. Other sensitive species found within this UEA include the wood stork (*Mycteria americana*), osprey (*Pandion haliaetus*), American alligator (*Alligator mississippiensis*), Barbour's map turtle (*Graptymys barbouri*), alligator snapping turtle (*Macroclemys temminckii*) and several species of special concern fish. A significant portion of the acreage included within this UEA (1100 acres) consists of impounded water, providing the largest expanse of open water found on the installation. This in turn provides habitat for the many waterfowl that are located in this area.

This site includes a very heterogeneous mixture of high quality wetlands, degraded uplands, and some areas with upland forests of high natural integrity. About 800 acres of the UEA consists of high quality wetland forests, shrublands, or marsh vegetation. Included here is one of the largest (380 acres) occurrences of the *East Gulf Coastal Plain Small River Oak Bottomland Forest* (CEGL007354) on the installation. Also present is a high quality example of *Water Tupelo - Swamp Blackgum Swamp Forest* (CEGL007429). Wetland shrublands found here include excellent examples of the *Southeastern Smooth Alder Swamp* (CEGL008474), *Southern Buttonbush Pond* (CEGL002191) and *Black Willow Riverbank Shrubland* (CEGL003901). A final important herbaceous wetland association located with this site is the *Southern Wild Rice Slough Marsh* (CEGL004139), which provides food for many wildlife species. These high quality wetland habitats are the ecological foundation of this UEA.

Contrasting with these high quality wetlands are large areas of low quality or non-native wetland habitats. Associations of lower quality and poorer natural condition include some three hundred acres of planted loblolly forests and pecan orchards. Also located here are substantial amounts of successional forests such as Pinus taeda - Liquidambar styraciflua semi-natural forest (CEGL008462) and other similarly modified associations. Of more concern are areas dominated by exotic species. In particular, some 25 acres were identified as Alternanthera philoxeroides Herbaceous Vegetation (CEGL003858-*Alligator-weed Exotic Emergent Vegetation*).

Management Issues, Goals, Recommendations and Other Considerations

This area is seldom used by the military and no serious impacts from training are apparent. The backwater area is widely used for various types of recreation including hunting, fishing, and canoeing. Special restrictions are enforced during bald eagle

nesting season in the vicinity of the nesting area. Current management practices seem adequate to address these issues.

The presence of non-native, invasive wetland species, particularly infestations of alligator weed (*Alternanthera philoxeroides*), should be a leading concern for this UEA. Eradication efforts should target the 25 acre area mentioned above. Currently this is the only area at Fort Benning that has been identified with this large an infestation. Other known invasions here consist of smaller occurrences of Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), and Japanese climbing fern (*Lygodium japonicum*). These infestations were observed on a 4/20/05 site visit. Significant feral hog damage was also observed at that time.

Another issue identified for this UEA has been the occasional application of prescribed fire (or the occurrence of escaped fire) in hardwood ravine, slope and bottomland forests near the southeastern boundary of the site. This concern became evident during the mapping of plant associations for this area, and was observed again on 4/20/05. Fire in these forests may negatively impact soils (organic humus composition) and may limit the development of the rich mesic herbaceous layer characteristic of the forest floor on such sites. Upland prescribed fire in this UEA should be carried out under moderate climatic conditions so that fires are low intensity and do not encroach into bottomland hardwood areas on a regular basis.

Restoration of degraded upland habitats such as pine plantations, old pecan orchards, or early successional hardwoods should also be a management goal for this UEA. Over 500 acres of modified or cultivated upland forest types have been mapped at this site. Restoration to longleaf pine would improve the buffering capacity of the uplands and help the overall natural integrity of the site, perhaps limiting additional problems from invasive species.

Some individuals have expressed concern for the expansion of the *Southern Wild Rice Slough Marsh* into shallow waters of the UEA, fearing impacts on waterfowl species from the reduction of open water. Treatment with herbicide has been suggested as a remedy. It is important to point out that this association is a native part of these wetland systems and provides valuable wildlife food. Without treatment, the shallow waters of the Chattahoochee Backwaters will undoubtedly undergo a natural plant succession with woody species slowly encroaching from the margins. However, the use of herbicide to prevent this succession may have some unintended consequences for a wide range of animal species, from invertebrates, freshwater snails and mussels, to higher vertebrates. These may be a part of the food chain for some of the special concern avian species that occur here. Managers should discuss the potential impact of herbicides here, weighed against the potential loss of open water habitat.

Management Issue	Management Goal	Mgt Recommendation*
Sensitive species such as bald eagles	Ensure successful breeding of endangered and	Minimize disruptive activities that interfere with

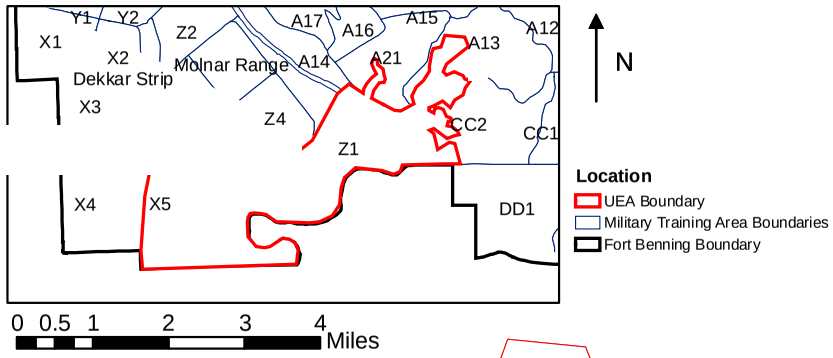
	threatened wildlife	special concern species
Invasive plant species	Eradicate invasive plants; avoid displacement of native species	Identify infested areas and appropriate eradication methods
Degraded upland plant communities	Longleaf pine restoration on uplands	None
Fire	Maintain natural composition and structure of rich herbaceous component of mesic hardwood forests	Minimize encroachment of fire into hardwood areas
Encroachment of *Southern Wild Rice Slough Marsh* into shallow waters of UEA	Maintain open water for waterfowl species	Determine severity of the problem; identify solutions that accommodate special concern avian species

*"None" implies that the installation's existing land management practices are adequate to address the needs of this UEA.

Figure 8. Plant associations of the Chattahoochee Backwaters UEA

- Chattahoochee Backwaters UEA Boundary
- Fort Benning Boundary
- Associations comprising less than 25 acres
- Alnus serrulata southeastern seasonally flooded shrubland
- Alternanthera philoxeroides Herbaceous Vegetation
- Carya illinoensis planted woodland
- Fagus grandifolia - Quercus alba - Liquidambar styraciflua / Magnolia grandiflora / Smilax pumila - Hexastylis arifolia forest
- Liquidambar styraciflua - Liriodendron tulipifera / Onoclea sensibilis forest
- Liquidambar styraciflua - Quercus (laurifolia, nigra) - (Pinus taeda) / Arundinaria gigantea / Carex abscondita forest
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Nyssa aquatica - Nyssa biflora forest
- Nyssa biflora - Acer rubrum var. rubrum / Lyonia lucida forest
- Pinus elliottii planted forest
- Pinus taeda - Liquidambar styraciflua semi-natural forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda - Quercus falcata - Quercus alba / Ostrya virginiana / Chasmanthium sessiliflorum forest
- Pinus taeda - Quercus nigra forest [placeholder]
- Pinus taeda planted forest
- Platanus occidentalis - Liquidambar styraciflua - Ulmus americana / Crataegus viridis forest
- Quercus alba - Carya glabra - Carya alba / Aesculus pavia forest
- Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium staminium forest
- Quercus nigra forest
- Quercus pagoda - Liquidambar styraciflua / Quercus shumardii / Verbesina virginica - Solidago auriculata Forest
- Quercus pagoda - Quercus nigra / Halesia diptera - Ilex decidua / Chasmanthium sessiliflorum - Dicliptera brachiata forest
- Zizaniopsis miliacea coastal plain slough herbaceous
- water

*** White spaces represent areas where vegetation was not mapped to association level**



9. SLOPES OF NORTHERN AFFINITIES

UEA Overview, Ecological Significance and Condition

This UEA (656 acres) is located in the east central portion of the installation in training areas K31, 32, & 33 and is comprised of a mixture of rolling xeric sandhills interspersed with ravines and slopes of more mesic hardwood forests. Much of the vegetation in the sheltered, mesic positions shows closer relationships to the flora of the Piedmont and Blue Ridge.

Plant associations of significance here include the *Dry East Gulf Coastal Plain Beech - White Oak Forest* (CEGL003859) which has a high EO (element occurrence) ranking and covers about 60 acres. Also of importance here is the *Sandhills Sandy Fire-sheltered Black Oak - Sparkleberry Forest* (CEGL008553) which occupies about 100 acres within the UEA. The extent and distribution of this association is poorly known; it is described only from the sandhills region of western Georgia. Neither of these plant communities are extremely rare, but they are high quality examples and represent a distinct forest habitat on Fort Benning. The ridgetops of this site support a substantial amount (nearly 200 acres) of high quality *Xeric Upper East Gulf Coastal Plain Longleaf Pine Woodlands* (CEGL008491). This is a G3 plant association (significantly rare) that also provides habitat for large populations of gopher tortoise within the UEA boundary. A portion (190 acres, nearly one third of the UEA) of the upland area here consists of modified or cultivated forests.

No globally imperiled plant species are located here, but some are noteworthy and unusual elements, typical of more northern physiographic provinces. Examples of these include broad-leaved bunchflower (*Melanthium latifolium*), mountain laurel (*Kalmia latifolia*), galax (*Galax urceolata*), Indian cucumber (*Medeola virginiana*) and crane-fly orchid (*Tipularia discolor*).

Management Issues, Goals, Recommendations and Other Considerations

The military generally uses this area for mechanized training, but the steepness of the terrain here protects the mesic slopes from serious impact. Ridgetop forests may experience soil disturbance or erosion from tracked vehicles. Dismounted infantry training is unlikely to create large scale impacts on the plant associations.

Prescribed fire is important in maintaining the longleaf pine woodlands that dominate the exposed ridgetops, and current fire management plans for the installation as a whole appear adequate to maintain these associations. Degraded upland areas should be restored to longleaf pine using techniques applied elsewhere on the installation, including fire. When applying fire, however, effort should be made to avoid burning the more mesic, fire-sensitive hardwood associations such as the *Dry East Gulf Coastal Plain Beech - White Oak Forest* association. Fire may negatively impact soil structure and understory composition of rich mesic forests, and may disturb rare plant populations. The broad-leaved bunchflower was looked for but not relocated during a

site visit on 7/13/05. The area had recently been burned. Fire should be excluded, to the extent possible, from these communities by either restricting upland fire to the dormant season, or burning under mild conditions such as following rain.

This UEA is adjacent to the eastern Fort Benning boundary; adjacent land uses include timber production and some residential development. This site benefits from ongoing efforts to establish a conservation or no-development buffer around the installation through the Army Compatible Use Buffer program. This buffer minimizes smoke-sensitive areas so that land managers can effectively apply prescribed fire.

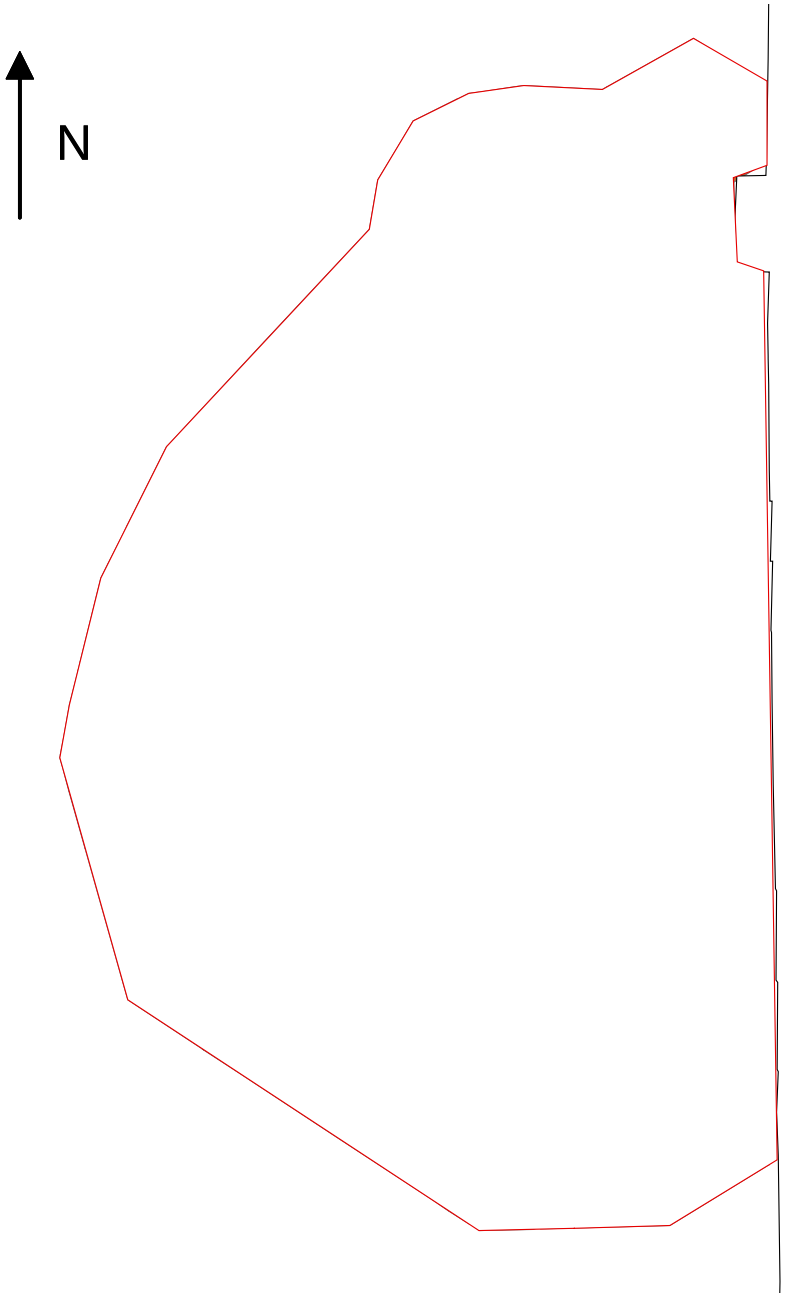
No particular large infestations of non-native species are known from this UEA that would serve as a target for eradication.

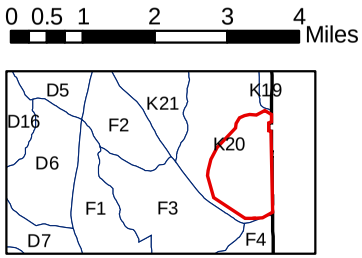
Management Issue	**Management Goal**	**Mgt Recommendation***
Erosion by tracked vehicles on ridgetops	Minimize impact to longleaf pine associations	Make sure that vehicles stay on marked trails as much as possible and monitor impacts
Fire	Maintain natural structure of rich herbaceous component of mesic hardwood forests	Avoid burning fire-sensitive rare plant populations and minimize encroachment of fire into mesic hardwood areas
Degraded upland plant associations	Restore longleaf pine	None
Adjacent off-post land use	Minimize smoke-sensitive areas	Establish a conservation buffer

*** "None" implies that the installation's existing land management practices are adequate to address the needs of this UEA.**

Figure 9. Plant Associations of the Slopes of Northern Affinities UEA

- Slopes of Northern Affinities UEA Boundary
- Fort Benning Boundary
- Fagus grandifolia - Quercus alba / Symplocos tinctoria East Gulf Coastal Plain forest
- Liriodendron tulipifera - Nyssa biflora - Magnolia virginiana / Toxicodendron vernix - Morella caroliniensis / Osmunda regalis forest
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus palustris / Schizachyrium scoparium / Verbesina aristida loamhill woodland
- Pinus palustris planted forest
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda - Quercus falcata - Quercus alba / Ostrya virginiana / Chasmanthium sessiliflorum forest
- Pinus taeda planted forest
- Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium staminium forest
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest
- Quercus laevis / (Andropogon virginicus, Aristida spp., Schizachyrium scoparium) woodland
- Quercus nigra forest
- Quercus velutina - Carya pallida - (Pinus echinata) / Vaccinium arboreum / Yucca filamentosa forest





Location

- UEA Boundary
- Training Area Boundaries
- Fort Benning Boundary

10. ARKANSAS OAK ROCK HILLS

UEA Overview, Ecological Significance and Condition

The Arkansas Oak Rock Hills UEA comprises 3823 acres and is located in the southeast corner of the installation in training areas F, G, and H. It consists of a mosaic of longleaf pine woodlands occurring on dry, rocky uplands and more mesic to sub-mesic protected lower slopes and ravines. Due to its rugged topography, this area has historically been less disturbed relative to many other parts of the installation. A number of unusual, special concern plants occur here, including Flyr's nemesis (*Brickellia cordifolia*), bottlebrush buckeye (*Aesculus parviflora*), Arkansas oak (*Quercus arkansana*) and dwarf chinquapin oak (*Quercus prinoides*). The upland ridges of this UEA support more than 1000 acres of *XericUpper East Gulf Coastal Plain Longleaf Pine Woodlands* (CEGL008491). These longleaf pine woodlands provide habitat for large concentrations of gopher tortoise, red-cockaded woodpecker and Bachman's sparrow. Other associations of ecological significance that occur here include a small occurrence (40 acres) of *Upper East Gulf Coastal Plain Loamhill Longleaf Woodland* (CEGL008452), and more substantial amounts of high quality *Upper East Gulf Coastal Plain Dry-Mesic Circumneutral Black Oak Forest* (CEGL008565) and *Sandhills Sandy Fire-sheltered Black Oak - Sparkleberry Forest* (CEGL008553).

This site is large and heterogeneous with a wide gradient in ecological condition, particularly with regard to upland forests. Much of the "natural" longleaf pine associations are in good to fair condition, but the second largest component within the UEA, the *Loblolly Pine - Shortleaf Pine Managed Woodlands* (CEGL003618), is of low natural integrity. Altogether there are some 1330 acres of forest here that are classified as modified or cultivated.

Other communities of high quality within this UEA are temporarily flooded, seasonally flooded or saturated bottomland forests, some of which occur extensively. The *East Gulf Coastal Plain Hardwood Seepage Forest* (CEGL004772) occupies nearly two hundred acres here and is located along the middle sections of streams just below where they emerge from seepage areas. Other high quality wetland forests are of more limited extent.

Management Issues, Goals, Recommendations and Other Considerations

This area is used primarily for dismounted military training and these activities appear to have minimal impact. No significant disturbance features related to military activity were noted on site visits conducted on 6/08/05 and 7/19/05. Some erosion was seen. Soil movement and loss could be a problem in this UEA given the steep slopes found here. Exposed soil also creates opportunity for colonization by invasive species. Two patches of the invasive Chinese wisteria (*Wisteria sinense*) were found during site visits. Both erosion and invasive species monitoring should be conducted for this UEA on a regular basis.

While prescribed fire is a necessary management tool in maintaining the upland longleaf associations found within this UEA, site visits confirmed several instances where fire encroached significantly into slope hardwood communities. Fire is also a natural component of hardwood slope communities and may create rich ecotonal areas between uplands and slopes, yet fire return intervals on slopes should be much longer relative to adjacent uplands. Of particular concern here is the potential impact of fire on rare plant species found in hardwood communities. Site visits to relocate *Brickellia cordifolia* found this special concern species at only one of three known locations, and here only one plant was found. This plant was adjacent to an eroded area, and much of the hardwood slope on which it occurred had recently been burned. When burning adjacent upland areas, encroachment of fire into slope hardwood areas should be minimized to the extent possible by either restricting upland fire to the dormant season, or burning under mild conditions such as following rain.

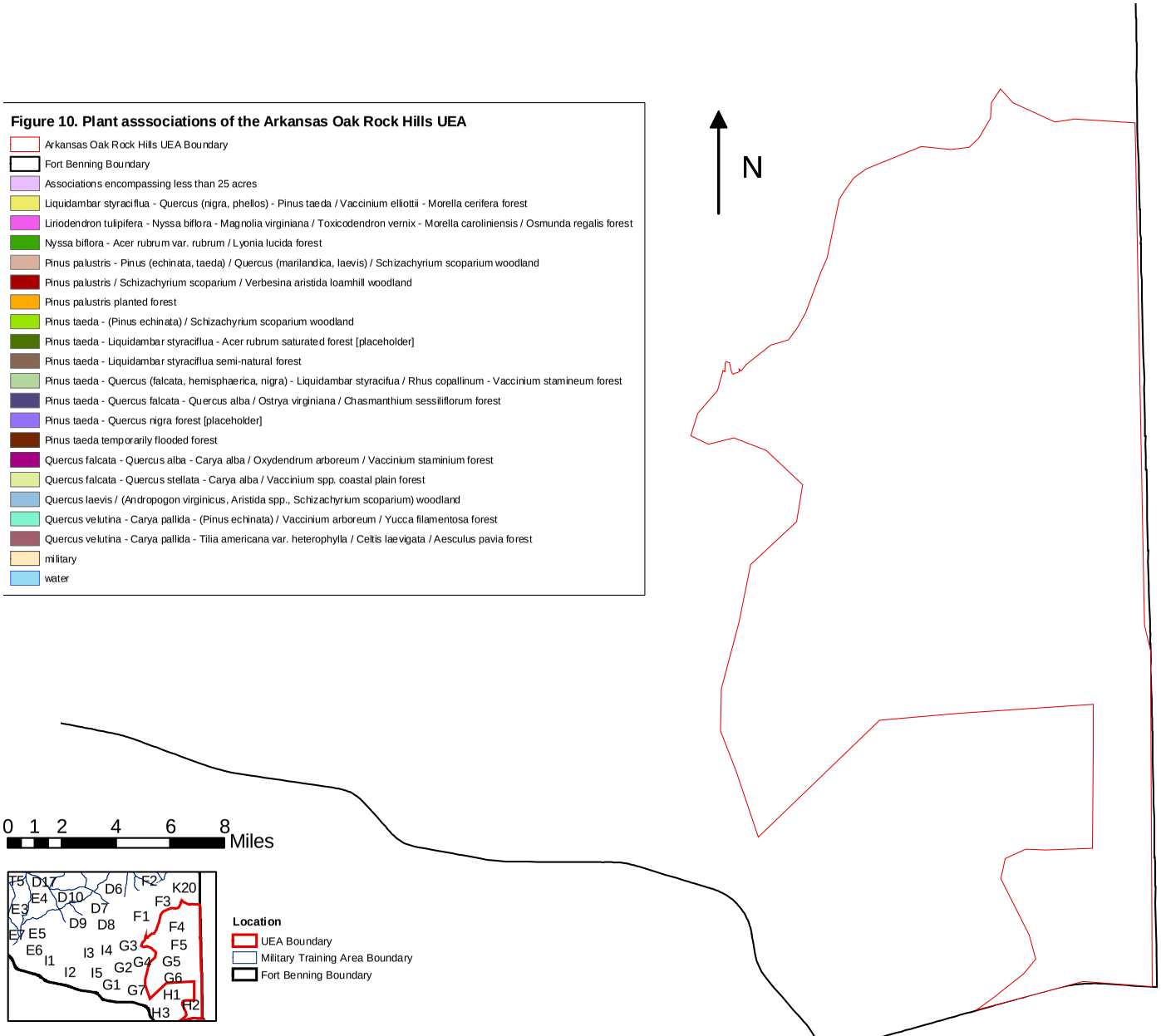
A primary focus for management activities in this UEA should be the restoration of natural longleaf pine woodlands to upland ridges currently dominated by loblolly pine (*Pinus taeda*). This would increase the ease of moving fire through the uplands and would enhance habitat for gopher tortoise, red-cockaded woodpeckers, and Bachman's sparrows. Longleaf restoration techniques applied elsewhere on the installation appear appropriate for these sites as well. Site visits also noted several large patches of loblolly pine exhibiting symptoms of 'forest decline syndrome,' which is a problem in various places throughout the installation. Until management techniques intended to limit, prevent, or mitigate this phenomenon are developed, these decline areas should be monitored to ensure that symptoms are restricted to loblolly pine, and that regeneration in openings is dominated by longleaf pine.

The eastern boundary of this UEA coincides with the eastern boundary of Fort Benning. Adjacent land use currently includes timber production, agriculture and some residential development. The natural integrity of this UEA would benefit from the establishment of a no-development or conservation buffer. This would enhance habitat for special concern animal species and ensure the ability of land managers to apply prescribed fire by minimizing smoke-sensitive areas.

Management Issue	Management Goal	Mgt Recommendation
Erosion	Prevent further soil loss, especially near rare plant species	Monitor and remediate if erosion continues
Fire	Maintain natural composition and structure of rich herbaceous component of mesic hardwood forests	Minimize encroachment of fire into hardwood areas
Degraded upland pine associations, including loblolly decline syndrome	Longleaf pine restoration on uplands	Monitor and develop mitigation techniques for loblolly decline
Adjacent off-post land use	Minimize smoke sensitive areas and protect habitat for special concern animal species	Establish a conservation buffer

Figure 10. Plant asssociations of the Arkansas Oak Rock Hills UEA

- Arkansas Oak Rock Hills UEA Boundary
- Fort Benning Boundary
- Associations encompassing less than 25 acres
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Liriodendron tulipifera - Nyssa biflora - Magnolia virginiana / Toxicodendron vernix - Morella caroliniensis / Osmunda regalis forest
- Nyssa biflora - Acer rubrum var. rubrum / Lyonia lucida forest
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus palustris / Schizachyrium scoparium / Verbesina aristida loamhill woodland
- Pinus palustris planted forest
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Liquidambar styraciflua - Acer rubrum saturated forest [placeholder]
- Pinus taeda - Liquidambar styraciflua semi-natural forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda - Quercus falcata - Quercus alba / Ostrya virginiana / Chasmanthium sessiliflorum forest
- Pinus taeda - Quercus nigra forest [placeholder]
- Pinus taeda temporarily flooded forest
- Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium staminium forest
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest
- Quercus laevis / (Andropogon virginicus, Aristida spp., Schizachyrium scoparium) woodland
- Quercus velutina - Carya pallida - (Pinus echinata) / Vaccinium arboreum / Yucca filamentosa forest
- Quercus velutina - Carya pallida - Tilia americana var. heterophylla / Celtis laevigata / Aesculus pavia forest
- military
- water



11. UPATOI CREEK FLATWOODS

UEA Overview, Ecological Significance and Condition

This UEA (533 acres) is located in training area K22 in the northeastern corner of the installation and primarily consists of seasonally flooded and temporarily flooded hardwood forests adjacent to Upatoi Creek. It was delineated as a UEA because of the high quality bottomland forests that occur here. Four of these alluvial forest types are of high enough quality and large enough extent to be considered globally significant. The largest component of the UEA is an outstanding example of *Diamondleaf Oak Atlantic Brownwater River Floodplain Terrace and Ridge Forest* (CEGL004678), which occupies over 100 acres. Upland areas within this UEA generally consist of low quality successional or modified communities.

A few species of conservation concern have been located within this UEA. Occurrences of lax water-milfoil (*Myriophyllum laxum*), Canadian St. John's-wort (*Hypericum canadense*), broadleaf marsh St. John's-wort (*Triadenum tubulosum*), and white nymph (*Trepocarpus aethusae*) are described from this area. There is also an interesting record for southeastern myotis (*Myotis austroriparius*), a Georgia bat species of special concern.

Management Issues, Goals, Recommendations and Other Considerations

There is little or no military activity within this UEA and no apparent management concerns related to training activities. The hardwood forests are managed passively so there are also no conflicts regarding forest management practices here. As with most bottomland forests at Fort Benning, disturbance from the rooting of feral swine within this watershed is a problem that needs attention. Swine rooting diminishes native plant populations, provides an opportunity for non-native species to become established, and increases the potential for erosion and decline of water quality.

Degraded upland forests present another opportunity for improving the functioning of natural systems here. For these sites, restoration to longleaf pine woodlands would enhance the quality of the habitat within the UEA.

This UEA occurs along the installation's northern boundary and benefits from the establishment of buffer areas off post through the Army Compatible Use Buffer program. Current adjacent land use primarily includes timber production, but development is increasing. Maintaining or restoring adjacent lands to native forest vegetation and conserving soil along this watershed are especially important in protecting and enhancing hydrologic processes along Upatoi Creek.

Management Issue	Management Goal	Mgt Recommendation*
Feral swine disturbance	Protect natural integrity of bottomland forests	Reduce or eliminate swine population
Degraded upland plant communities	Longleaf pine restoration on uplands	None
Adjacent off-post land use	Protect upstream hydrologic processes along Upatoi Creek	Establish a conservation buffer

* "None" implies that the installation's existing land management practices are adequate to address the needs of this UEA.

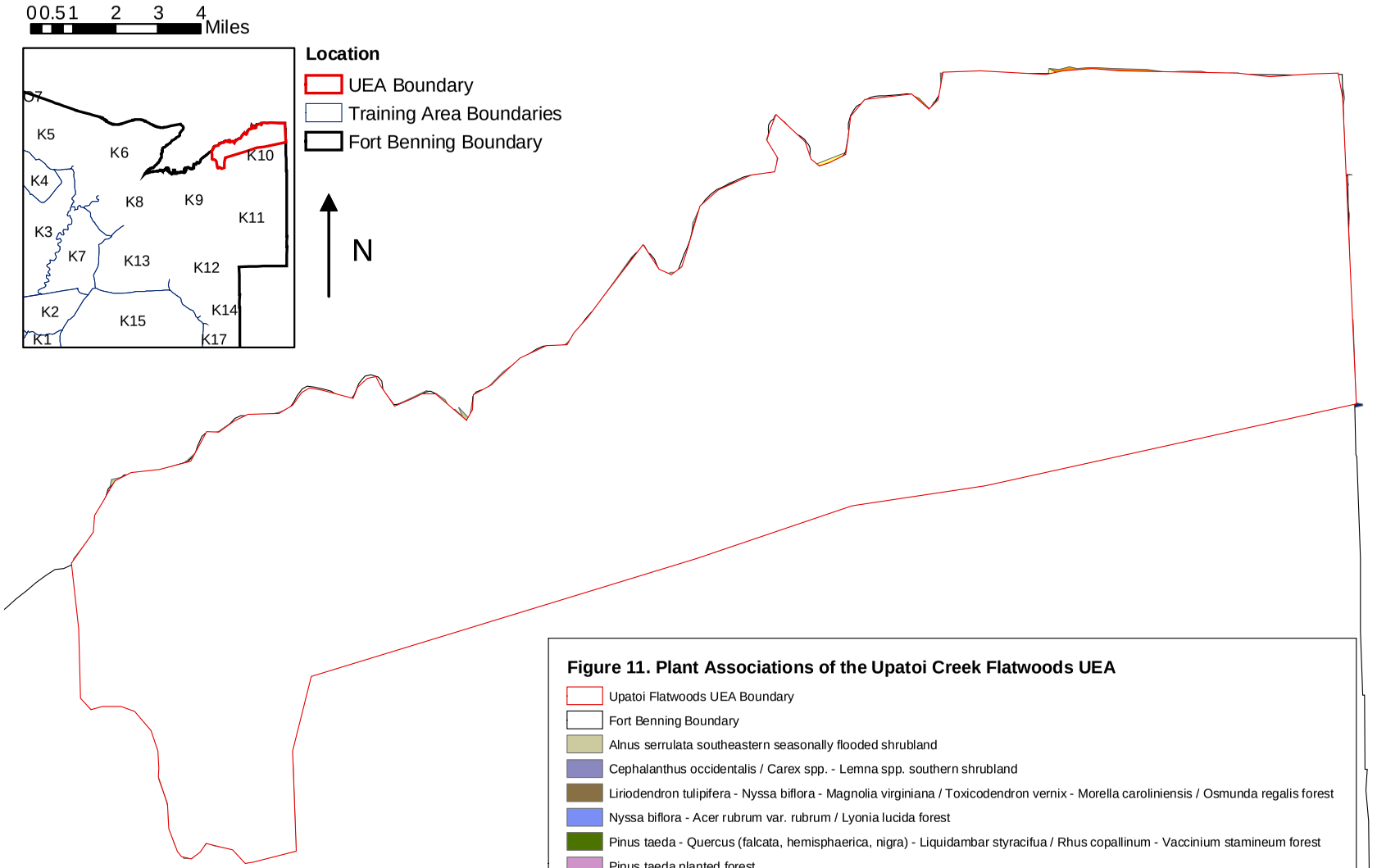


Figure 11. Plant Associations of the Upatoi Creek Flatwoods UEA

- Upatoi Flatwoods UEA Boundary
- Fort Benning Boundary
- Alnus serrulata southeastern seasonally flooded shrubland
- Cephalanthus occidentalis / Carex spp. - Lemna spp. southern shrubland
- Liriodendron tulipifera - Nyssa biflora - Magnolia virginiana / Toxicodendron vernix - Morella caroliniensis / Osmunda regalis forest
- Nyssa biflora - Acer rubrum var. rubrum / Lyonia lucida forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styraciflua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda planted forest
- Pinus taeda temporarily flooded forest
- Potamogeton spp. - Ceratophyllum spp. - Elodea spp. permanently flooded herbaceous
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest
- Quercus hemisphaerica - Quercus (falcata, nigra) / Ilex opaca - Vaccinium arboreum / Cnidoscolus stimulosus forest
- Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana forest
- Quercus nigra forest
- Quercus phellos - Quercus nigra - Quercus alba / Chasmanthium (laxum, sessiliflorum) forest
- water

12. OCHILLEE CREEK WETLANDS

UEA Overview, Ecological Significance and Condition

This UEA is located within the south-central portion of the installation and consists of a three mile long, somewhat narrow section of the floodplain of Ochillee Creek totaling 836 acres. This area was selected as a UEA because of the abundance of high quality alluvial forests. A substantial portion of this UEA (215 acres) is dominated by high quality *Diamondleaf Oak Atlantic Brownwater River Floodplain Terrace and Ridge Forest* (CEGL004678). There are six temporarily flooded or saturated wetland forests of conservation significance located here.

This UEA also contains the installation's champion loblolly pine tree. Whereas the bottomlands generally are of high quality and significance, the uplands are mostly successional or disturbed and of low quality. Developed facilities and more degraded habitats surround the UEA, and few special concern plant or animal species are found within the UEA.

Management Issues, Goals, Recommendations and Other Considerations

This area is sometimes used for dismounted military training, but this occurs infrequently in the wetland areas. Similarly, the hardwood forests of the bottomlands are managed passively and no apparent conflicts with forest management exist.

Altogether, lower quality, semi-natural communities make up about one quarter (206 acres) of this UEA. Improvement of these habitats would enhance buffering capabilities for the wetlands and the quality of the site as a whole. In some cases, restoration of longleaf pine should be carried out, particularly in areas currently dominated by less desirable successional species such as sweetgum (*Liquidambar styraciflua*). In other areas, upland oak restoration and maintenance is appropriate and desirable. Additional site visits are needed to determine which community types are desirable for particular areas.

No large infestations of non-native, invasive species are known from this UEA that would serve as targets for eradication. However, this should be continually monitored because of the potential for invasives from surrounding developed lands.

The southeast corner of this UEA is adjacent to the installation boundary, where there is an increasing amount of development. As such, the hydrologic processes of Ochillee Creek would benefit from the establishment of a no-development or conservation buffer.

Management Issue	Management Goal	Mgt Recommendation*
Degraded upland plant associations	Restore appropriate natural associations to upland sites	Determine appropriate community type (upland longleaf or oak) and restore accordingly
Adjacent off-post land use	Protect hydrologic processes along Ochillee Creek	Establish a conservation buffer

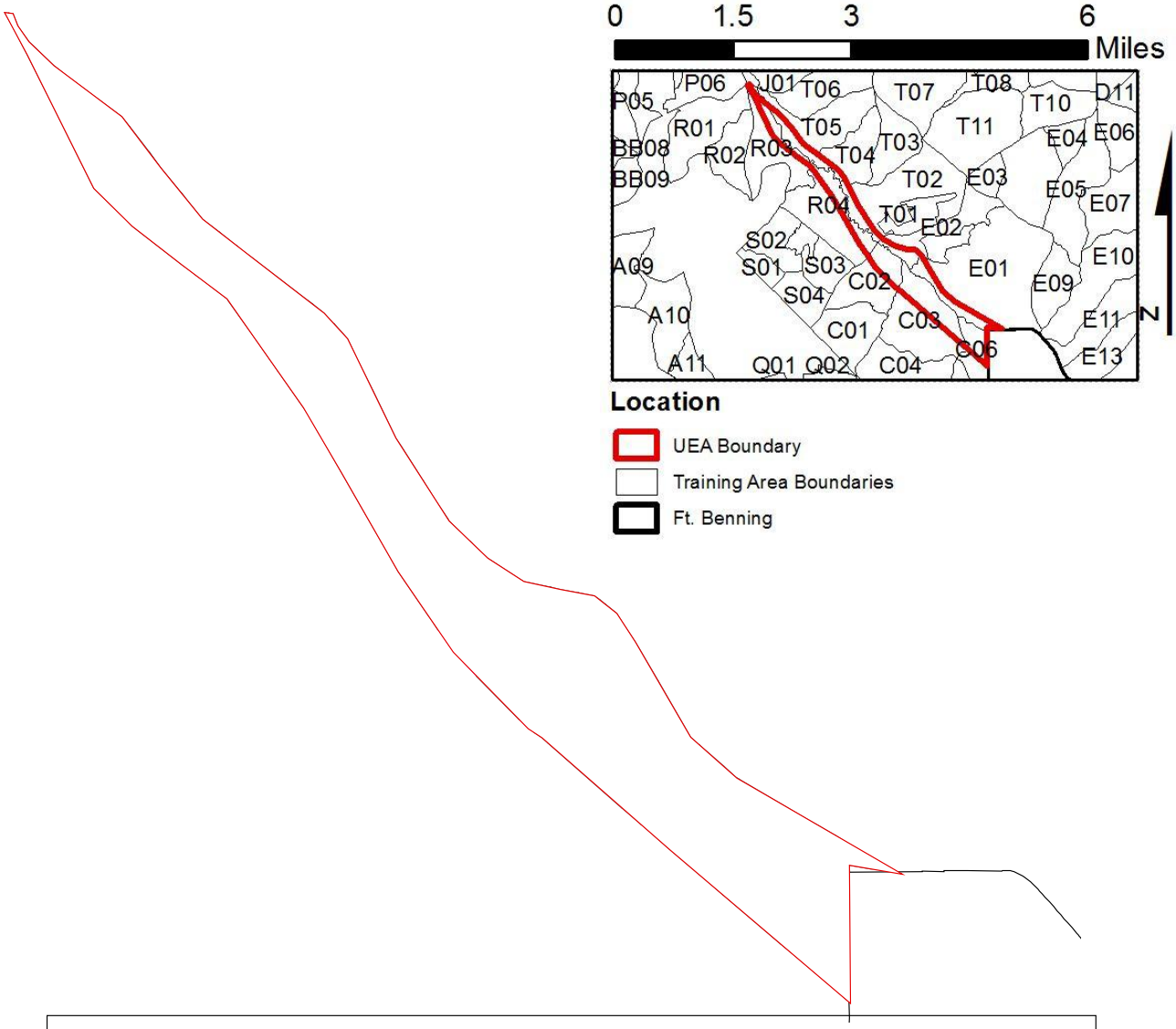


Figure 12. Plant Associations of the Ochille Creek Wetlands UEA

- Ochille Creek UEA Boundary
- Fort Benning Boundary
- Associations comprising less than 15 acres
- Alnus serrulata southeastern seasonally flooded shrubland
- Fagus grandifolia - Carya spp. / (Acer negundo, Magnolia macrophylla, Tilia americana var. heterophylla) Temporarily Flooded Forest
- Liquidambar styraciflua - Liriodendron tulipifera / Onoclea sensibilis forest
- Liquidambar styraciflua - Quercus (laurifolia, nigra) - (Pinus taeda) / Arundinaria gigantea / Carex abscondita forest
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Liriodendron tulipifera - Nyssa biflora - Magnolia virginiana / Toxicodendron vernix - Morella caroliniensis / Osmunda regalis forest
- Nyssa biflora - (Acer rubrum) / Ilex opaca / Leucothoe axillaris / Carex atlantica ssp. capilliaceae forest
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda planted forest
- Pinus taeda temporarily flooded forest
- Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana forest
- Quercus phellos - Quercus nigra - Quercus alba / Chasmanthium (laxum, sessiliflorum) forest

13. LONGLEAF PINE LOAMHILLS

UEA Overview, Ecological Significance and Condition

This UEA (1162 acres) ranks with few others as one of the most significant natural areas on the installation. This is because of the quality and extent of globally rare (G2G3) longleaf pine woodlands that occur here on fine textured soils. Nearly ninety-five percent of the rolling uplands within this site consist of *Upper East Gulf Coastal Plain Loamhill Longleaf Woodland* (CEGL008452). Few other areas at Fort Benning exhibit such a large and uniformly high quality, relatively unbroken woodland landscape. Successional or disturbed plant associations make up only a very small fraction of this UEA.

Several special concern species also occur here including red-cockaded woodpecker (*Picoides borealis*), Bachman's sparrow (*Aimophila aestivalis*), short-leaved skeleton grass (*Gymnopogon brevifolius*), coastal-plain crownbeard (*Verbesina aristata*), and sandhills bean (*Phaseolus sinuatus*).

Management Issues, Goals, Recommendations and Other Considerations

Infantry platoon battle courses (IPBC) are planned for the vicinity, but appear to directly impact only a small percentage of this site. As such, these should not have a large effect on the overall integrity of this UEA. However, because the amount of foot traffic in this UEA will be greatly increased, this area should be monitored to ensure there are no large impacts to the structure and composition of the plant associations here.

This area has already received special management attention. A large portion of these loamhills is set aside as a reference area to be managed by prescribed burn only. For all of these upland longleaf pine dominated areas, the key management consideration is the use of prescribed fire to maintain the natural structure and composition of the plant associations. Most ecologists visiting this site are impressed with the quality and condition of these stands as they are now managed.

Management Issue	Management Goal	Mgt Recommendation
Military Infantry Platoon Battle Course	Minimize impact on structure and condition of longleaf association	Monitor

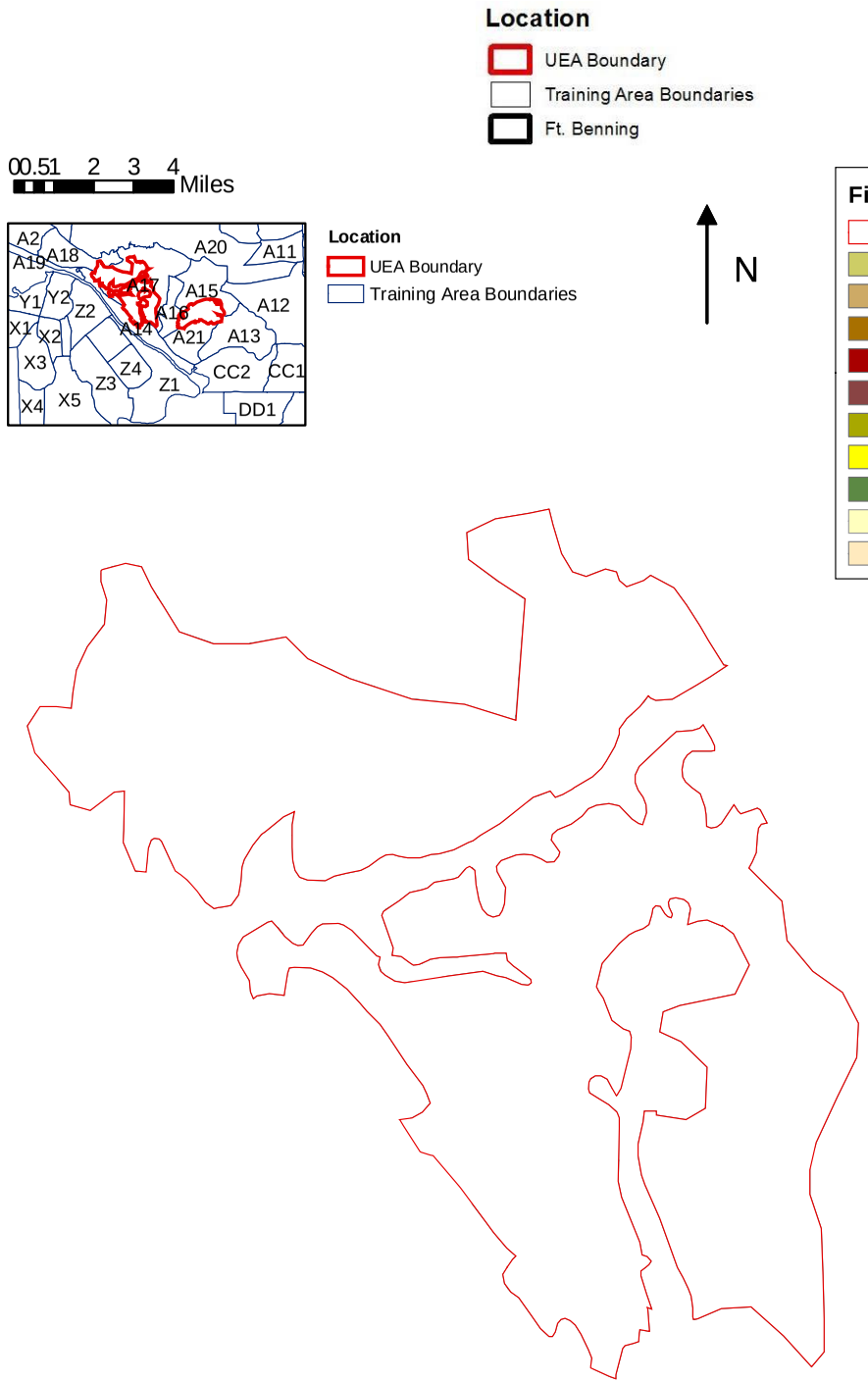


Figure 13. Plant Associations of the Longleaf Pine Loamhills UEA.

- Longleaf Pine Loamhills UEA Boundary
- Liquidambar styraciflua - Quercus (laurifolia, nigra) - (Pinus taeda) / Arundinaria gigantea / Carex abscondita forest
- Pinus palustris / Schizachyrium scoparium / Verbesina aristida loamhill woodland
- Pinus palustris planted forest
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda temporarily flooded forest
- Quercus alba - Carya glabra - Carya alba / Aesculus pavia forest
- Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium staminium forest
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest
- Quercus nigra forest
- military

*** White spaces represent areas where vegetation was not mapped to association level**

14. HITE BOWL SWAMP

UEA Overview, Ecological Significance and Condition

This UEA is located on the western side of the Chattahoochee River in Alabama, near the southwestern end of the installation in training area X1. It is a 276 acre site composed mostly of wetland forested areas, but it also includes substantial amounts of open herbaceous and shrub dominated wetland communities. Its designation as a UEA was based largely on the unusual topography found here, particularly the presence of a large bowl-like depression with a north aspect slope.

Central to this site is a high quality occurrence *of Swamp Blackgum Floodplain Seepage Forest* (CEGL004427). The sixty acres of this globally rare association was one of few areas of this type on Fort Benning to be to be considered excellent in both condition and size. Two other wetland associations of global concern – *Sandhills Swamp Black Gum Floodplain Forest* (CEGL007864) and *Depression Pond (Spikerush-Creeping Rush Subtype)* (CEGL0047480) – are located here and also are of high quality. The upland forests that act as a buffer are typically of low quality and natural integrity.

Management Issues, Goals, Recommendations and Other Considerations

These wetlands are rarely used by the military, and the site serves primarily as part of the buffer for the Fryar Drop Zone.

Forest management is rarely an issue for this UEA as the site is only passively managed. Restoration of longleaf pine to degraded upland sites would improve the functionality of the wetland forests located below them, particularly the hydrology. Restoration techniques applied elsewhere on the installation appear adequate for this area.

This UEA is located along the installation boundary; adjacent land is mostly used for timber production but there are some areas of residential development. To avoid impact to hydrologic processes upstream, this UEA would benefit from the establishment of an off-post conservation or no-development buffer.

Management Issue	Management Goal	Mgt Recommendation*
Degraded upland plant associations	Restore longleaf pine associations	None
Adjacent off-post land use	Protect upstream hydrologic processes	Establish a conservation buffer

* "None" implies that the installation's existing land management practices are adequate to address the needs of this UEA.

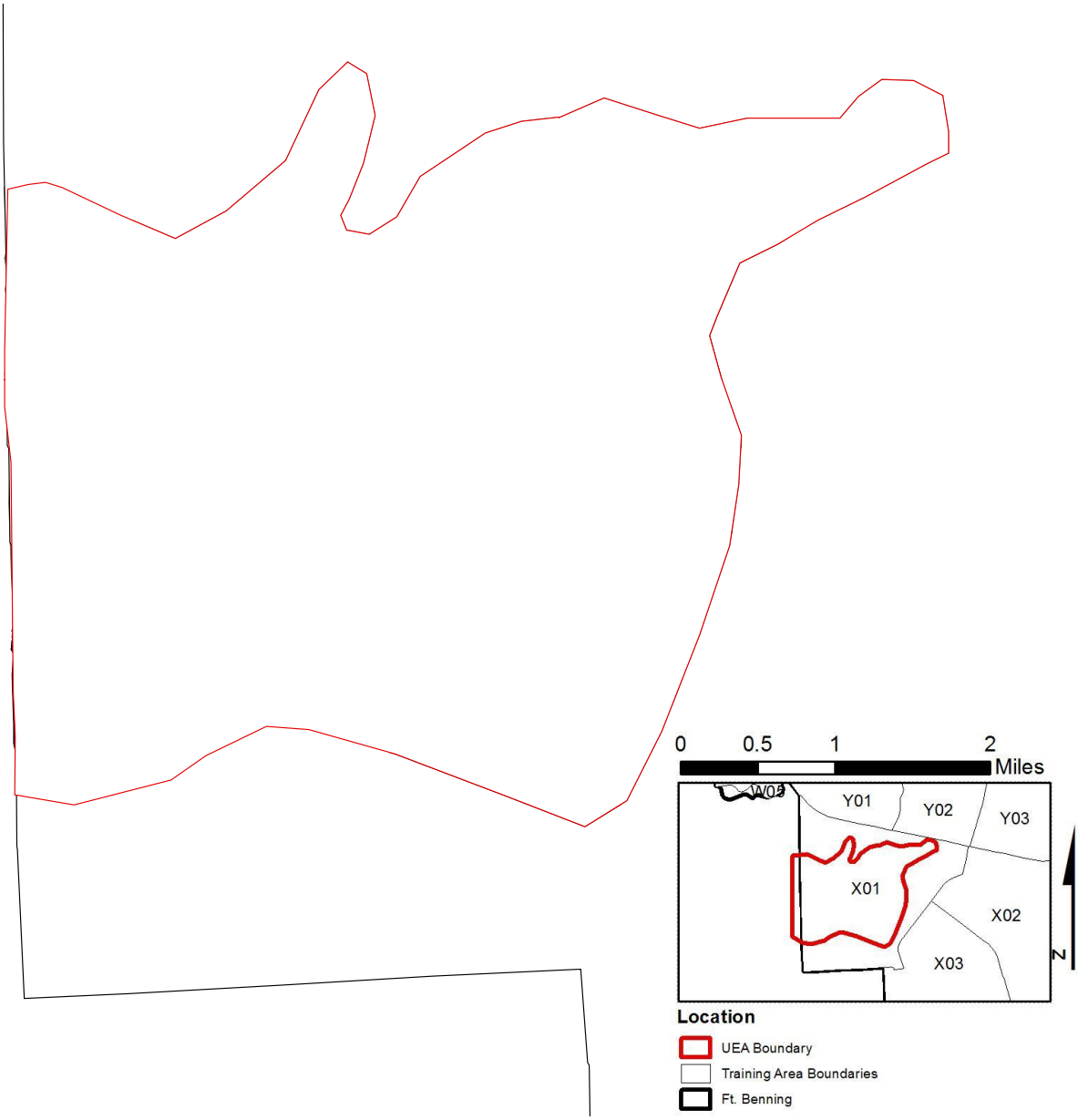


Figure 14. Plant Associations of the Hite Bowl Swamp UEA

- Hite Bowl Swamp UEA Boundary
- Fort Benning Boundary
- Cynodon dactylon herbaceous
- Decodon verticillatus seasonally flooded shrubland
- Eleocharis microcarpa - Juncus repens - Rhynchospora corniculata - (Mecardonia acuminata, Proserpinaca spp.) herbaceous
- Juncus effusus seasonally flooded herbaceous
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Nyssa aquatica - Nyssa biflora forest
- Nyssa biflora - (Acer rubrum) / Ilex opaca / Leucothoe axillaris / Carex atlantica ssp. capilliaceae forest
- Nyssa biflora - Acer rubrum var. rubrum / Lyonia lucida forest
- Pinus palustris planted forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda planted forest
- Quercus hemisphaerica - Quercus (falcata, nigra) / Ilex opaca - Vaccinium arboreum / Cnidoscolus stimulosus forest
- Quercus nigra forest

15. LONGLEAF PINE SANDHILLS

UEA Overview, Ecological Significance and Condition

This UEA (169 acres with proposed additions) is located in the northeastern portion of Fort Benning in training areas K13 and K14 and is dominated by high quality *Upper East Gulf Coastal Plain Loamhill Longleaf Woodland* (CEGL008452).

The name of this UEA may be misleading. Even though surface soils are coarse sands, the predominant soil type at this site (Ailey) has a substantial loamy fraction and is less well-drained in the lower strata. The high quality longleaf woodlands here provide habitat to the typical suite of special concern species associated with longleaf pine including red-cockaded woodpecker (*Picoides borealis*), gopher tortoise (*Gopherus polyphemus*) and Bachman's sparrow (*Aimophila aestivalis*). This area is also designated as a reference area to provide baseline data for understory plant community composition and stand structure in high quality, uneven-aged natural longleaf pine stands. Only a small portion of this UEA (34 acres) consists of modified vegetation.

Management Issues, Goals, Recommendations and Other Considerations

As a designated reference area, this UEA already has a special management plan in place. Prescribed burning is the only activity that will take place here. The small amount of *Loblolly Pine - Shortleaf Pine Managed Woodland* (CEGL003618) should be considered as an additional management target for conversion to the loamhill longleaf type, using restoration techniques applied elsewhere on the installation. No other management issues have been identified here.

Management Issue	Management Goal	Mgt Recommendation*
Degraded upland plant communities	Restore longleaf pine associations	None

* "None" implies that the installation's existing land management practices are adequate to address the needs of this UEA.

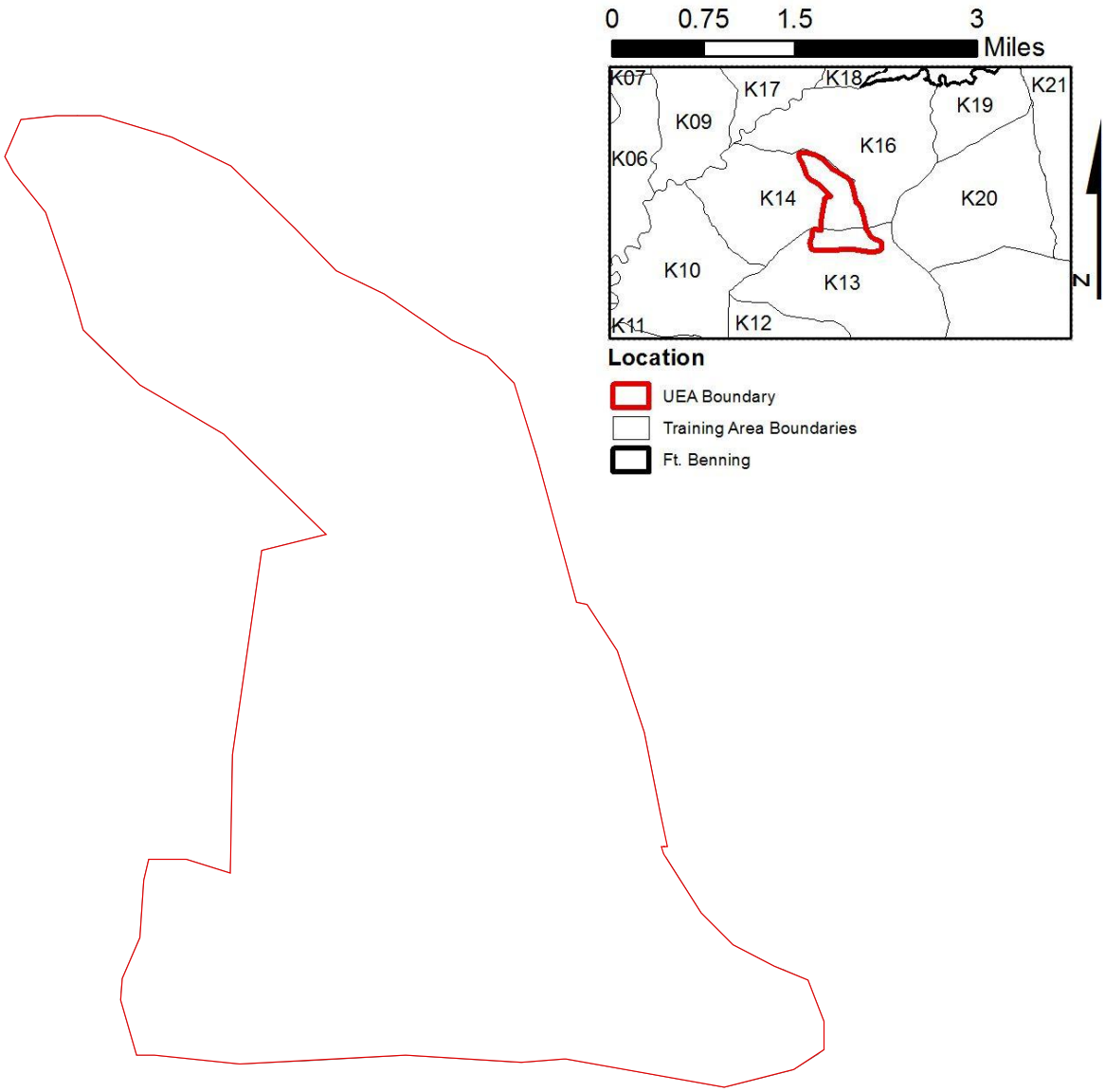


Figure 15. Plant Associations of the Longleaf Pine Sandhills UEA

- LLP Sandhills UEA Boundary
- Crataegus flava - Quercus (incana, laevis) woodland
- Liquidambar styraciflua - Quercus (laurifolia, nigra) - (Pinus taeda) / Arundinaria gigantea / Carex abscondita forest
- Liriodendron tulipifera - Nyssa biflora - Magnolia virginiana / Toxicodendron vernix - Morella caroliniensis / Osmunda regalis forest
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus palustris / Schizachyrium scoparium / Verbesina aristida loamhill woodland
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Liquidambar styraciflua - Acer rubrum saturated forest [placeholder]
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda - Quercus nigra forest [placeholder]
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest

NEWLY PROPOSED UNIQUE ECOLOGICAL AREAS

As a part of the process of developing an installation wide vegetative map of Fort Benning, a detailed examination of aerial photography revealed the presence of several areas with unique ecological characteristics. As a result of this effort, along with the additional field work involved in collecting data to describe existing UEAs and ground truth areas with intriguing photographic signatures, four new UEAs have been proposed for recognition at Fort Benning. The rationale and details involved in the selection of these areas as UEAs are discussed in greater detail in other reports. These sites vary greatly in size and community type, ranging from extensive hardwood forests associated with the Chattahoochee River corridor to small seasonally flooded depression ponds. The following describes these areas briefly and addresses any management issues that are known at the present time. A further and more detailed investigation of these areas should be undertaken at the time that they are formally adopted as UEAs.

1. L1 (FORMERLY L6) SEASONALLY FLOODED DEPRESSION PONDS AND UPATOI SANDHILLS

Overview, Ecological Significance and Condition

This area (172 acres) is located near the central portion of the installation just south of Lee Field in training compartment L1. It contains two ecologically significant and quite distinct plant communities, both of which provide habitat for rare plant species tracked by the Georgia Natural Heritage Program. On the northern boundary are unique seasonally flooded depression ponds, including a gradient of diverse herbaceous wetland vegetation. Also significant here is a rather large ultra-xeric sandhill community occurring over Lakeland soils along a bluff overlooking Upatoi Creek.

Sphagnum cyclophyllum (a sphagnum moss) and spathulate seedbox (*Ludwigia spathulata*) are rare species associated with the herbaceous depression pond. The associations themselves are considered globally rare and are more typical of cypress pond systems located further south in the outer Coastal Plain. Five distinct rare herbaceous wetland communities have been identified within these depression ponds; their condition is somewhat compromised by an old tracked vehicle trail that runs through the center.

The sandhill component of this proposed UEA is also very significant. Two occurrences of Pickering's morning-glory (*Stylisma pickeringii*) are located here along with a very dense concentration of gopher tortoise burrows. A sizeable (42 acre) occurrence of *Atlantic Coastal Plain Xeric Sandhill Scrub* (CEGL003590) provides the habitat for these elements, and represents one of only two locations for this G2 association on the installation. The condition of this plant community is somewhat degraded with the canopy missing much of the longleaf pine component. However, the fundamentals of this community are still largely intact, and it would be an excellent target for longleaf restoration.

Management Issues, Goals, Recommendations and Other Considerations

The *Atlantic Coastal Plain Xeric Sandhill Scrub* association should undergo restoration of longleaf pine to the canopy. This could be accomplished through moderate underplanting of longleaf pine. Site visits in March 2005 confirmed the sparseness of longleaf pine in this area and also noted additional degraded upland areas (24 acres) that would benefit from longleaf restoration. Great care, however, should be taken in areas where Pickering's morning glory occurs. This plant seems to prefer an open canopy with little or no leaf litter accumulation. This growth habit was verified during a site visit on 6/10/05.

Military use of this area could potentially be a problem if vehicles get too close to the pond communities, or if erosion of the sandhill bluffs is exacerbated. Sensitive area signs should be posted around the perimeter of this UEA, and the area should be monitored. This would help ensure that further degradation of the depression ponds does not occur as a result of tracked vehicles.

Some feral hog damage was also observed around the edges of the depression ponds during the site visit on 6/10/05. Rooting of hogs could be very damaging to the herbaceous vegetation here and to the integrity of the wetland areas in general.

Fire is presumed to be an important agent in maintaining the open condition of the depression ponds. An assessment of the appropriate fire return interval for this site should be undertaken and applied as a management prescription.

The proximity of xeric sandhill gopher tortoise habitat to the seasonal depression pond suggests that this area may be appropriate habitat for the gopher frog (*Rano capito*), though no gopher frogs are documented as occurring in this area. If gopher frog population expansion becomes a management goal for Fort Benning's rare species program in the future, this area should be considered.

Management Issue	Management Goal	Mgt Recommendation
Degraded upland plant associations including species composition of *Sandhill Scrub* canopy	Restore longleaf pine associations	Underplant longleaf pine in appropriate areas
Rare plant populations	Maintain or increase populations of Pickering's morning glory	Maintain open canopy; minimize leaf litter accumulation
Military Training	Ensure integrity of herbaceous wetland vegetation and avoid altering hydrology	Post sensitive area signs around perimeter and monitor for tracked vehicle disturbance
Feral swine disturbance	Protect wetland communities	Reduce or eliminate swine population
Fire	Maintain open condition of herbaceous plant associations	Determine appropriate fire return interval for wetland associations and monitor woody plant encroachment

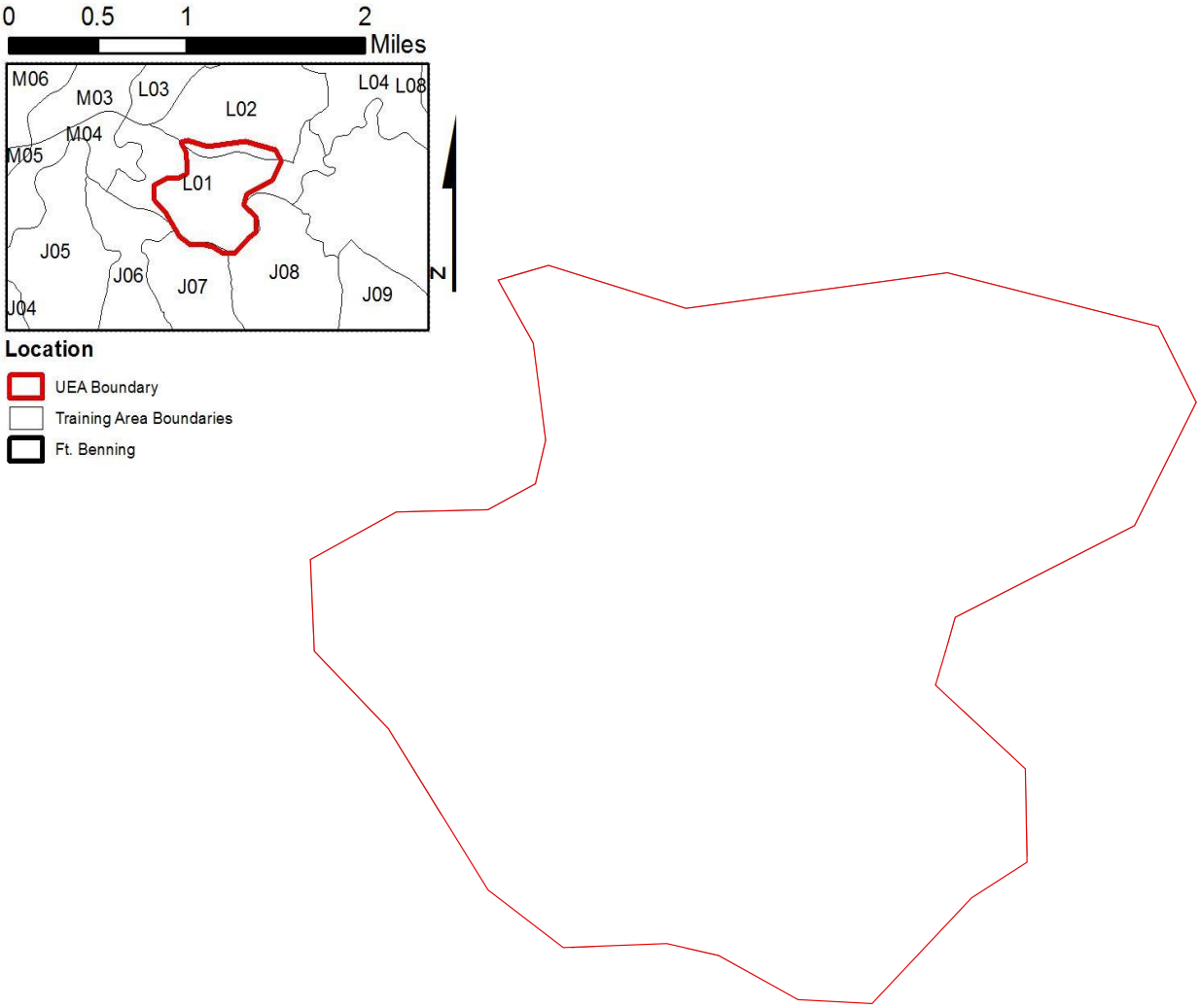


Figure 16. Plant Associations of the Proposed L6 Depression Ponds UEA

- L6 Depression Ponds UEA Boundary
- Dichanthelium wrightianum - Dichanthelium erectifolium herbaceous
- Nyssa biflora / Itea virginia - Cephalanthus occidentalis depression forest
- Panicum hemitomon - Eleocharis equisetoides - Rhynchospora inundata
- Panicum hemitomon - Pluchea (camphorata, rosea) - Ludwigia spp. herbaceous
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus palustris / Quercus laevis / Aristida purpurascens - Stipulicida setacea - (Rhynchospora megalocarpa, Selaginella acanthonota) woodland
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styraciflua / Rhus copallinum - Vaccinium stamineum forest
- Quercus hemisphaerica - Quercus (falcata, nigra) / Ilex opaca - Vaccinium arboreum / Cnidoscolus stimulosus forest
- Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana forest
- Saccharum spp. - Panicum verrucosum - (Rhexia spp., Sabatia angularis) herbaceous
- water

2. CHATTAHOOCHEE RIVER CORRIDOR

Overview, Ecological Significance and Condition

This proposed UEA (1118 acres) would extend along both sides of the Chattahoochee River from the Chattahoochee Backwaters UEA at its southern end, northward to the Bickerstaff property on the west side of the river, and then further northward to the confluence of Upatoi Creek on the eastern side. Its principal value is a substantial occurrence of calcareous hardwood forest (*Alabama Red Hills Mesic Hardwood Bluff Forest* - CEGL008557) associated with steep bluffs along the river.

Several species of special concern occur here, notably croomia (*Croomia pauciflora*) and Georgia rockcress (*Arabis georgiana*). Georgia rockcress in particular occurs at several locations within this corridor. This extremely rare plant (G2) is restricted to a very narrow range, solely in Alabama (S2) and Georgia (S1), and is protected in only a few places. It is a candidate plant for federal listing as Threatened.

Altogether, seven plant associations of conservation concern would be included within this proposed UEA. The flora here is as rich and diverse as any known from Fort Benning. Recognition and protection of these steep bluffs would also help protect water quality in the Chattahoochee River by minimizing erosion.

This area is very heterogeneous with respect to condition and quality of plant associations. The steep hardwood bluffs are generally in excellent shape but a large number of areas within the corridor have successional or cultivated forest types. Roughly 220 acres of degraded forest associations occur within the proposed UEA. Non-native, invasive species are also a problem, particularly Japanese honeysuckle (*Lonicera japonica*) and Japanese climbing fern (*Lygodium japonicum*). These are worrisome because of their potential to overwhelm special concern plant species.

Management Issues, Goals, Recommendations and Other Considerations

The threat that non-native, invasive species pose to special concern plants in this UEA should be assessed as a first priority. In particular, the populations of Georgia rockcress are located on eroded river banks that are extremely vulnerable to infestation by invasive plants. On 5/24/05 and 5/25/05, known populations of Georgia rockcress were revisited, and river banks that appeared to have habitat suitable for this plant were searched. Populations occurring on the Georgia bank of the Chattahoochee River were heavily affected by damage from feral hogs. Some Japanese honeysuckle was also established here, but did not appear to be impacting the population. Large invasions of kudzu (*Pueraria lobata*) and liriope (*Liriope muscari*) were also noted in the vicinity of the rockcress populations, and adjacent to a population of lamance iris (*Iris brevicaulis*), an S1 plant in Georgia. These exotics should be high priority for eradication.

Given the growth habit and the rarity of Georgia rockcress, several sites along the Chattahoochee corridor could be used for restoration and population enhancement of

this species. It is likely that this could be easily accomplished through dispersal of local seed along the bank. Plants growing on the Alabama bank appeared to be in good condition.

Indian olive (*Nestronia umbellula*), a special concern plant state listed in Georgia as Threatened, was found on the Alabama bank of the river during these site visits. No immediate threats were noted for this population. The habitat for croomia also appears to be less disturbed and less likely to be threatened because of its somewhat difficult access.

Restoration of degraded upland associations to appropriate natural types should also be considered for this UEA. Longleaf pine restoration should be considered for many areas, though in some cases upland oak communities may be more appropriate. Additional site visits to upland areas are necessary to determine which community types are appropriate and desirable.

This area is not used by the military, and no conflicts or issues with the impact of training activities are anticipated.

Management Issue	**Management Goal**	**Mgt Recommendation**
Feral swine disturbance	Protect wetland and bluff areas	Reduce or eliminate swine population
Impacts of non-native invasive species on special concern plants	Ensure viability of populations of special concern plants, especially *Arabis georgiana*	Eradicate invasive plants using methods least likely to impact special concern plants
Rare plant populations	Maintain viability of critically rare *Arabis georgiana*	Monitor existing populations and consider restoration and enhancement in other areas
Degraded upland plant associations	Restore appropriate natural associations to the buffer area of UEA	Determine appropriate community type (upland longleaf or oak) and restore accordingly

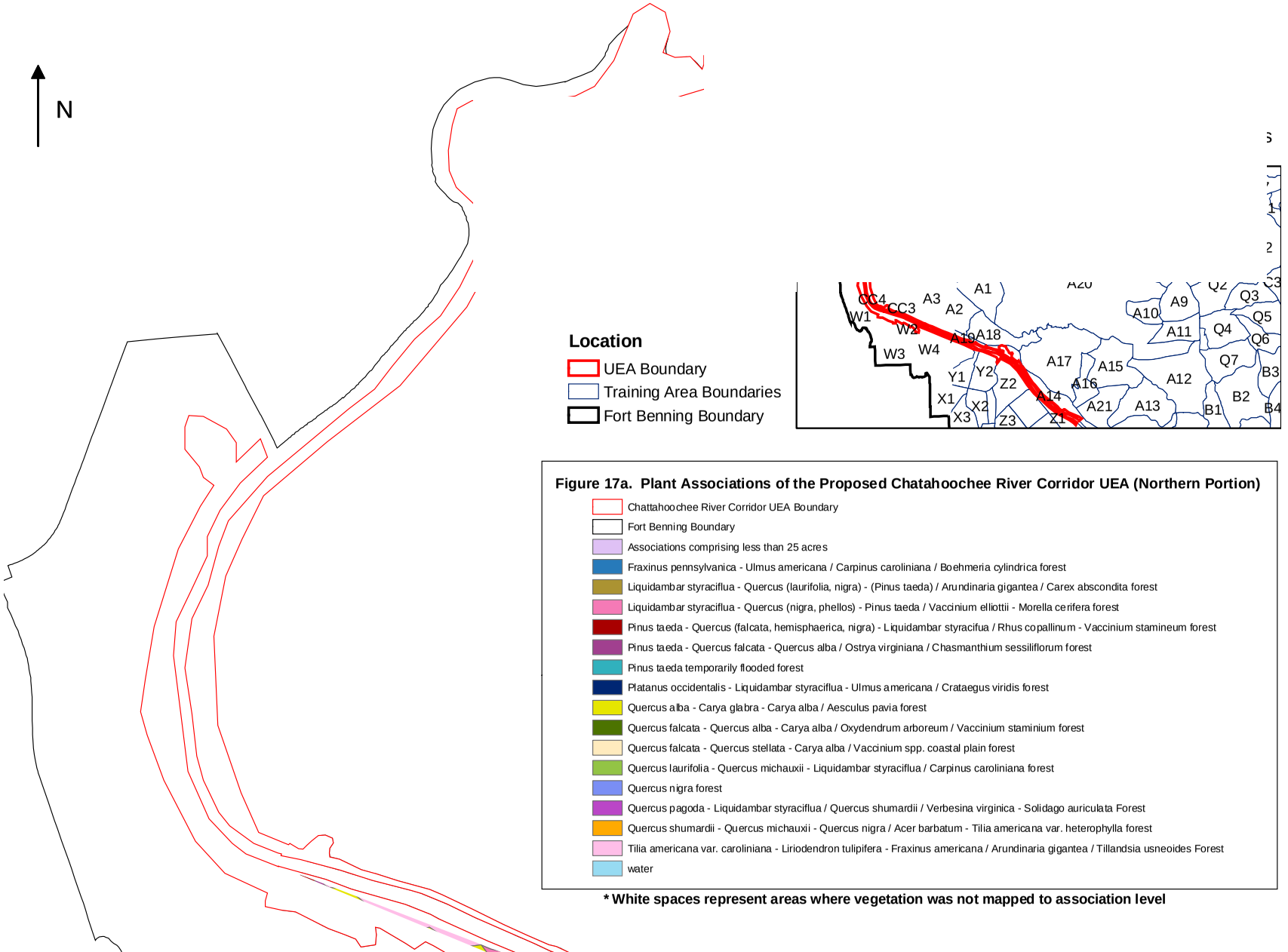


Figure 17a. Plant Associations of the Proposed Chatahoochee River Corridor UEA (Northern Portion)

- Chattahoochee River Corridor UEA Boundary
- Fort Benning Boundary
- Associations comprising less than 25 acres
- Fraxinus pennsylvanica - Ulmus americana / Carpinus caroliniana / Boehmeria cylindrica forest
- Liquidambar styraciflua - Quercus (laurifolia, nigra) - (Pinus taeda) / Arundinaria gigantea / Carex abscondita forest
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda - Quercus falcata - Quercus alba / Ostrya virginiana / Chasmanthium sessiliflorum forest
- Pinus taeda temporarily flooded forest
- Platanus occidentalis - Liquidambar styraciflua - Ulmus americana / Crataegus viridis forest
- Quercus alba - Carya glabra - Carya alba / Aesculus pavia forest
- Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium staminium forest
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest
- Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana forest
- Quercus nigra forest
- Quercus pagoda - Liquidambar styraciflua / Quercus shumardii / Verbesina virginica - Solidago auriculata Forest
- Quercus shumardii - Quercus michauxii - Quercus nigra / Acer barbatum - Tilia americana var. heterophylla forest
- Tilia americana var. caroliniana - Liriodendron tulipifera - Fraxinus americana / Arundinaria gigantea / Tillandsia usneoides Forest
- water

*** White spaces represent areas where vegetation was not mapped to association level**

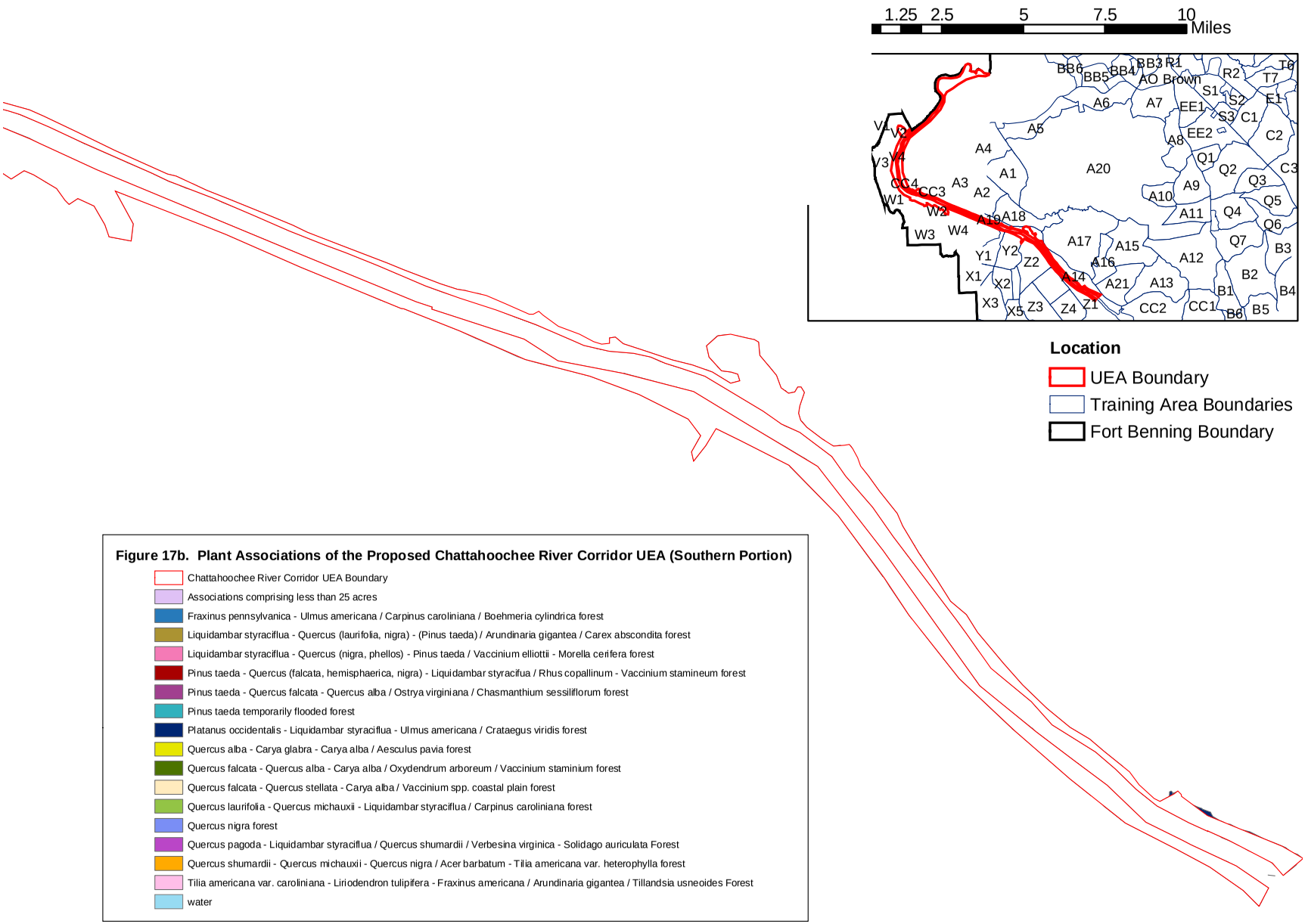


Figure 17b. Plant Associations of the Proposed Chattahoochee River Corridor UEA (Southern Portion)

- Chattahoochee River Corridor UEA Boundary
- Associations comprising less than 25 acres
- Fraxinus pennsylvanica - Ulmus americana / Carpinus caroliniana / Boehmeria cylindrica forest
- Liquidambar styraciflua - Quercus (laurifolia, nigra) - (Pinus taeda) / Arundinaria gigantea / Carex abscondita forest
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Pinus taeda - Quercus (falcata, hemisphaerica, nigra) - Liquidambar styracifua / Rhus copallinum - Vaccinium stamineum forest
- Pinus taeda - Quercus falcata - Quercus alba / Ostrya virginiana / Chasmanthium sessiliflorum forest
- Pinus taeda temporarily flooded forest
- Platanus occidentalis - Liquidambar styraciflua - Ulmus americana / Crataegus viridis forest
- Quercus alba - Carya glabra - Carya alba / Aesculus pavia forest
- Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium staminium forest
- Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. coastal plain forest
- Quercus laurifolia - Quercus michauxii - Liquidambar styraciflua / Carpinus caroliniana forest
- Quercus nigra forest
- Quercus pagoda - Liquidambar styraciflua / Quercus shumardii / Verbesina virginica - Solidago auriculata Forest
- Quercus shumardii - Quercus michauxii - Quercus nigra / Acer barbatum - Tilia americana var. heterophylla forest
- Tilia americana var. caroliniana - Liriodendron tulipifera - Fraxinus americana / Arundinaria gigantea / Tillandsia usneoides Forest
- water

*** White spaces represent areas where vegetation was not mapped to association level**

3. O3 (FORMERLY O14) MESIC LONGLEAF PINE

Overview, Ecological Significance and Condition

This area is located northeast of the Malone Range Complex along a small tributary on the west side of Randall Creek in training area O3. This 103 acre area has been proposed as a UEA because it contains examples of saturated longleaf and pond pine (*Pinus serotina*) communities, which are infrequent at Fort Benning. In addition, this area has a small but significant high quality occurrence of *Upper East Gulf Coastal Plain Loamhill Longleaf Woodland* (CEGL008452).

Unusual species located here that are typical of wet savannas include toothache grass (*Ctenium aromaticum*), coastal bog asphodel (*Tofieldia racemosa*), sweet pitcherplant (*Sarracenia rubra*; state endangered in Georgia), and dwarf sundew (*Drosera brevifolia*). The majority of this habitat is of high quality and natural integrity. It merits further investigation, which may yield additional species of conservation concern that are often associated with saturated pine woodlands. A few less desirable plant associations occur within this UEA as well, such as Pinus taeda – Liquidambar styraciflua – Acer rubrum forest (CEGL007560).

Management Issues, Goals, Recommendations and Other Considerations

This UEA was visited on 4/20/05. Pond pine associations are extremely fire dependent and fire frequency and intensity is a problem here; the sweet pitcher plants are quite overgrown by shrubby species. These plants require frequent fire and an open vegetation structure to flower and maintain healthy growth. Ideally, this area should be burned more frequently until the optimum structure is obtained. Since it seems that the fuel load here may not carry this sort of prescribed fire, it may be necessary to hand-prune around the pitcher plants, or to use a propane hand torch here to restore the habitat. The background fire management prescription for the installation as a whole should be adequate for the rest of the UEA.

Removal of less desirable species via timber harvest to promote longleaf pine is permissible in this UEA, but should occur only after the area has been more thoroughly surveyed for rare plant populations, and should be carried out in areas where rare plants are not present. By removing the dominant water users, thinning may also help retain the saturated character that defines this UEA. The decision to thin areas within this UEA, however, should also consider the potential impact on fire continuity that accompanies removal of overstory fuel sources (pine needles).

As part of the development of MCoE, new tank trails have been constructed throughout this UEA and pose significant threats to the long term integrity of the site, especially hydrological conditions. Monitoring of the wetland areas should continue to assess the impacts of new tank tails.

Management Issue	**Management Goal**	**Mgt Recommendation**
Fire exclusion and fire return interval for pond pine association	Restore appropriate natural structure and condition to fire dependent community	Apply fire more intensely and frequently until open structure is obtained
Degraded plant associations	Restore to saturated longleaf pine woodland	Survey for additional rare plants beforehand

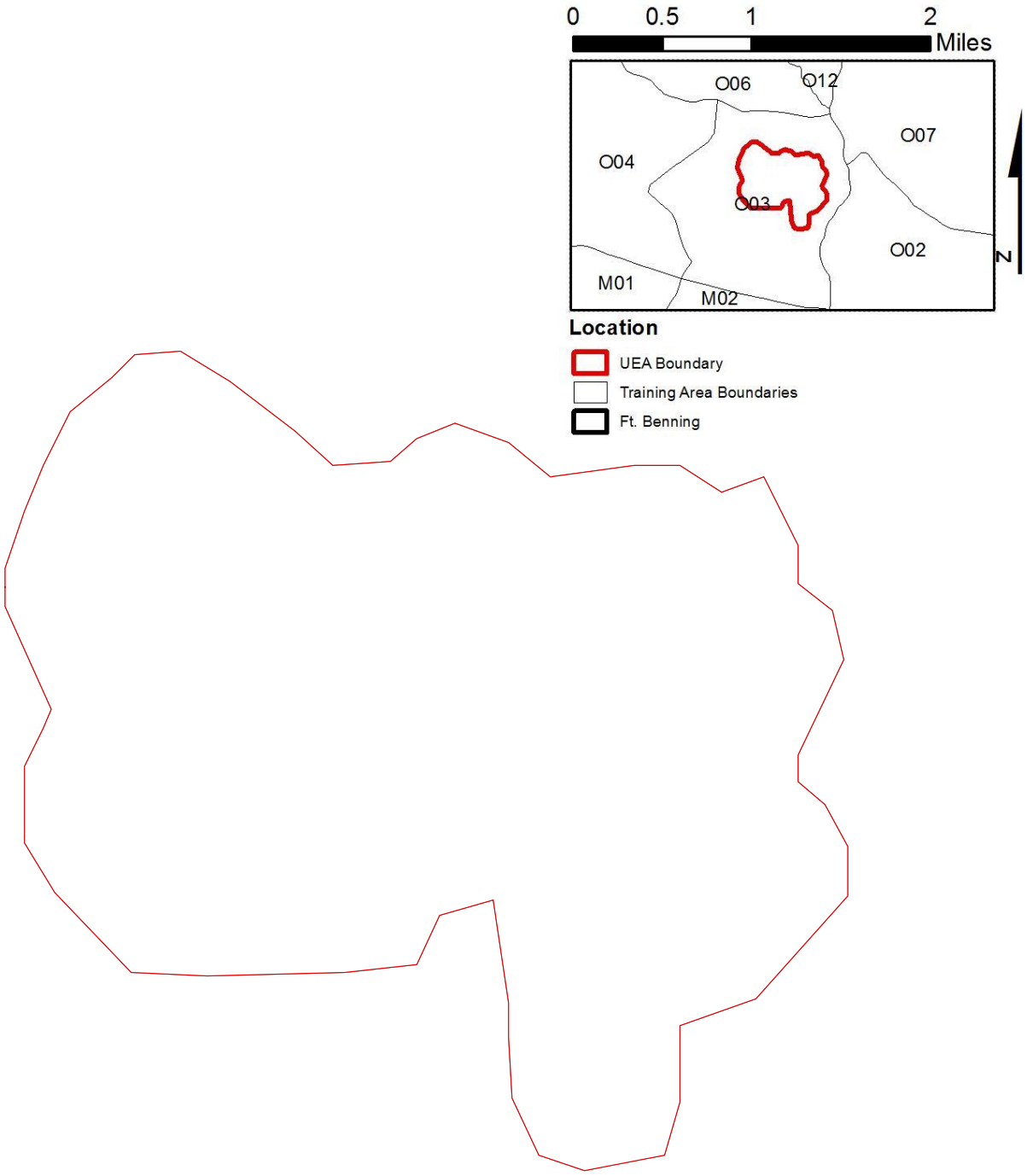


Figure 18. Plant Associations of the Proposed O14 Mesic Longleaf Pine UEA

- O14 Mesic Longleaf Pine UEA Boundary
- Liquidambar styraciflua - Quercus (nigra, phellos) - Pinus taeda / Vaccinium elliottii - Morella cerifera forest
- Liriodendron tulipifera - Nyssa biflora - Magnolia virginiana / Toxicodendron vernix - Morella caroliniensis / Osmunda regalis forest
- Pinus palustris - Pinus serotina / Ilex glabra - Lyonia lucida / Ctenium aromaticum woodland
- Pinus palustris / Schizachyrium scoparium / Verbesina aristida loamhill woodland
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Pinus taeda - Liquidambar styraciflua - Acer rubrum saturated forest [placeholder]
- Quercus alba - Carya glabra - Carya alba / Aesculus pavia forest
- Quercus laevis / (Andropogon virginicus, Aristida spp., Schizachyrium scoparium) woodland

4. A1 SEASONALLY FLOODED DEPRESSION PONDS

Overview, Ecological Significance and Condition

This 53 acre site includes high quality examples of herbaceous dominated, seasonally flooded depression ponds. It is located in the A1 training compartment in the vicinity of the Longleaf Pine Loamhills UEA. These types of naturally occurring herbaceous dominated wetlands are very infrequent in the Coastal Plain landscape and protected examples are even more uncommon. They serve as important breeding areas for amphibian species such as the gopher frog (*Rano capito*) and other wetland-dependent animals.

At present, no special concern plant or animal species are documented within this site. It deserves recognition as a UEA largely on the basis of the infrequently occurring plant associations located here.

Management Issues, Goals, Recommendations and Other Considerations

This area has only recently been discovered, and an in-depth investigation of potential management issues has not been undertaken. Because of its proximity to the A20 Impact Area, this UEA can be difficult to access. It was unavailable for scheduling during spring/summer 2005. Further site visits should be scheduled, however, so that an assessment of potential management issues to address can be developed. This should include determining if the existing fire regime is adequate to maintain natural communities (occasional fire is probably important in maintaining the open character of these depression ponds), and ensuring that no human activities are interfering with the natural hydrologic processes important for the functioning of these seasonally flooded wetlands.

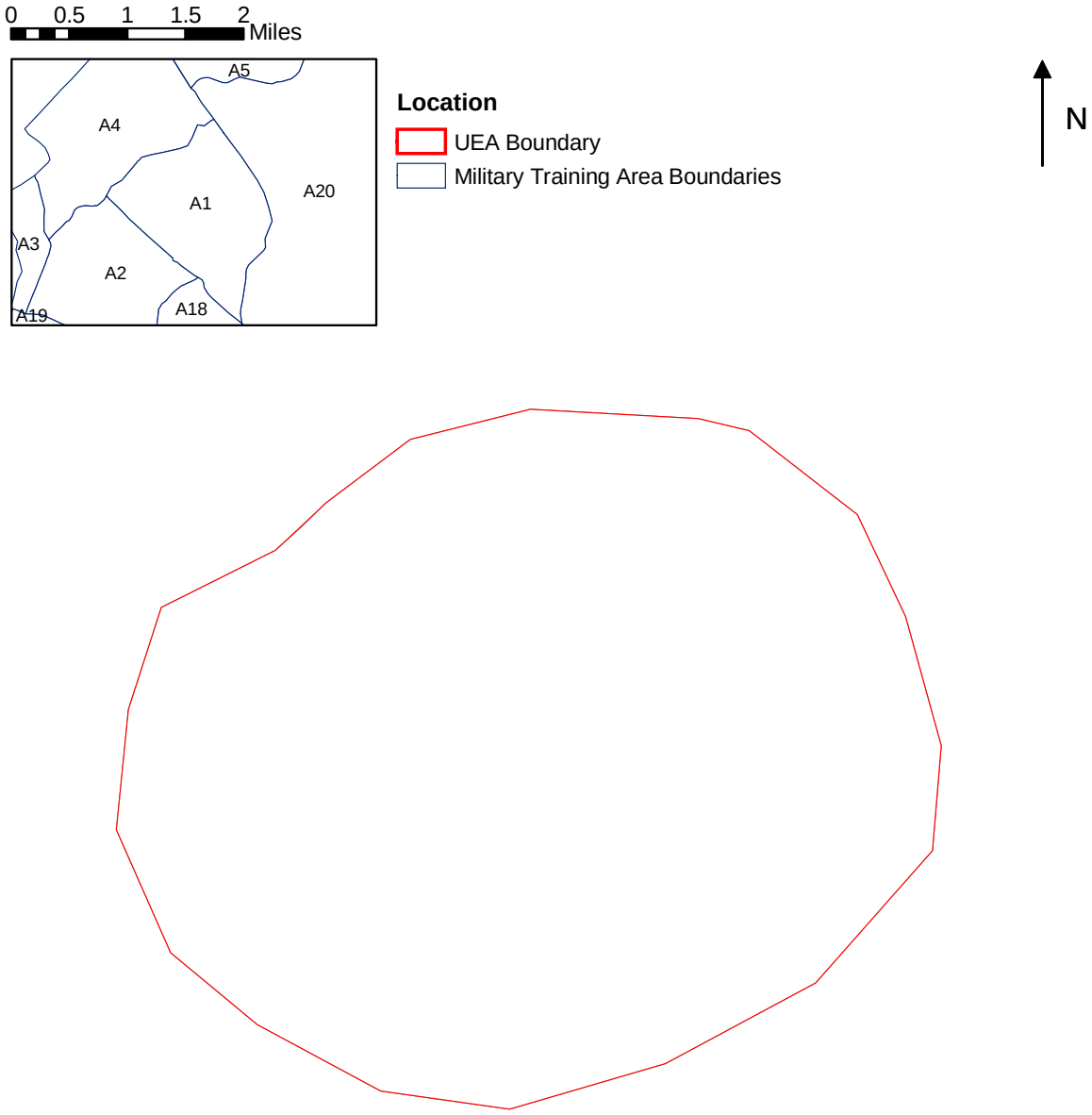


Figure 19. Plant Associations of the Proposed A1 Seasonally Flooded Depression Pond UEA

- A1 Depression Ponds UEA Boundary
- Dichanthelium wrightianum - Dichanthelium erectifolium herbaceous
- Nyssa biflora / Itea virginia - Cephalanthus occidentalis depression forest
- Panicum hemitomon - Pluchea (camphorata, rosea) - Ludwigia spp. herbaceous
- Pinus palustris - Pinus (echinata, taeda) / Quercus (marilandica, laevis) / Schizachyrium scoparium woodland
- Pinus taeda - (Pinus echinata) / Schizachyrium scoparium woodland
- Saccharum spp. - Panicum verrucosum - (Rhexia spp., Sabatia angularis) herbaceous

The following documents were used in the compilation of this report:

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USAIC (U.S. Army Infantry Center). 2001. Integrated Natural Resources Management Plan 2001-2005; Fort Benning Army Installation, Georgia, 344 p.

U.S. Fish and Wildlife Service. 2003. Recovery Plan for the Red-Cockaded Woodpecker (*Picoides borealis*): Second Revision. U.S. Fish and Wildlife Serv

APPENDIX B

REFERENCE TABLES AND SUPPORTING DOCUMENTS FOR MANAGEMENT PROGRAMS

APPENDIX B1 FOREST MANAGEMENT PROGRAM

Table B.1.1 Forest types classified on Fort Benning, in descending order of acreage, based on 2013 forest inventory database.

Classified Forest Type	Acres
Mixed Pine - Longleaf	34,127
Longleaf Pine Plantation	21,671
Sweetgum - Water Oak - Willow Oak	16,867
Mixed Pine	12,338
Sweetbay - Swamp Tupelo - Red Maple	7,685
Loblolly Pine	6,271
Bottomland Hardwood - Yellow Pine	5,715
Cove Hardwood - Yellow Pine	4,993
Sweetgum - Yellow Poplar	4,836
Yellow Pine - Upland Hardwood	4,467
White Oak - Red Oak - Hickory	4,368
Oak - Hickory	3,879
Upland Hardwood - Yellow Pine	3,183
Longleaf Pine	2,780
Water	2,728
Undrained Flatwoods	2,421
Loblolly Pine Plantation	2,349
Scrub Oak	2,262
Yellow Poplar - White Oak - Laurel Water Oak	1,738
Mixed Pine - Longleaf Underplant	1,572
Mixed Pine - Longleaf - Longleaf Underplant	1,440
Loblolly Pine - Hardwood	1,261
Scrub Oak - Yellow Pine	1,198
Loblolly Pine - Longleaf Underplant	1,021
Brush species	809
Slash Pine Plantation	462
Longleaf Pine - Hardwood	314
Laurel Oak - Willow Oak	290
Sweetgum	116
Scarlet Oak	100
Longleaf Pine - Longleaf Underplant	91
Yellow Pine - Upland Hardwood - Longleaf Underplant	85
Longleaf Pine - Scrub Oak	48
Shortleaf Pine	46
River Birch - Sycamore	41
Blackgum	29
Yellow Pine - Cove Hardwood	27
Slash Pine Plantation - Longleaf Underplant	17
Northern Red Oak	13
Shortleaf Pine - Longleaf Underplant	13
Shortleaf Pine - Oak	4
Longleaf Pine - Hardwood - Longleaf Underplant	3
Loblolly Pine - Hardwood - Longleaf Underplant	3
Total Forest Area Classified	153,682

Table B.1.2 Forest Inventory Schedule

Fiscal Year	Compartments And Cantonment Areas
2014	A13, A23, A24, A26, D05, E06, E07, E11, F02, F05, F10, G06, HCC-E, J07, J08, K17, K34, L06, N03, N08, O08, T04, T06, T10, U08, W03, W04, W05, W06
2015	A04, A06, A07, A08, AA04, D01, D10, D18, D19, E04, F06, F07, F08, J04, J05, K07, K26, K27, N05, N06, O11, O17, O24, O27, S03, W01, X04
2016	A09, A16, A17, B04, B08, D11, D17, E01, E09, EOD, H01, H02, HCC-D, HCC-I, I03, I04, J06, K30, K31, L03, L05, M07, N02, O03, O04, Q03, R01, SHC-B, SHC-D, SHC-E, SHC-F
2017	A01, A18, A25, A30, B02, B03, B05, B07, B09, BB03, D07, D13, DD02, J03, K02, K09, K18, L01, M05, O06, O19, O29, O30, O34, P02, P05, P06, Q02,Q04, S01, S04, U03, U04, U05, U06, U10, X03
2018	A21, AA01, BB04, BB05, BB06, BB07, C05, C06, D02, D08, D09, D12, D14, G08, H05, I05, I06, K33, L09, M1, M04, M06, O07, O21, O25, 035, T08, T09, T11, W02, W08, Y01, Y02, Z01

Table B.1.3 Planned Timber Harvest by Fiscal Year

2014	2015	2016	2017	2018
T 08	A 08	E 01	A 15	E 05
T 09	C 03	H 02	A 22	E 12
M 06	C 04	I 03	D 04	F 03
N 03	C 05	I 04	D 15	H 03
A 01	C 06	K 31	D 16	HCC F
A 21	F 10	L 03	E 10	K 03
I 05	U 08	L 05	G 02	K 14
W 02	U 02	N 02	G 07	L 04
W 08	U 01	O 03	H 04	N 07
O 33	W 04	O 04	K 34	A 10
W 06	W 05	Q 03	K 35	I 01
W 07	AA 04	D 13	L 02	I 02
X 01	F 07	J 02	O 01	I 07
O 35	J 04	J 03	O 15	K 04
K 29	K 07	K 02	O 26	K 08
K 30	K 06	O 29	O 25	L 08
K 32	L 01	O 30	O 28	N 01
O 08	J 05	O 34	HCC M	N 04
BB 02	J 06	P 05	R 02	P 04
BB 03	N 06	Q 02	X 02	Q 09
BB 04	W 01	Q 04	Z 02	S 02

Table B.1.3 Planned Timber Harvest by Fiscal Year (cont.)

2014	2015	2016	2017	2018
BB 06	X 04	U 03	A 29	T 02
BB 07	A 09	U 04	BB 10	V 01
BB 05	A 16	U 05	BB 11	V 04
A 05	A 17	U 06	D 03	X 05
A 07	A 18	U 10	E 02	

Table B.1.4 Annual Timber Harvest (tons)

	2014	2015	2016	2017	2018
PST	5000	3000	5000	3000	5000
PP	10000	5000	10000	5000	10000
HWST	0	0	0	0	0
HWP	10000	5000	10000	5000	10000
Chips	30000	30000	30000	30000	30000

PST = Pine Saw Timber; PP = Pine Pulpwood; HWST = Hardwood Timber; HWP = Hardwood Pulpwood

Table B.1.5 Fort Benning Champion Trees

SCIENTIFIC NAME	DBH	CIRC. (in)	HEIGHT (ft)	CROWN SPREAD (ft)	POINTS	Location
Fraxinus pennsylvanica	31.9	100	131	63	247	L8
Fraxinus pennsylvanica	31.3	98	90	55	202	P2
Fraxinus profunda	24.5	77	89	48	178	BB4
Taxodium distichum	24	75	85	24	166	X4
Tilia americana var. caroliniana	35.2	111	88	73	217	O22
Telia heterophylla	22	69	97	66	183	Main Post
Telia heterophylla	30	94	66	44	171	Uchee Creek
Fagus grandifolia	32.9	103	102	61	221	X5
Fagus grandifolia	34	107	88	59.5	210	L8
Betula nigra	25.6	80	82	59	177	Z1
Betula nigra	28.2	89	93	51	194	Main Post
Nyssa sylvatic	27.3	86	86	58	186	K33
Nyssa sylvatic	20.9	66	76	42	152	Harmony Church
Acer negundo	17	53	69	52.5	136	Main Post
Catalpa bignonioides	20.2	63	46	35	118	A12
Prunus serotina	23.7	74	43	28	124	Main Post

Table B.1.5 Fort Benning Champion Trees (cont.)

SCIENTIFIC NAME	DBH	CIRC. (in)	HEIGHT (ft)	CROWN SPREAD (ft)	POINTS	Location
Prunus serotina	14.1	44	50	26	101	U6
Melia azedarach	27.7	87	30	42	128	Main Post
Populus deltoides	49	154	124	70	295	Main Post
Malus angustifolia	5.2	16	10	15	30	A16
Cornus florida	8.1	25	47	32.5	81	J2
Ulmus rubra	16.8	53	79	53.5	145	Main Post
Ulmus alata	32.6	102	64	90	189	X4
Ulmus alata	32.2	101	78	91.5	202	X4
Carya glabra	25.9	81	100	66.5	198	E11
Carya glabra	35.8	112	129	83	262	L8
Carya pallida	37.6	118	120	91	261	E10
Carya pallida	36.4	114	71	79	205	Golf Course
Carya ovata	32	101	115	69.5	233	A16
Carya ovata	30.5	96	117	65.5	229	O16
Carya aquatica	31.9	100	120	79	240	O11
Ilex opaca	12.9	41	55	36.5	105	J3
Ostrya virginiana	11.7	37	45	38.5	91	J3
Magnolia macrophylla	9.4	30	64	27	100	BB4
Magnolia grandiflora	32.5	102	58	45	171	X4
Magnolia grandiflora	43.3	136	110	72.5	264	L9
Acer barbatum	26.2	82	62	62	160	T7
Acer rubrum	38.2	120	102	63	238	Main Post
Morus rubra	28.1	88	50	56	152	X4
Quercus velutina	45.3	142	85	68	244	D16
Quercus incana	16.5	52	52	40.5	114	N3
Quercus pagoda	55.4	174	88	86	284	Main Post
Quercus hemispherica	60	188	75	80	283	Main Post
Quercus hemispherica	54.5	171	85	80	276	Main Post
Quercus virginiana	32.8	103	43	59	161	V3
Quercus rubra	24.8	78	81	40.5	169	E11
Quercus lyrata	39.4	124	127	89	273	O17
Quercus lyrata	40.4	127	138	101	290	M5
Quercus stellata	39.3	123	65	84	209	Golf Course
Quercus falcata	64.6	203	66	117	298	Golf Course
Quercus falcata	62.3	196	104	125.5	331	Main Post
Quercus michauxii	48.7	153	125	96	302	O17
Quercus michauxii	46.1	145	120	98.5	289	O11

Table B.1.5 Fort Benning Champion Trees (cont.)

SCIENTIFIC NAME	DBH	CIRC. (in)	HEIGHT (ft)	CROWN SPREAD (ft)	POINTS	Location
Quercus laurifolia	39.4	124	125	96	273	O17
Quercus laevis	24.4	77	51	59	142	Main Post
Quercus laevis	25.2	79	48	53.5	141	Main Post
Quercus nigra	82.9	260	83	125	375	Main Post
Quercus alba	43.9	138	125	98.5	288	O17
Quercus alba	47	148	120	118.5	297	O16
Quercus phellos	72.2	227	86	123	344	Golf Course
Quercus phellos	67.3	211	82	104	319	Golf Course
Carya illinoensis	44.5	140	88	72	246	Main Post
Diospyros virginiana	21.5	68	84	34	160	F9
Pinus taeda	41.3	130	134	64.5	280	Main Post
Pinus taeda	42	132	138	62	285	Main Post
Pinus palustris	35.3	111	82	62.5	209	K24
Pinus echinata	22.7	71	124	43	206	X5
Pinus glabra	37.5	118	141	50.5	271	M5
Pinus glabra	37.7	118	130	59.5	263	M5
Pinus glabra	44	138	109	79.5	267	Sand Hill
Juniperus virginiana	29.8	94	78	41	182	K7
Juniperus virginiana	34.1	107	65	38	182	K17
Sassafras albidum	18.5	58	58	38	126	Main Post
Albizia julibrissin	27.5	86	73	44	170	O33
Oxydendrum arboreum	16.8	53	97	45	161	O17
Oxydendrum arboreum	16.7	52	78	32	138	J3
Celtis laevigata	38	119	64	58	198	Main Post
Liquidambar styraciflua	42.4	133	129	93	285	F9
Liquidambar styraciflua	42.9	135	150	66	301	Sand Hill
Platanus occidentalis	39.3	123	125	51	261	Main Post
Platanus occidentalis	39.2	123	82	70	223	Main Post
Juglans nigra	26.5	83	60	67.5	160	O33
Salix nigra	20	63	78	41	151	Z1
Salix nigra	22.3	70	82	31.5	160	Sand Hill
Liriodendron tulipifera	43.6	137	126	88	285	X1

Table B.1.6 Land Management Branch Annual Budget FY14-FY18

Budget - Labor

1. Personnel Costs with Overhead (26%)

		FY14	FY15	FY16	FY17	FY18
Supervisory Forester	GS-13	$101,148	$104,182	$107,308	$110,527	$112,738
Lead Forester	GS-12	$86,699	$89,291	$91,076	$92,898	$94,756
Lead Forester	GS-12	$86,699	$89,291	$91,076	$92,898	$94,756
Forester (GIS)	GS-11	$72,334	$74,483	$75,973	$77,492	$79,042
Forester	GS-11	$72,334	$74,483	$75,973	$77,492	$79,042
Forester	GS-9	$72,017	$73,487	$74,957	$76,456	$77,985
Forester	GS-9	$62,283	$63,554	$64,825	$66,122	$67,444
Forest Technician	GS-9	$70,065	$71,495	$72,925	$74,384	$75,872
Forest Technician	GS-9	$73,969	$75,479	$76,989	$78,528	$80,099
Forest Technician	GS-7	$62,052	$63,319	$64,585	$65,877	$67,194
Forest Technician	GS-7	$60,460	$61,694	$62,928	$64,186	$65,470
Forest Technician	GS-7	$60,460	$61,694	$62,928	$64,186	$65,470
Forest Technician	GS-7	$60,460	$61,694	$62,928	$64,186	$65,470
Forest Technician	GS-7	$57,300	$58,470	$59,639	$60,832	$62,049
Forest Technician	GS-7	$50,930	$51,970	$53,010	$54,070	$55,151
Forest Technician	GS-7	$50,390	$51,970	$53,010	$54,070	$55,151
Overtime/Hazard Pay		$63,500	$66,675	$70,000	$73,500	$77,000
Total Labor		$ 1,163,100	$ 1,193,231	$ 1,220,130	$ 1,247,705	$ 1,274,689

Projects	FY14	FY15	FY16	FY17	FY18
Reforestation - Site Prep, trees,	$315,888	$257,110	$264,330	$273,538	$287,500
Firebreak Maintenance (rock,	$103,000	$90,000	$90,000	$90,000	$90,000
Kudzu Control	$55,000	$59,000	$70,000	$70,000	$70,000
Aerial Photography	$40,000	-	$45,000	-	$50,000
Geographical Information	$5,000	$25,000	$3,000	$3,500	$3,000
Prescribed Burning Supplies	$15,000	$5,550	$16,500	$8,000	$17,000
Equipment	$320,000	$90,000	$90,000	-	$20,000
Wildfire Detection Contract	$15,102	$15,555	$16,000	$16,400	$16,900
Forest Inventory Software	$2,500	$2,500	$3,000	$3,250	$3,500
Total Projects	$871,490	$544,715	$597,830	$464,688	$557,900

APPENDIX B2 PRESCRIBED BURNING PROGRAM

B.2.1 Fort Benning Prescribed Burning Standard Operating Procedures

1. **PURPOSE:** The purpose of this Standard Operating Procedure (SOP) is to establish procedural guidance for the application of prescribed fire during the dormant season and growing season.

2. **IMPORTANCE:** All Conservation Branch (CB) and Land Management Branch (LMB) personnel involved in prescribed burning will adhere to this SOP to ensure crew safety and high standards of quality. The SOP will be revised by the team leader of the implementation section of LMB as needed to reflect policy, procedural, regulatory, or technological changes. Revisions in the SOP will be coordinated with personnel in the LMB and CB.

3. **GENERAL INSTRUCTION**

   Prior to the Burn Season:

   a. Six to seven months before burning, the planning section will provide the lead forest technician that directs trail/firebreak maintenance with a list of training areas and cantonment areas scheduled for burning in the following fiscal year. This will allow sufficient time to complete trail/firebreak maintenance work (about 175-225 miles) on burn units, training area boundaries, installation boundaries, and impact areas before the start of burn season. The majority of this work is accomplished with motor graders, although crawler tractors are used to install best management practices (BMP).

   b. Five months before the start of the burn season, the planning section prepares a burn plan folder for each burn unit. Two months prior to the start of burn season these folders are coordinated with other program specialists within the LMB and CB for their input or concerns with respect to RCWs (prioritization and timing of burns), other threatened and endangered species, stand management objectives, timber marking, timber harvesting, soil restoration projects, and game management areas. This process identifies areas that require fire exclusion. It also serves as a reminder for CB personnel to protect game areas (sawtooth oak sites) by disking around them. Areas requiring fire exclusion must be protected before the start of burn season on the Monday following Thanksgiving.

   c. Four to six weeks before the burn season, the lead fire technician begins scheduling training areas for burning from the prioritized list. Scheduling is coordinated with Range Control Division, and training areas are entered into the Range Facility Management Support System (RFMSS) scheduling system. Range Control lists TAs scheduled for burning in the weekly range bulletin.

   d. On the burn plan form and orthophoto, identify and document the assets/resources within the burn area that must be protected (such as utility poles and boxes, latrines, bleachers, buildings, and railroad trestles). The burn boss must coordinate the location of these assets with burn crews to ensure their protection before conducting the burn. Protect these assets by raking pine straw, leaves, and grass to a distance of three feet. Remove dead branches and limbs that produce radiant heat. Ignite the raked fuel, allowing it to burn away from the assets. Extinguish flare ups or hot spots with a

backpack pump or pumper truck. Ensure the fire has burned a sufficient distance away from the assets before leaving the area. Look for ladder fuels (vines) near buildings or other assets and avoid igniting them because they have a tendency to emit burning or smoldering embers that may fall on top of the building and ignite it. If ladder fuels catch fire, suppress them with a backpack pump or pumper truck. When burning around assets, always use a fire rake, backpack pump, or pumper truck. If logging debris or other flammable material is adjacent to the asset, it will be necessary to remove it with a dozer in order to eliminate radiant heat that may cause the asset to ignite. If accessible, a pumper truck should be used to apply water to the asset (buildings, railroad trestles, utility poles and boxes, etc.) before lighting the fire around it.

On the Burn Day, Before Leaving Office:

f. The designated burn boss will ensure that the burn plan, smoke management plan, and all other burn forms are completed and the SOP is followed. The burn boss will bring the burn plan folder, aerial photographs, and a 1:50,000 map. If burning in a RCW cluster, the burn boss will ensure that the RCW tree listing and GPS cluster map are on hand. The burn boss will appoint crew members to ensure that trucks are properly prepared and equipped according to the list in **Box 1**. The burn boss and crew members will be familiar with the equipment list.

g. Obtain the GFC forestry weather and smoke management forecast at 0800 hours from http://weather.gfc.state.ga.us/. The current and forecasted fire danger rating also can be found at this site. Other sites for weather information include AccuWeather.com and Weather.com (http://www.weather.com/weather/maps/forecast/fore3_440x275.html). Hourly forecasts can be found at these sites, which provide wind direction and speed. This information is useful in determining the direction smoke will move at night. These sites also provide Doppler radar maps (precipitation) and satellite maps (cloud cover) that are useful in assessing the movement and direction of weather systems. If internet access is not available, the GFC can be contacted at 706-568-2158 (Columbus) or 229-649-2289 (Buena Vista) to obtain forestry weather forecasts and fire danger ratings. It is advisable to get the forestry weather forecast every day for planning purposes related to prescribed burning, fire detection, and fire suppression. The GFC's afternoon forestry weather and smoke management forecast is useful in making decisions and preparations for burning on the following day, as well as weekend burning.

h. Notify individuals, offices or agencies on the Coordination List – Prescribed Burning of intentions to burn and burn locations. Get final concurrence from Range Control on those areas previously scheduled for burning in RFMSS and on the Range Control maps (Scale 1:25,000). Fax the call list to the Chief, EMD.

i. Ensure that the LMB Chief, Dispatcher, and Lead Forester are aware of the burn locations. Coordinate the fire weather forecast and burn plan parameters with the Lead Forester. Exceptions to burning outside the plan parameters must be granted by the LMB Chief.

Box 1. Prescribed Burning Equipment Checklist

Item	Quantity
First aid kit	1
Fire extinguisher	1
Belt weather kit	1
Drip torches	2
Five-gallon cans, filled with burning fuel	3
Back pack pump or bladder bag	1
Five-gallon containers	2
Fire flaps	1
Fire rakes	2
Shovel	1
Smoke caution signs	4
Lights for smoke signs, if necessary	4
Batteries for lights	8

Crew members will travel two to a vehicle. Each burner will ensure that they have the following equipment:

Ignition source	1
Fire rake	1
Drip torch (filled with fuel)	1
Leather safety boots	1
Nomex clothing	1
Leather gloves	1
Water Cooler (1/2-1Gal.)	1
Hard hat	1
Safety goggles	1

*** Approved fire shelters are available for use.**

At the Burn Location:

j. The burn boss will make the final decision on whether to burn and whether any adjustments are necessary to the burn plan. Set a test fire to observe fire behavior, smoke dispersion, and plume trajectory.

k. Refer to orthophotos or aerial photographs to ensure burning in the designated location. Communicate and work as a team to effectively execute the burn plan.

l. Procedures listed below are followed throughout the burn will ensure that no vehicles are lost to fire:

1. Leave ignition key in a designated location, out of sight, but familiar to other crew members.
2. Park vehicle only within areas that are noncombustible (e.g., bare soil, pavement, burned out area).
3. Roll up windows.

4. Do not spill burning fuel in the truck bed.
5. Do not fill drip torches in truck bed.
6. Keep truck bed free of trash, litter, and fuel spills.
7. Do not park vehicles near burning snags.
8. Do not park vehicles near ladder fuels, such as vines.
9. Extinguish torch wick prior to placing in truck.
10. Close torch breather valve.
11. Put torch in rack or torch bracket.
13. Ensure fire extinguisher is accessible and operable.
14. Fire shelters will be placed in each vehicle/equipment assigned for prescribed burning.

m. Notify the LMB fire dispatcher when ignition of the burn area begins.

n. Prior to burning RCW clusters, RCW technicians will burn around all RCW cavity or nest trees that have a potential to ignite and burn. Forestry technicians may be called upon to assist the RCW technicians in this process. To assist in making decisions about a cavity tree's potential to ignite, look for fuel continuity around the bole that may allow the fire to ascend the tree rapidly (such as loose bark, pitch from resin wells, and fusiform cankers). Unless otherwise directed by the burn boss, all decisions and techniques regarding burning around cavity trees will be the responsibility of each individual burn crew, whether RCW technicians, forestry technicians, or a combination of the two. The backpack pump or bladder bag will be on hand during the burning process. When vegetation around a cavity tree is extremely thick and high, it must be removed with a fire rake to protect the tree from ignition due to radiant heat.

o. Secure the baseline and then the flanks. Use the GFC-forecasted winds and field observations to decide which side of the perimeter will become the baseline as the burn progresses. Backfire the baseline and then ignite the flanks. Due to the high temperatures in the summer season, burning should begin as soon as the dew and fog burn off and the fuel reaches an ignitable state (15 percent fuel moisture or less than 60 percent humidity).

p. When using drains as firebreaks between burn units a crew member must make a final inspection of the drain perimeter to ensure the fire did not cross over into another burn unit or compartment. Igniting the stand uphill from the ecotone, before peak fire weather, should prevent the fire from crossing the drainage. On the other hand, fire will be used to manage those ecotones where hardwood encroachment from the ecotones is degrading RCW habitat.

q. If smoke may be a problem, extinguish the wood that is generating smoke with water or cover it with dirt. Use a dozer or a pumper truck. If there is an abundance of smoldering logs/snags on the burn unit perimeter—adjacent to roads, powerlines, or the boundary—extinguish them ASAP after the fire passes. If necessary, rake around them to keep from igniting. If smoke will not be a problem, let the wood burn. If necessary, smoke-warning signs will be posted on highways and paved roads. Two signs will be posted in each direction. If smoke will be a problem at night, lights should be placed on the signs to warn motorists. It may be necessary to leave the signs out for several days if residual smoke from 1,000 hour and 10,000 hour timelag fuels is a problem.

r. Hazards such as burning snags and green trees that are within 1-1½ tree lengths of firebreaks, roads, highways, reservation boundaries, power lines, or assets must be suppressed by one or a combination of the following methods:

- Fell the snag/tree with a chainsaw and suppress it with water or dirt. Before felling the snag/tree, it will be necessary to put the lower portion of the bole out with a pumper truck (if possible). This will allow the sawyer a safer working area to make the cut.

- Push the snag or tree down with a dozer and suppress it with water or dirt.

- Suppress the snag/tree with a pumper truck if it is accessible and within pumper's range. Before leaving the burn unit, the burn boss will inspect the burn perimeter to ensure that the fire is contained and all hazards have been suppressed/eliminated. Hazards will be checked the following morning to ensure that they are still out. This post-burn inspection is especially important for hollow trees that may still be burning inside. Hollow trees may burn for several days before falling. If hazards are still burning the following day, coordinate any additional mop-up action with the burn boss.

Following the Burn:

s. Complete the initial burn evaluation on the BURN PLAN FORM (for prescriptions, evaluations, and records of fire).

t. Enter the burn data in the prescribed burn database and update the ArcGIS prescribed burning map.

4. PROCEDURE TO FOLLOW WHEN BURNING IN RCW CLUSTERS:

Both active and inactive RCW trees require protection from fire. Active cavity trees (those currently used by RCWs) are distinguished from inactive cavity trees by the presence of freshly pecked resin wells that the woodpeckers regularly tend to produce pitch (sap), which flows freely during the warmer months. This flammable pitch may extend to the base of the tree, creating a potentially volatile situation that could harm the tree. Inactive cavity trees (those not currently used by RCWs) seldom have free-flowing pitch; however, many of these trees have many layers of dry pitch that also will melt and burn when exposed to the heat of a fire. The white bands used to mark the trees are susceptible to smoke and soot damage and should be preserved. For these reasons, the following steps must be taken to protect RCW trees from igniting:

a. Before leaving the motor pool, ensure that the backpack pump is filled with water and functioning properly. Ensure 5-gallon water containers are full. Check soundness and sharpness of fire rakes. Make necessary repairs. Obtain a current list showing the status of all RCW trees in the area being burned; however, be aware that inactive RCW trees and artificial cavities may become active at any time as birds occasionally move and switch cavities. At the burn site, look for the fresh rusty-red pecking on the bark to be certain.

b. At the burn site, work as a team to ensure all RCW trees are properly protected throughout the burning process. Begin burning clusters when RCW technicians and the

burn boss determine that the fuel and weather conditions are suitable to achieve the desired habitat management objectives within the stand. Be careful to avoid fire weather conditions that may allow the fire to spread too fast making protection of the RCW trees difficult or unsafe. RCW technicians on site are responsible for determining the degree of protection needed for each RCW tree. Ignition within an RCW cluster may occur any time from 0930 to 1300 hours depending on the season of year, type of fuel, fuel load, wind speed, and humidity. Burning late in the day should be avoided when low humidities and high winds are forecasted, because the fire weather will be more unstable causing more intense fire behavior and possible crown scorch. In addition, local winds (speed and direction) become unpredictable due to solar radiation and downdrafts from approaching thunderstorms.

c. At the burn site, take a properly functioning backpack pump, fire rake, drip torch, ignition source, and current RCW tree list to each RCW tree being protected. When deciding which tree to begin with, take into consideration the procedures described in sections "c" and sections "h" through "l" below. In most cases, ignition should begin on the downwind side of the RCW tree that is on the downwind side of the cluster. Before ignition, scrape the loose bark and pitch off of the lower 2 feet of the tree with boot. Clear accumulated bark and pitch away from the base of the tree approximately 1 to 2 feet, depending on amount of accumulation. Clear all material away from tree scars or cankers. Using the rake, cut down all volatile plants (such as gallberry, wax myrtle, blueberry, and thick bunch grasses) and remove dead branches within 8 feet of the RCW tree, depending on activity of tree and amount of fuel load. Next, using the backpack pump, spray the entire bole of the tree from the top white band down. Avoid wetting the fuels at the base of the tree, because this fuel must be burned or removed to make the tree secure before moving to the next RCW tree.

d. If the conditions at an RCW tree require additional precautions to protect the tree, an area approximately 3 feet in width about 15 to 20 feet from the tree should be raked clear of vegetation. Loosen the soil in this 3-foot band and form a pile. Soil from this pile may be thrown on the fire in the event the backpack pump malfunctions or runs out of water. This pile of soil will serve as an emergency backup for the backpack pump. After the tree has been secured with a 15 to 20 foot black line (an area in which all fuel has been consumed by fire), spread the piled soil and previously raked vegetation back over this bare area.

e. Normally, raking around RCW trees should be avoided to minimize soil and fine root damage and the spread of undesirable plants; however, under more extreme conditions, all of the fuel and vegetation must be raked or removed a distance of 10 to 12 feet from the base of an RCW tree to ensure its protection. Scatter the piled fuel with the fire rake to reduce radiant heat.

f. Once these steps have been followed, the RCW tree is prepared for the burning phase. Ignite a small spot fire on the downwind side of the tree. This will allow the fire to back around the tree. A backing fire will emit less heat and move slowly, allowing time to react in the event of a contingency (such as a sudden wind shift or a flare up). Only if conditions permit, this process can be speeded up by igniting a line 2-3 feet long perpendicular to the wind direction at the base of the downwind side of the tree. After this line has burned 1-2 feet away from the tree downwind, a second line of fire can be laid downwind and parallel to the first line. These fires will burn together quickly. Subsequent fires can be started in a similar fashion downwind and flanking the RCW

tree if conditions permit safe execution of this type of lighting. As always, consult knowledgeable RCW personnel or the burn boss before deviation from the more cautious procedure. Never allow fire to approach the upwind side of the tree from another fire until sufficient blackline has developed to ensure protection of the RCW tree. Always wear the backpack pump properly when burning around RCW trees with volatile conditions since one left on the ground makes quick response more difficult.

g. Monitor the active cavity tree until the fire has burned the fuel around the tree. Be alert for sudden flare-ups in nearby volatile vegetation. Flare-ups generate radiant heat that can ignite the pitch on a tree. Sudden flare-ups can be suppressed with water or soil. Be alert and watch for the ignition of pitch on the bole of the tree, which can rapidly burn up to and beyond the cavity if not extinguished in time. Extinguish these pitch fires immediately. Make sure that the fire burning away from the tree is never too hot to prevent you from approaching the tree and controlling a pitch fire. This can be done by occasionally spraying water on the flames. The idea is to make the fire manageable and the tree approachable without extinguishing the fire.

h. In the event two or more RCW trees are located in close proximity (within 75 feet), it will be necessary to prepare all of these trees as described in “c”, “d”, and/or “e”. Also, conditions may warrant that a 3-foot wide by 10-foot long break in the fuels be raked between each of these adjacent trees to slow the spread of fire from one tree to another. Piled fuels should be scattered prior to ignition. RCW trees located in close proximity to each other should be handled by four or more people working together in crews of two (one crew per tree).

i. In clusters located on steep slopes (“F” and “G” training areas) as well as on some moderate slopes, ignition should start at the RCW tree located at the top of the slope. After proper preparation, ignite the fuel on the uphill side of the tree. Allow the fire to back around the tree. Under most conditions, fire will burn more intensely up a steep slope than with the direction of the wind. Never start ignition at the bottom of the slope as this will create a head fire that will burn upslope with a high rate of spread, making it impossible to secure the RCW trees. Monitor each tree until the fire has burned the fuel around it developing a protective blackline.

j. During the RCW spring nesting season, extreme caution and special care must be given to nest trees. Protection of these trees requires the highest priority within the cluster. All reasonable precautions described above should be followed. If a nest tree has not been discovered, look for evidence of nesting activity such as an RCW flushing from a cavity or one or more RCWs vocalizing and staying close to an active cavity tree. Any cavity tree surrounded by such activity should be treated as a nest tree.

k. When prioritizing the protection of RCW trees, those of most importance are active cavities, followed by active starts, inactive cavities, enlarged inactive cavities, and inactive starts--in that order.

l. RCW management personnel, with the assistance of forestry personnel, should burn the clusters within the burn unit. Forestry personnel, with the assistance of RCW personnel, should burn the stands around the clusters once they are secured. RCW management personnel are most familiar with the level of activity of the RCW trees, as well as their locations within the clusters. Forestry personnel, on the other hand, often do not know the exact location of each RCW tree, because they are not involved in the RCW

monitoring process. For this reason, forestry personnel may inadvertently miss RCW trees that are obscured from view or are separate from the main cluster. This would put these trees in jeopardy during the burning process. The only exception to this procedure of burning clusters is when RCW technicians are unavailable and forestry personnel have the following documentation: current RCW tree listing and a GIS map showing the GPS location of all cavity trees. Only if this information is available will forestry personnel conduct burning in RCW clusters, following the procedures detailed in steps "a" through "k". This method of burning RCW clusters should protect the RCW trees and eliminate the potential of an RCW tree becoming severely damaged by fire.

m. If a cavity tree is very active and there is uncertainty or apprehension about what to do, communicate with an experienced prescribed burner for guidance. Ability and experience in handling these situations varies from one individual to the other. Do not take chances. Remember that fire is indiscriminate and unpredictable. Work safely at all times.

SMOKE HAZARDS--During prescribed burning and fire suppression activities, you will be exposed to carbon monoxide, particulate matter, and other compounds. For this reason, it is important to avoid inhaling the smoke. Try to stay upwind from the smoke during prescribed burning. This will not always be possible when burning around RCW cavity trees, mopping up snags or stumps, or suppressing fires. Therefore, when you are burning or firefighting under conditions which make smoke unavoidable, wear the respirator you have been issued.

5. CONSULTATION WITH U.S. FISH AND WILDLIFE SERVICE:

In the event an RCW cavity tree is damaged by fire or is in jeopardy of delayed mortality due to extensive crown scorch, the USFWS Ecological Services Office will be notified of the circumstances that resulted in the damage. In the event a cavity tree is lost to fire, mitigation measures may include the installation of an artificial cavity to augment the cluster. The consultation process will be followed for any prescribed burning that may jeopardize the existence of endangered, threatened, and species proposed for listing in compliance with Section 7 "Interagency Cooperation" of the ESA. In addition, an annual summary of prescribed burning will be provided the Ecological Services Office. This summary will include an update on the 3-year burn rotation, number of acres burned during the growing season (GS), number of acres burned during the dormant season (DS), number of clusters burned, and distribution of burn acres by month.

6. PRESCRIBED BURNING IN CANTONMENT AREAS:

The cantonment areas of Fort Benning present a unique opportunity for the expansion of the RCW population and reduction of fuel loads at the wildland/urban interface. Prescribed burning in these areas is an important natural resources management activity that can create a safer environment in addition to creating suitable RCW habitat. As time and fire weather permit, pine and pine / hardwood stands in the cantonment area will initially be prescribed burned during the dormant season (December-February) to reduce fuel loads and minimize delayed mortality. After the initial dormant season burn, the goal will be to apply prescribed fire during the growing season to control hardwoods. Similar to the training areas, the goal will be a 2-3 year burn rotation until hardwoods are under control. This will not only enhance habitat for RCWs but also reduce fuel loads at the wildland/urban interface preventing a catastrophic fire. An ambitious effort is already under way to burn cantonment areas in Sand Hill and Harmony Church. Some of these areas are already on a 3-year burn rotation. Currently, prescribed burning activities are

being concentrated in those areas where RCW clusters already exist. Unfortunately, prescribed burning in the cantonment areas will continue to be a challenge because of the presence of smoke sensitive adminstrative, recreational, and housing areas. Smoke concerns with respect to safety and public health will continue to be an issue. For this initiative to be successful, it will be necessary to spend more time and effort on public awareness. Public awareness and acceptance are critical to reducing fuel loads at the wildland/urban interface and creating suitable RCW habitat in the cantonment areas.

B.2.2 Prescribed Burn Documentation

The following documentation must be completed before, during, and after all prescribed burning activities on Fort Benning:

a. Control Burn Checklist
b. Burn Plan Form
c. Telephone Contact List
d. GFC Fire Weather Forecast
e. Field Weather Observations
f. Orthophoto of Burn Area
g RCW Tree Listing
h. RCW GPS Map
i. Smoke Management Screening Form
j. Smoke Impact Map

Control Burn Checklist

Compartment _____

Date _____

Burn Start Time [NLT 1100(EST)-1200(DST) hours] _____

	Go /	No Go
Training Compartment Clear [DPTMS approval]		
Weather Conditions: *		
Surface Wind Speed [< 18 mph]		
Canopy Wind Speed [< 12 mph]		
Smoke Dispersion Index (SDI) [> 40]		
Fog Potential [< 4] (None 1, Slight 2, Mod 3, High 4)		
Mixing Height [> 1650 ft]		
Transport Wind Speed [> 9 mph]		
Drought Index [< 500]		
Down-wind Plot		
Notifications:		
Routine (e.g. Range control, PAO, DPS, etc.)		
Proximity Notifications (Hospital, units, etc)		
Daily Accumulative Burn [< 2000 acres]		
Weekly Accumulative Burn [< 3500 acres]		

* Any recommended burn outside the standard requires Chief, Land Management Branch.

Signature _____

BURN PLAN FORM

Area:_____ Dates:_____ Prescribed Fire:___ Wildfire:___ Site prep: Ovrstory___ ClrCut___

Burn Unit Acres:_____ Burn Area Acres:_____ Previous Burn Date:_____

Coordination: Initials/Date RCW>_____T&E>_____ Soils>_____

Game>_____ Timber>_____ Reforestation>_____

BURN PLAN: FOR PRESCRIPTIONS, EVALUATION, AND RECORDS

Location (RCW Clusters, Roads, Creeks, Training Sites):_____

_____

Pre-Burn Reconnaisance Completed (Soldiers, Hunters, Assets, Etc.)? Yes:_____ No:_____

Ignition Time:_____ Burn Out Time:_____

Burn Boss (BB)/Burn Crew:_____

_____

Burn Objective:_____

Firebreaks Plowed? Yes:_____ No:_____ If Yes, Identify on Orthophoto with Red Dash Line

ASSETS PRESENT (Power Poles, Utility Boxes, Buildings, Railroads, Latrines, Etc.)? Yes:_____ No:_____

If Yes, Description:_____

_____

_____

PERSONNEL Assigned to Protect Assets:_____

Date Protected:_____

HAZARDS (Near Roads, Utility Lines, Railroads, Buildings, Reservation Boundary)? Yes:_____ No:_____

If Yes, Description (Snags, Green Trees, Number of Each and Location in Burn Unit):_____

_____

_____

PERSONNEL Assigned to Hazards:_____

Action Taken to Eliminate Hazards (felled w/saw or dozer, raked around, suppressed with water or dozer):

_____

_____

_____

PROBLEMS:_____

_____

_____

STAND CONDITION:

Overstory (Forest Type Code: 21__ 26__ 25__ 31__; DBH 0-2”__ 2-6”__ 6-10”__ 10+”__; BA: <50__ >50__)

Longleaf Pine Plantations Yes:_____ No:_____ If Yes, number of acres_____

Clearcut Yes:_____ No:_____

Midstory (Species: scrub oak ___ sweetgum___ upland hardwood (red/white oak, hickory)___ other hardwood___

Height / Density: LS___ LM___ LD___; MS___ MM___ MD___; TS___ TM___ TD___)

Fuels (Rough: 1yr___ 2yr___ 3yr___ >3yr___; herbicide___)

Topography (Slope: 0-5%___ 5-10%___ 10-15%___)

FIRE WEATHER:	Preferred	Forecasted / Actual
SFC Wind / Direction	6-18 MPH	_____/_____
Air Temperature: (40˚-70˚ Winter, 60˚-85˚ Spring, 75˚-95˚ Summer)		_____/_____
Relative Humidity	20-60%	_____/_____
Mixing Height	> 1650 ft.	_____
Transport Wind	> 9 MPH	_____
Fuel Moisture	1 hr. (6.5-15%)	_____
Days Since Rain	1 – 10 Days	_____
Amount of Rain		_____

Smoke Dispersion Index (SDI): _____ Drought Index (KBDI):_____

Ozone Forecast:_____

EVALUATION (During, Post-Burn, and Day After Burn):

Date:_____

1) Time Burn Perimeter, Assets, and Hazards Checked?

During Burn:_____ ***PATROLLED BY:***_____

Action Taken:_____

_____

Post Burn:_____ ***PATROLLED BY:***_____

Burn Perimeter, Assets, and Pre-Burn / Post-Burn Hazards Protected and Secured?

Yes:_____ No:_____ If No, Additional Action Taken:_____

_____

2) Time of final Inspection (Next A.M.):_____ ***INSPECTED BY:***_____

Burn Perimeter, Assets, and Pre-Burn / Post-Burn Hazards Still Protected and Secured?

Yes:_____ No:_____ If No, Additional Action Taken:_____

3) Signs Retrieved? Yes:_____ No:_____ N/A_____ If No,

Why:_____

4) Stand Condition:

Crown Scorch: 0-25%_____ 25-50%_____ 50-75%_____ 75-100%_____

Hardwood Topkill: 0-25%_____ 25-50%_____ 50-75%_____ 75-100%_____

5) Smoke Problems / Impacts? Yes:_____ No:_____ Location:_____

_____

If Yes, Action Taken:_____

_____

6) Fire Behavior (ROS, Torching Out, Controlled, Intense, Subdued, Plume Trajectory):

Test Fire:

Rate of Spread: 1-2ch/hr_____ 2-4ch/hr_____ 4-6ch/hr_____ 6-8ch/hr_____ 8-10ch/hr_____ >10ch/hr_____

Torching Out_____ Controlled_____ Intense_____ Subdued_____

Plume Trajectory N__ S__ E__ W__ NE__ NW__ SE__ SW__

Actual Burn:

Rate of Spread: 1-2ch/hr_____ 2-4ch/hr_____ 4-6ch/hr_____ 6-8ch/hr_____ 8-10ch/hr_____ >10ch/hr_____

Torching Out_____ Controlled_____ Intense_____ Subdued_____

Plume Trajectory N__ S__ E__ W__ NE__ NW__ SE__ SW__

7) Were Objectives Met?

Fuel Reduction Yes:_____ No:_____

Hardwood Control Yes:_____ No:_____

Brownspot Control Yes:_____ No:_____

SEMP Site Yes:_____ No:_____

Site Preparation Yes:_____ No:_____

Other Yes:_____ No:_____

If Yes, Explain:_____

If No, Explain:_____

8) Erosion or Mineral Soil Exposed? Yes:_____ No:_____ (If Yes, Identify on Photo)

Location and GC:_____

9) Remarks, Problems, Adverse Impacts of Public Relations:_____

_____

_____

_____

_____

_____

10) ***FORM COMPLETED BY:***_____

DATE:_____

COORDINATION LIST – PRESCRIBED BURNING (Revised 9/16/13)

DATE_____ OZONE FORECAST_____ PM 2.5 READING_____

COMPARTMENT_____ DOVE FIELD_____ SITE PREP_____ UNDERSTORY_____

BURN CREW _____

RANGE CONTROL CONCURRENCE: YES_____ NO_____

		TIME NOTIFIED	PERSON CALLED
_____EMAIL LIST			
_____RANGE CONTROL	544-6291	_____	_____
_____PAO OFFICE	545-2237 or 706-604-0468	_____	_____
_____GFC (WAVERLY HALL)	706-582-3396	_____	_____
_____GFC (TOWER)	706-989-3662	_____	_____
_____GFC (MARION CO.)	229-649-2289	_____	_____
_____GFC (HARRIS CO.)	706-582-3996	_____	_____
_____MILITARY POLICE	545-2222 or 545-5222	_____	_____
_____MARION CO. SHERIFF	229-649-3841	_____	_____
_____COLUMBUS 911	706-653-3231	_____	_____
_____AFC (RUSSELL CO.)	334-855-3302	_____	_____
_____WEST CENTRAL GA HOSPTIAL	706-568-5226	_____	_____
_____GA DOT	706-989-3940	_____	_____
_____ASP FACILITY	544-6015 or 544-7490	_____	_____
_____UCHEE CREEK REC. AREA	545-7238 or 545-4053	_____	_____
_____LAWSON AIR FIELD Operations	545-3524	_____	_____
_____RTB (C1-C3, Q1-Q3, TODD FIELD)	544-6602 or 544-6441	_____	_____
_____CAMP DARBY	706-604-8252 or 544-2186	_____	_____
_____3RD BDE/3RD INF DIV (KELLY HILL)	544-4111	_____	_____
_____ASSIST. FIRE CHIEF FT. BENNING	706-604-9071	_____	_____
_____COLLINS TC (R1-R4, S1-S4)	544-7128	_____	_____
_____MACH (FACILITIES MGMT. BR.)	544-3632	_____	_____
_____WEAPONS POOL (BB5)	544-1307	_____	_____
_____SNIPER SCHOOL (HARMONY CHURCH)	544-6006	_____	_____
_____STAFF DUTY OFFICER	545-2218	_____	_____

GFC Fire Weather Forecast

Forestry Weather & Smoke Management Forecast
From Georgia Forestry Commission
Issued at: 630 AM EDT Thu 24 Mar 2011

District 2 (Flint)

CAUTION ITEMS
Americus, Ga ; Adel, Ga ; Byromville, Ga ; is forecast to have a Class 4 day today!
Relative Humidity is below 25% in 1ST period
Occasional Gusts in 1ST period
Relative Humidity is below 25% in 3RD period

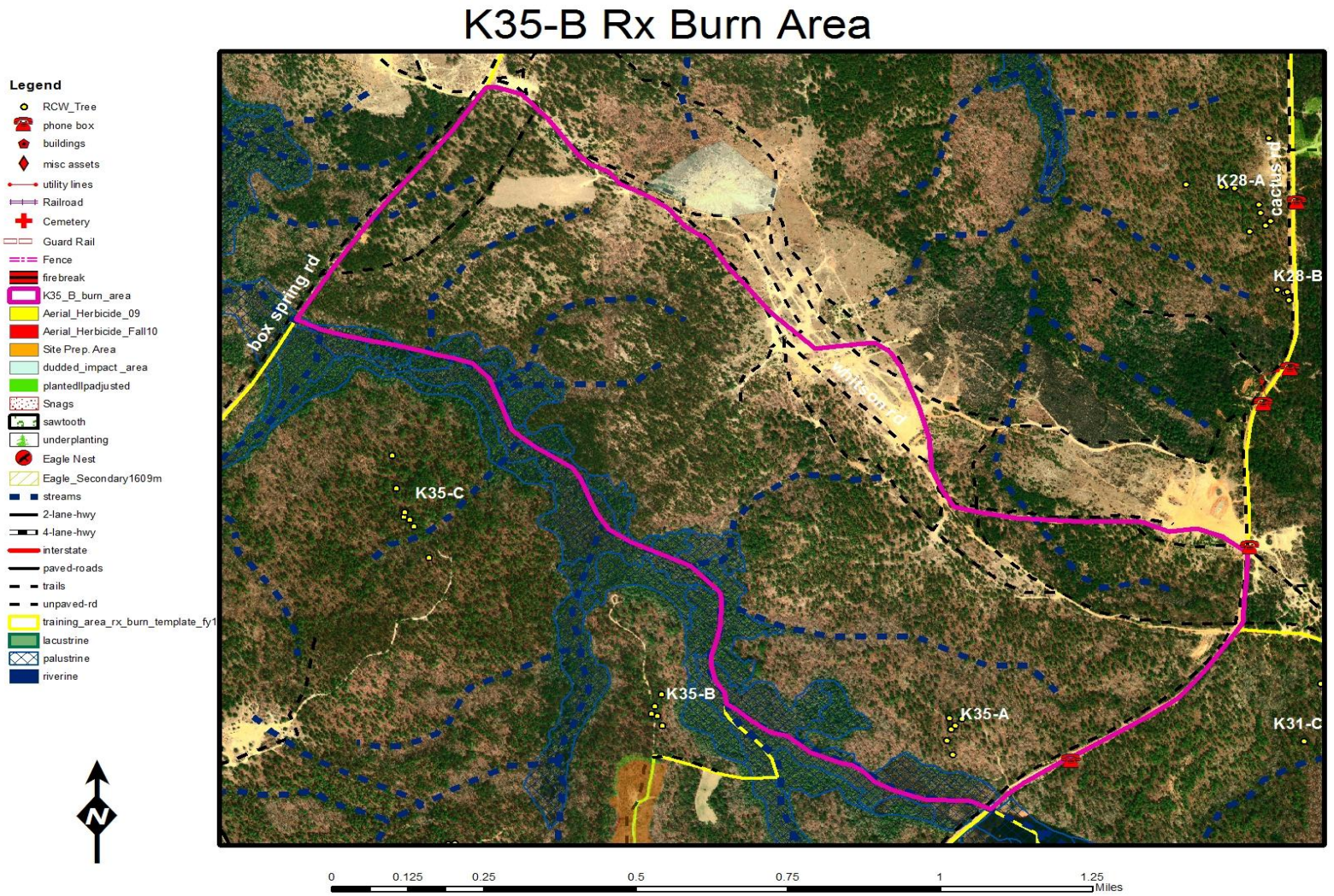
	Today	Tonight	Friday	Friday Night	Saturday
Sky Condition	Sunny	Clear	Sunny	Clear	Mostly Cloudy
Temperature	78 To 82	40 To 44	73 To 77	48 To 52	80 To 84
Relative Humidity	19 To 21	85 To 90	22 To 24	93 To 98	38 To 43
Heat Index	----	----	----	----	80 To 84
Wind Chill Temperature	----	34 To 41	----	----	----
Probability of Precipitation	None	None	None	None	40
Shower Coverage	None	None	None	None	Widly Scattered
Precipitation Type	None	None	None	None	Showers
Precipitation Amount	None	None	None	None	Trace
Precipitation Duration	None	None	None	None	1 To 3 Hours
Surface Wind (Open)	West 12-16mph Occasional Gusts	Northwest 5-8mph	West 5- 8mph	Light Variable 1- 3mph	Southwest 10- 14mph
Canopy Wind	West 8-12mph	Variable 3-6mph	Variable 3-6mph	Light Variable	Southwest 6-10mph
Smoke Dispersion Index	70(Good)	7(Poor)	67(Good)	3(Very Poor)	49(Generally Good)
Fog Potential	None	Slight	None	High	None
Low Visibility Occurrence Risk Index	1(Low)	5(Medium)	1(Low)	8(High)	1(Low)

Mixing Height	2980m 9774ft	203m 666ft	2642m 8666ft	68m 223ft	1371m 4497ft
Transport Wind Speed	10m/s 22mph	5m/s 11mph	6m/s 13mph	3m/s 7mph	8m/s 18mph
Turner & Atmosphere Tendency	4(Normal)	5(Normal)	3(Normal)	7(Subdued)	4(Normal)
Plume Trajectory	East	Southeast	East	Little Movement	Northeast
Drying Potential	Very High	Low	High	Low	High
Available Sunshine	Around 12 Hours	None	Around 12 Hours	None	Around 5 Hours

FIRE – WEATHER INFORMATION

DATE	TIME	LOCATION	WIND		TEMPERATURE		RH	REMARKS	Initial
			Speed	Direction	Dry	Wet			

Orthophoto of Burn Area



SMOKE MANAGEMENT SCREENING FORM

Step I: Direction and Distance of Possible Smoke Impact

A. Smoke Dispersion Index (SDI): _____ Category: 3___ 4___ 5___ 6___

B. (1) Burn Type: prescribed burn___ site preparation: overstory___ clearcut___

(2) Fuel Type: rough 1yr__ 2yr__ 3yr__ >3yr__; herbicide__

(3) If Prescribed burn, size of burn area >300 acres? Yes___ No___

If Site preparation, size of burn area >200 acres? Yes___ No___

(4) Firing Technique: backing__ strip-heading__ spotting__ flanking__

(5) Possible Smoke Impact Distance (Miles):

0.25__ 0.5__ 1__ 2__ 3__ 4__ 6__ 8__ 12__

C. Any smoke sensitive areas (SSA's) within 5 or 10 chains of burn? Yes*****___ No___

D. Any downwind smoke sensitive areas (SSA's)? Yes*****___ No___

E. Any down-drainage smoke sensitive areas (SSA's)? Yes*****___ No___

*** If Yes to Step I: C, D, or E identify areas on smoke screen map and go to Step II.**

Step II: Identify and List SSA's (Smoke Sensitive Areas)

A. List SSA's***** within 5 or 10 chains.

(1) _____

(2) _____

(3) _____

(4) _____

B. List SSA's***** in downwind impact area.

(1) _____

(2) _____

(3) _____

(4) _____

C. List SSA's***** in down-drainage impact area.

(1) _____

(2) _____

(3) _____

(4) _____

***If any SSA's listed in Step II: A, B, or C above, continue screening system.**

Step III: Actions Taken or Changes Made to Eliminate, Minimize, and Mitigate Smoke Problems:

A. SSA's adjacent to or within 5 or 10 chains? Yes___ No___
If yes, what action was taken or changes made to eliminate, minimize, and mitigate a smoke problem? _____
_____

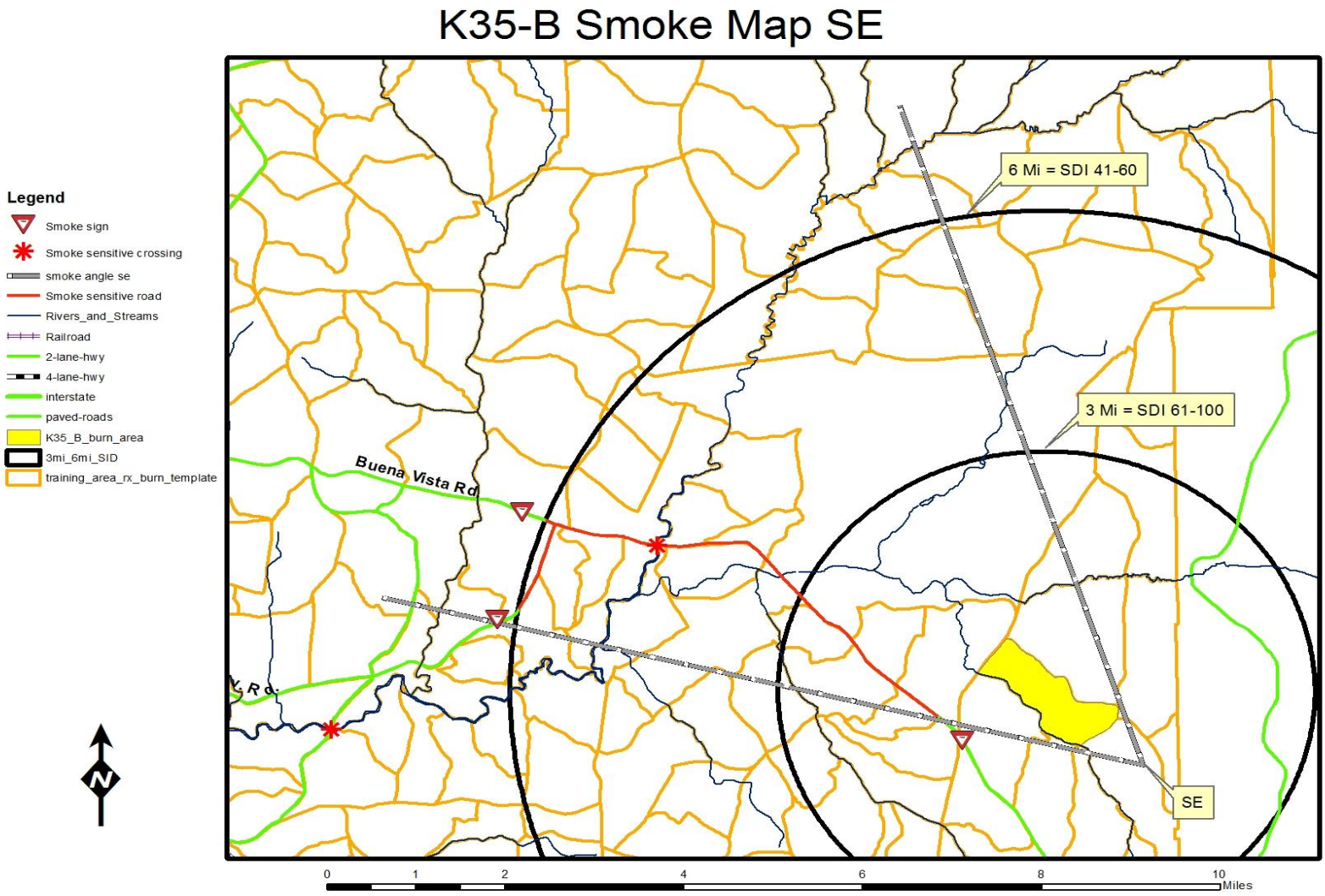
B. SSA's in downwind impact area? Yes___ No___
If yes, what action was taken or changes made to eliminate, minimize, and mitigate a smoke problem? _____
_____

C. SSA's in down-drainage impact area? Yes___ No___
If yes, what action was taken or changes made to eliminate, minimize, and mitigate a smoke problem? _____
_____

Step V: Interpreting Results

Were there any other actions taken or changes made in the prescription to eliminate, minimize, and mitigate a smoke problem? _____
_____
_____
_____
_____
_____
_____
_____
_____

Smoke Screening Impact Map



APPENDIX B3 WILDFIRE MANAGEMENT PROGRAM

B.3.1 Wildfire Suppression and Detection

Wildfire Detection Procedures

- Obtain the GFC fire danger rating for Fort Benning from http://weather.gfc.state.ga.us/. The fire danger rating will determine the level of fire detection and suppression readiness needed (see Appendix B-2.
- Conduct periodic "spot checks" from the main fire tower during regular work hours on Class 1 and 2 days.
- Man the main fire tower from 1200-1600 hours during the regular workweek and, if needed, on weekends and holidays during Class 3 days.
- Man the main fire tower from 1200-1600 hours during all Class 4 and 5 days (including weekends and holidays).
- Maintain communication with Range Control and GFC Chattahoochee County fire tower during fire detection activities.
- Complete the fire detection log in the main fire tower.

Wildfire Suppression Procedures

Routine Procedures

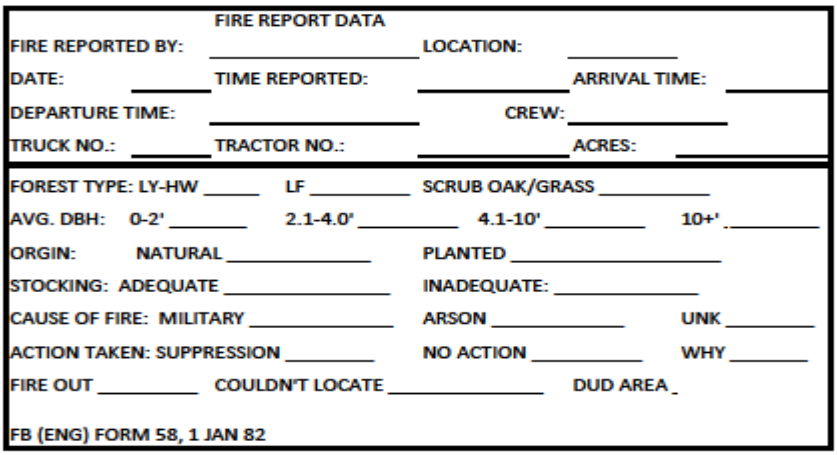
- Inspect fire suppression equipment on a daily basis and address defects as soon as possible.
- Operation of heavy fire suppression equipment may be conducted only by certified/licensed technicians or operators.
- The fire crew is the primary fire crew listed on the fire roster for any given week. Fire crews are rotated weekly.
- All Land Management Branch and Conservation Branch personnel must be on alert for fire suppression activities on all fire class days, especially on Class 4 and 5 days.
- Contact Range Control when the fire danger rating is Class 4 or 5, so they can notify training units to suspend the use of incendiary devices.

Fire Response Procedures

- If possible and manpower is available, respond to a wildfire with no less than two persons outfitted with appropriate suppression equipment.
- Response to a wildfire by personnel “on call” must be within 45 minutes of notification after work hours (including weekends and holidays). Notify an RCW biologist or technician as soon as possible if a wildfire may potentially burn through a cluster, so the decision can be made to either suppress the fire or protect cavity trees and let the fire burn.
- Contact the Fort Benning Fire Department for assistance with wildfire suppression in cantonment areas.
- Alert motorists of possible smoke presence in cantonment areas by posting warning signs with flashing lights along roads.
- The Land Management Branch representative is the fire incident boss.
- Identify hazardous conditions and sites (gullies, steep slopes, wet and boggy areas) by conducting thorough reconnaissance of wildfires before suppression.
- Do not enter training range areas to suppress wildfires until Range Control places the training unit on check fire first.
- Follow procedures as outlined in the “Ten Standard Fire Fighting Orders” (see Chapter 5.6).
- Let wildfires burn (i.e., no suppression but treat as a prescribed burn) if fire weather conditions are within the required parameters, wildfires are contained by appropriate boundaries (scraped roads, creeks, wet drains, already established fire breaks), and they do not jeopardize fire intolerant ecologically unique areas (unless it is a low intensity fire causing minimal damage), civilian or military assets on and off post (equipment, buildings, and structures), military and civilian personnel (hunters and contractors), and smoke-sensitive areas (roads, highways, housing areas, hospitals, Lawson Army Airfield, etc.) .
- “Let Burn” decisions are to be made only by personnel with knowledge of fire weather conditions, fire behavior, boundaries suitable for containment, location of environmentally sensitive areas, civilian/military assets, civilian/military personnel, smoke-sensitive areas, and stands with marked timber.
- Let wildfires in DUD areas burn, while monitoring perimeter for a potential spot over.
- Contain wildfires in DUD areas by scraping existing roads or re-plowing firebreaks that surround them.
- Contact Explosive Ordnance Disposal (EOD) if unexploded ordnance is found on or off training ranges and outside DUD areas while suppressing a fire.

- Burn fuels surrounding RCW cavity trees as a protective measure if the decision is made to allow a wildfire to burn through a cluster (see Prescribed Burning SOP in Attachment 5.4.1).
- Do not place firebreaks within an RCW cluster except in emergency situations (such as protecting a nest tree from imminent ignition), while maintaining a 50-foot distance from cavity trees if possible.
- Extinguish fuels that may potentially spot over control lines and minimize smoke hazards along the fire perimeter by extinguishing smoldering fuels such as snags, stumps and cat-faces
- Contact the Columbus Fire Department and/or GFC if a wildfire burns across the Installation boundary onto private land. Assist city, county, and state firefighters in fire suppression on such fires.
- Document all wildfires on fire cards, GIS map, and master fire map and wildfire summary database.
- Notify military police and EMD Chief of property damaged by wildfires.
- Notify Range Control of incendiary device use during Class 4 and 5 days.
- Notify Range Control and/or the USFWS when training fires occur in or damage cavity trees in RCW clusters.

Figure B.3.1 Fort Benning Fire Card for Wildfire Reporting



FIRE REPORT DATA

FIRE REPORTED BY: _____ LOCATION: _____

DATE: _____ TIME REPORTED: _____ ARRIVAL TIME: _____

DEPARTURE TIME: _____ CREW: _____

TRUCK NO.: _____ TRACTOR NO.: _____ ACRES: _____

FOREST TYPE: LY-HW _____ LF _____ SCRUB OAK/GRASS _____

AVG. DBH: 0-2' _____ 2.1-4.0' _____ 4.1-10' _____ 10+' _____

ORGIN: NATURAL _____ PLANTED _____

STOCKING: ADEQUATE _____ INADEQUATE: _____

CAUSE OF FIRE: MILITARY _____ ARSON _____ UNK _____

ACTION TAKEN: SUPPRESSION _____ NO ACTION _____ WHY _____

FIRE OUT _____ COULDN'T LOCATE _____ DUD AREA _

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APPENDIX B4 GAME AND SPORT FISH MANAGEMENT PROGRAM

Table B.4.1 Game Species Occurring on Fort Benning.

Birds	Fish
Eastern wild turkey (*Meleagris gallopavo*)	largemouth bass (*Micropterus salmoides*)
Northern bobwhite quail (*Colinus virginianus*)	spotted bass (*Micropterus punctulatus*)
mourning dove (*Zenaida macroura*)	shoal bass (*Micropterus* sp.cf. *Poecilurum*)
Wilson's snipe (*Gallinago gallinago*)	bluegill (*Lepomis macrochirus*)
American woodcock (*Scolopax minor*)	redear (shellcracker) (*Lepomis microlophis*)
Canada goose (*Branta canadensis*)	redbreast (*Lepomis auritus*)
wood duck (*Aix sponsa*)	green sunfish (*Lepomis cyanellus*)
mallard (*Anas platyrhynchos*)	spotted sunfish (*Lepomis punctatus*)
American black duck (*Anas rubripes*)	flier sunfish (Centrarchus macropterus)
green-winged teal (*Anas crecca*)	longear sunfish (Lepomis megalotis)
blue-winged teal (*Anas discors*)	dollar sunfish (Lepomis marginatus)
American ring-necked duck (*Aythya collaris*)	yellow perch (Perca flavescens)
lesser scaup (*Aythya affinins*)	white bass (Morone chrysops)
bufflehead (*Bucephala albeola*)	hybrid white bass (Morone chrysops x saxatilis)
American wigeon (*Anas americana*)	chain pickerel (Esox niger)
gadwall (*Anas strepara*)	warmouth (Lepomis gulosus)
Northern shoveler (*Anas clypeata*)	black crappie (Pomoxis nigromaculatus)
redhead (*Aythya americana*)	white crappie (Pomoxis annularis)
canvasback (*Aythya valisineria*)	spotted bullhead (Ameiurus serracanthus)
hooded merganser (*Lophodytes cucullatus*)	white catfish (Ameiurus catus)
Northern pintail (*Anas acuta*)	yellow bullhead (Ameiurus natalis)
	brown bullhead (Ameiurus nebulosus)
	channel catfish (Ictalurus punctatus)
Mammals	
white-tailed or Virginia deer (*Odocoileus virginianus*)	bobcat (Lynx rufus)
Eastern cottontail rabbit (*Sylvilagus floridanus*)	gray fox (Urocyon cinereoargenteus)
swamp rabbit (*Sylvilagus aquaticus*)	red fox (Vulpes fulva)
fox squirrel (*Sciurus niger*)	Virginia opossum (Didelphis virginiana)
gray squirrel (Sciurus carolinensis)	raccoon (Procyon lotor)

Table B.4.2 Fort Benning Wildlife Openings/Dove Fields

Number	Opening	Grid Coordinate	Acres	Remarks
1.	D2-1	117906	0	Removed for range construction
2.	D2-2	129893	0	Removed for range construction
3.	D2-3	130893	2.1	

Number	Opening	Grid Coordinate	Acres	Remarks
4.	D2-4	123913	2.2	
5.	D3	134893	1.9	
6.	D5	148876	1.5	
7.	D6	153862	3.4	
8.	D12	102866	2.3	
9.	D13-1	103887	0	Removed for range construction
10.	D13-2	107885	0	Removed for range construction
11.	D13-3	104881	0	Removed for range construction
12.	E4-1	106846	0.4	
13.	E4-2	106846	1.4	
14.	E6	118815	1.7	
15.	E7	073817	1.2	
16.	F2-1	174859	0.6	
17.	F2-2	174855	1.8	
18.	I-5	146803	3.2	
19.	J2	037865	2.2	
20.	J4-1	060884	3.6	
21.	J4-2	062885	1.3	
22.	K16	111936	2.8	
23.	K20	193864	1.4	
24.	K21	176882	1.3	
25.	K23	137907	0	Removed for range construction
26.	L1	080916	0.6	
27.	M2	074925	1.7	
28.	M7	021949	2.4	
29.	M8-1	028956	1.4	
30.	M8-2	035954	1.7	
31.	M8-3	033942	4.8	
32.	O5-1	062996	2.0	
33.	O5-2	063997	1.3	
34	O7	097000	1.9	
35.	O8-1	094993	0.7	
36.	O8-2	101995	1.6	
37.	O8-3	097994	1.1	
38.	O10	079957	1.0	
39.	O11	075968	0.8	
40.	O12	105922	2.0	
41.	O13	081933	4.6	
42.	R2	028846	1.4	
43.	T3	056865	2.2	
44.	T4-1	086863	1.6	
45.	T4-2	093860	1.2	
46.	T4-3	094860	1.7	

Table B.4.2 Fort Benning Wildlife Openings/Dove Fields (cont.)

Number	Opening	Grid Coordinate	Acres	Remarks
47.	W2-1	889769	2.9	
48.	W2-2	898768	1.7	
49.	Z3	948714	5.0	
50.	Z4-1	968718	4.3	
51.	Z4-2	968716	1.3	
1.	A15	021769	13.1	Yankee Road Dove Field
2.	D11	112853	8.0	J. Rocket Dove Field
3.	P1	993858	19.0	Landfill 13 Dove Field
4.	T11	072853	11.8	General's Dove Field
5.	G1		9.0	Ledo North Dove Field
6.	W4	892755	39.8	Dog Trial Dove Field
7.	X2		15.2	Dekar Strip Dove Field
8.	X4	922699	15.8	Magnolia Dove Field
	TOTAL		**202.5**	

Table B.4.3 Plant Species Approved for Planting in Wildlife Openings at Fort Benning

Scientific Name	Common Name
Native Species	
Cyperus esculentus	Chufa flatsedge
Cassia fasciculata	Partridge pea
Non-Native Species	
Avena sativa	Oats
Glycine max	Soybeans
Echinochloa frumentacea	Japanese millet
Helianthus annuus	Sunflower
Lotus spp.	Bird's-foot trefoil
Panicum milaceum	Dove Proso millet
Pennisetum glaucum	Pearl millet
Quercus acutissima	Sawtooth oak[1]
Secale cereale	Rye
Sesamum orientale	Sesame
Sorghum bicolor	Grain sorghum
Trifolium incarnatum	Crimson clover
Trifolium pratense	Red clover
Trifolium repens	White clover
Trifolium repens hybrid	Oseola Ladino clover
Triticum aestivum	Wheat

Urochloa ramosa (= *Brachiaria ramosa*; = *Panicum ramosum*)	Brown-top millet, Dixie signalgrass
Vigna unguiculata	Cowpeas
Zea mays hybrid	Dwarf corn
Zea mays hybrid	Tropical corn

[1]Approved for planting to replace dead or dying trees only in areas previously planted. No new areas will be planted with this species.

Table B.4.4 Fort Benning Fish Ponds

Number	Name of Pond	Surface Area Acres	Management Code	Location Road	Grid Coordinates
1.	Kings Pond	72.2	1	Hourglass Rd	0682
2.	Weems	40.0	2	Jamestown Rd	0376
3.	Twilight	25.9	1	1st Division Rd	9984
4.	Victory	41.9	2	8th Division Rd	0382
5.	Hedley's	8.0	1	10th Armor Rd	0398
6.	Schley	17.0	3	Red Diamond Rd	1681
7.	Snelling's	9.0	3	Shamanski Rd	1394
8.	Averett's	20.0	3	Americo Tr	1396
9.	Kirk's	2.0	3	Wildcat Rd	0089
10.	Clear Creek	10.0	3	Pine Tree Rd	0684
11.	Sand Hill Duck Pond	2.0	3	ITB HQ	9888
12.	Russ Pond	2.0	1	10th Mt Div Rd	9183
13.	Russ Pool	2.0	1	10th Mt Div Rd	9183
14.	Upper King's	1.0	3	Hour Glass Rd	0883
		TOTAL 253			

[1] Management code designations are: 1 = intensive management—fertilize, lime, weed control, stock; check dam and water control structure monthly; 2 = moderate management—stock and/or weed control; check dam and water control structure monthly; 3 = little or no management—check dam and water control structure monthly.

Table B.4.5 Game and Sport Fish Program Five-Year Budget Plan

Fiscal Year	Labor [1]	Equipment/ Maintenance	Supplies	Contracts	Other[2]	Total
2014	0K	25K	17K	30K	4K	76K
2015	0K	15K	25K	35K	4K	79K
2016	0K	8K	18K	60K	4K	90K
2017	0K	30K	16K	40K	4K	90K
2018	0K	19K	17K	50K	4K	90K

[1] Salary for one contract technician equivalent to 1.0 CME

[2] Includes printing costs for hunting and fishing regulations and circular

Table B.4.6 Fiscal Year 2014–2018 Cyclic/Sporadic/One-time Activities

Fiscal Year	Activity	Location	Timing
2014	Lime Dove Fields (Contract)	All Designated Dove Fields	November-March
2015	Lime Wildlife Openings (Contract)	Post Wide	November-March
2016	Stock Threadfin Shad, Bluegill and Catfish (Contract)	Ponds where deemed appropriate	Spring-Summer
2017	Lime Fish Ponds (Contract)	Kings, Twilight and Headleys	November-December
2018	Lime Dove Fields and Widlife Openings (Contract)	Post Wide	November-March

Table B.4.7 Fiscal Year 2014–2018 Annual Activities

Activity	Location	Timing
Operate deer check stations	Building 5884/ Uchee Creek	October-January
Stock/Feed Russ Pool and Pond	Russ Pool/Pond	October-June
Compile harvest data		Sept-May
Conduct deer/swine track counts	10, 1-mile routes	August-September
Fertilize and mow edges of ponds	Twilight, King's, Hedley's	March-August
Conduct turkey/quail surveys	Post Wide	May-September
Support children's/family fishing events	Russ Pool/ Pond	April-August
Conduct quail call count surveys	5, 1-mile routes	May-June
Plant/Manage dove fields	Post Wide	April-September
Feral Swine Camera Surveys	Post Wide	August & February
Conduct annual advisory council open meeting		August
Edit MCoE Regulation 200-3 and process Decision Paper		June-August
Print circular and regulations	Printing Plant	August
Plant/Manage Wildlife openings	Post Wide	March-November
Review burn prescriptions		November-January
Review timber mgt. prescriptions		As Needed
Miscellaneous planning, order/replace signage, conduct creel census, public information campaigns, and other management		As Needed

APPENDIX B5 PEST MANAGEMENT PROGRAM: NATURAL RESOURCES COMPONENT

B.5.1 INVASIVE PLANT RANKING CRITERIA

As discussed in Section 5.7.3.1.2, there are a number of different criteria used to identify and categorize invasive plant rankings in Georgia and Alabama. Undesirable plant species management at Fort Benning is prioritized based on rankings developed by the Georgia Natural Heritage Program, the Georgia Exotic Pest Plant Council (EPPC) , and the Alabama Invasive Plant Council of 2007 (AIPC). Below is an explanation summation of these ranking criteria.

Georgia Natural Heritage Program
Dr. Jim Allison of the Georgia Natural Heritage Program developed a "working" list of non-native species that is specific to the Fort Benning environs. Dr. Allison defined four categories of invasiveness:

Category 1 Highly Invasive: Plants whose invasive qualities are pronounced and well documented. They have the potential to severely impact a variety of native plant communities.

Category 2 Moderately Invasive: Plants that usually exhibit a lesser degree of aggressiveness or seem not to invade the prevalent natural communities of the region. They may be highly disruptive, however, in certain specialized natural communities, especially in those that are naturally open such as rock outcrops (e.g., *Lespedeza cuneata*) or xeric sand ridges (e.g., *Eragrostis curvula*).

Category 3 Slightly Invasive: Plants that tend to occur in disturbed habitats. They include some of the common weeds of gardens, lawns, roadsides, and so on, that are artificially maintained in an early successional stage. These plants may invade natural communities when these are disturbed, but they seem not to persist for long in the absence of disturbance.

Category 4 Seemingly Innocuous: Plants that seem not to spread significantly from areas where they have been planted.

Georgia Exotic Pest Plant Council Rankings
Category 1 - Exotic plant that is a serious problem in Georgia natural areas by extensively invading native plant communities and displacing native species.

Category 1 Alert - Exotic plant that is a not yet a serious problem in Georgia natural areas, but that has significant potential to become a serious problem.

Category 2 - Exotic plant that is a moderate problem in Georgia natural areas through invading native plant communities and displacing native species, but to a lesser degree than category 1 species.

Category 3 - Exotic plant that is a minor problem in Georgia natural areas, or is not yet known to be a problem in Georgia but is known to be a problem in adjacent states.

Category 4 - Exotic plant that is naturalized in Georgia but generally does not pose a problem in Georgia natural areas or a potentially invasive plant in need of additional information to determine its true status.

Alabama Invasive Plant Council

Category 1:

1) The plant species is non-native to Alabama.
2) The plant has the potential for rapid growth, high seed or propagule production and dissemination, and establishment in natural communities or in managed areas where it is not desired.
3) The plant persists in free living infestations (without cultivation).
4) The plant is widespread in Alabama or at least common in a region or habitat type(s) in the state.
5) It occurs in dense stands of numerous individuals in minimally managed areas or in managed areas where it is not desired.
6) It is able to out-compete other species in the plant community, thereby impacting native plant biodiversity and/or ecosystem function.

Category 2:

7) The plant meets criteria 1-3.
8) It occurs in scattered and localized infestations within habitat or land use types across the state.
9) It occurs as scattered individuals within a habitat or land use type.

Watch list A:

10) The plant meets criteria 1-3.
11) The plant has recently appeared as free living populations in Alabama, or
12) It is invasive in nearby states but its status in Alabama is unknown or unclear, and/or
13) It has the potential, based on its biology and its colonization history in the Southeast and elsewhere, to become highly invasive in Alabama.

Watch list B:

14) The plant meets criteria 1-2.
15) The species is planted in Alabama.
16) The plant has a documented history of invasiveness in other areas of the Southeast and/or is listed by the Global Invasive Species Program as a world-class invasive plant for habitats similar to the Southeast.

Table B.5.1 Fort Benning Invasive Plant Rankings

Scientific Name	Common Name	Invasiveness Ranking			
		Allison Ranking	Federal Designation	Georgia EPPC Ranking	Alabama AIPC Ranking
Aira elegans	Hairgrass	2			
Albizia julibrissin	Mimosa, silk tree	2		1	2
Alternanthera philoxeroides	Alligator weed	1		1	1
Arthraxon hispidus	Small carpgrass, hairy jointgrass	1		1 Alert	
Arundo donax	Giant reed, elephant grass	2		3	2
Bothriochloa laguroides torreyana	Silver beardgrass	2			
Bulbostylis barbata	Watergrass	2			
Bromus catharticus	Rescue grass, bromegrass	3			
Bromus commutatus	Meadow brome, bromegrass	3			
Bromus japonicus	Japanese brome(grass)	3			
Clematis terniflora	Sweet autumn virginsbower, leather clematis	2		3	2
Colocasia esculenta	Coco yam, wild taro	2		3	2
Cuphea carthagenesis	Columbia waxweed	2			
Cyperus iria	Rice-field flatsedge	2			
Eichornia crassipes	Water hyacinth	?		1	1
Elaeagnus pungens	Thorny olive, Russian olive,	2		2	2

Scientific Name	Common Name	Invasiviness Ranking			
		Allison Ranking	Federal Designation	Georgia EPPC Ranking	Alabama AIPC Ranking
	thorny elaeagnus				
Eragrostis curvula	Weeping lovegrass	2		3	
Eragrostis secundiflora oxylepis	Red lovegrass	2			
Hedeoma hispida	Rough false pennyroyal	2			
Heterotheca subaxillaris	Camphorweed	2			
Hypochaeris glabra	Smooth cat's ear	2			
Hyptis mutabilis	Tropical bushmint	2			
Iva annua var. *annua*	Annual marshelder	2			
Lespedeza bicolor	Bicolor lespedeza	2		1	
Lespedeza cuneata	Sericea lespedeza	2		1	
Ligustrum sinense	Chinese privet, hedge privet, privet	1		1	1
Lolium arundinaceum (= *Festuca arundinacea*; = *F. elatior*)	Tall fescue	2			
Lonicera japonica	Japanese honeysuckle	1		1	1
Lygodium japonicum	Japanese climbing fern	2		1	1
Macrothelypteris torresiana	Mariana maiden-fern	2			
Melia azedarach	Chinaberry	2		1	2
Melilotus alba	White sweet-clover	2		3	
Microstegium vimineum	Nepalese browntop, Nepalgrass, Japanese grass	1		1	1
Myriophyllum	Watermilfoil,	2		2	1

Scientific Name	Common Name	Invasiveness Ranking			
		Allison Ranking	Federal Designation	Georgia EPPC Ranking	Alabama AIPC Ranking
aquaticum	Brazilian parrotfeather				
Murdannia keisak	Asian spiderwort, marsh dewflower	1		1	2
Paspalum dilatatum	Dallis grass	2			
Paspalum notatum	Bahia grass	2		2	
Phyllostachys aurea	Golden bamboo	1		2	
Plantago aristata	Large-bracted plantain	2			
Poa annua	Annual bluegrass	2		3	
Polygonum cespitosum	Oriental lady's-thumb	2			
Polygonum perisicaria	Spotted lady's-thumb	2			
Prunus caroliniana	Carolina laurelcherry	2			
Pueraria lobata (= *montana*)	Kudzu	1	Noxious	1	1
Senna occidentalis	Septicweed, coffee senna	3			
Sesbania punicea	Rattlebush, purple sesban	1		2	
Setaria pumila (= *glauca*)	Yellow bristlegrass, smooth millet	2		4	
Sida spinosa	Prickly fanpetals	2			
Solanum dimidiatum	Western horsenettle	2			
Sorghum halepense	Johnson grass	2		3	
Stachys floridana	Florida hedgenettle	2		3	
Teesdalia nudicaulis	Barestem teesdalia	2			
Triadica sebifera (= *Sapium sebiferum*)	Chinese tallowtree, popcorn tree	1		1	1

Scientific Name	Common Name	Invasiviness Ranking			
		Allison Ranking	Federal Designation	Georgia EPPC Ranking	Alabama AIPC Ranking
Verbascum thapsus	Common mullein, wooly mullein	3		4	
Verbena bonariensis	Tall vervain	2		4	
Verbena brasiliensis	Brazilian vervain	2			
Verbena rigida	Spreading vervain	2			
Vinca major	Large periwinkle	2		2	
Wisteria sinensis[2]	Chinese wisteria	1		1	1

Table B.5.2 Undesirable Plants Potentially Present at or at Risk to be Introduced to Fort Benning

Scientific Name	Common Name	Invasiviness Ranking			
		Allison Ranking	Federal Designation	Georgia EPPC Ranking	Alabama AIPC Ranking
Ailanthus altissima	Tree of heaven	2		1	1
Cardus nutans	Musk thistle, nodding thistle	2		3	1
Dioscorea oppositifolia (= *batatas*)	Cinnamon vine, Chinese yam, air-potato	1			1
Egeria densa	Brazilian elodea	1		2	
Elaeagnus umbellata	Autumn olive, silverberry	1		1	1
Glottidium vesicarium (= *Sesbania vesicaria*)	Bladder-pod	2			
Hedera helix	English ivy	2		1	1
Hydrilla verticillata	Hydrilla, water-thyme	1	Noxious	1	1
Imperata cylindrica	Cogongrass	1	Noxious	1 Alert	1
Marsilea quadrifolia	Eurasian water-clover	1			

Myriophyllum spicatum	Eurasian water-milfoil	2			1
Najas minor	Water nymph	1		4	
Panicum repens	Torpedo grass	1		3	2
Paulownia tomentosa	Princess tree, empress tree	2		1	2
Rosa multiflora	Multiflora rose	1		1	1
Salvinia molesta	Giant salvinia	1	Noxious	1 Alert	1
Sesbania herbacea (= *macrocarpa*)	Bigpod sesbania	2		2	

Table B.5.3 Invasive Plant Species that are a Focus for Management at Fort Benning: The Least Wanted

Scientific Name	Common Name	Management Priority	Remarks
Known Present			
Albizia julibrissin	Mimosa	LOW	Ubiquitous across the landscape; localized control implemented when posing a risk to listed species
Eleagnus umbellata	Autumn olive	LOW	Found on the Installation. Ubiquitous along the Chattahoochee upriver.
Imperata cylindrica	Cogongrass	HIGH	Currently present on the Installation.
Lespedeza bicolor	Bicolor lespedeza	LOW	Ubiquitous across the landscape; localized control implemented when posing a risk to listed species
Ligustrum sinense	Chinese privet, hedge privet, privet	MED	Concentrated around disturbed sites but occurs across the installation. Localized control implemented when posing a risk to listed species
Lonicera japonica	Japanese honeysuckle	MED	Ubiquitous across the landscape; localized control implemented when posing a risk to listed species
Melia azedarach	Chinaberry	LOW	Common in disturbed areas of the Installation.
Microstegium vimineum	Nepal grass	MED	Not present on the Installation.
Pueraria lobata (= *montana*)	kudzu	High	Focused containment strategy.
Triadica sebifera (= *Sapium sebiferum*)	Chinese tallowtree, popcorn tree	High	Several populations within Chattahoochee backwaters area; early eradication of these populations is essential

Wisteria sinensis	Chinese wisteria	LOW	Found across the Installation. Common in areas which were once home sites prior to military occupation.
Potentially Present or at Risk to be Introduced			
Dioscorea oppositifolia (= *batatas*)	Cinnamon vine, Chinese yam, air-potato	TBD	
Egeria densa	Brazilian elodea	TBD	Aquatic submerged
Elaeagnus umbellata	Autumn olive, silverberry	TBD	
Hydrilla verticillata	Hydrilla, water-thyme	TBD	Aquatic submerged
Marsilea quadrifolia	Eurasian water-clover	TBD	Aquatic emergent
Najas minor	Water nymph	TBD	Aquatic submerged
Panicum repens	Torpedo grass	TBD	
Rosa multiflora	Multiflora rose	TBD	
Salvinia molesta	Giant salvinia	High	Aquatic floating; observed near Fort Benning in Russell County, Alabama

Table B.5.4 Plant Species Approved for Use by the Natural Resources Conservation Service at Fort Benning

Scientific Name	Common Name
Native Species	
Panicum virgatum	Switchgrass
Pinus palustris	Longleaf pine
Pinus taeda	(Improved) loblolly pine
Schizachyrium scoparium scoparium (= *Andropogon scoparius*)	Little bluestem
Salix nigra	Black willow (cuttings)
Sorghastrum elliottii	Slender Indiangrass
Non-Native Species	
Cynodon dactylon	Common Bermudagrass
Cynodon dactylon hybrid	Tifton 44 Bermudagrass
Eremochloa ophiuroides	Centipede grass
Lespedeza cuneata	Sericea lespedeza[1]
Lolium arundinaceum (= *Festuca arundinacea*; = *F. elatior*)	Tall fescue[1]
Lolium temulentum	Annual ryegrass
Paspalum notatum	Bahia grass[1]
Secale cereale hybrid	Wren rye Abruzzie

Trifolium incarnatum	Crimson clover
Trifolium repens hybrid	Oseola Ladino clover
Urochloa ramosa (= *Brachiaria ramosa*; = *Panicum ramosum*)	Brown-top millet, Dixie signalgrass

[1]The use of these species will be phased out pending the identification and availability of suitable replacement species (either native or non-invasive non-native species).

Table B.5.5 Plant Species Approved for Use in Landscaping Projects at Fort Benning

Scientific Name	Common Name
Trees	
Acer negundo	Box elder
Acer rubrum	Red maple
Acer saccharum	Sugar maple[1]
Aesculus pavia	Red buckeye
Betula nigra	River birch
Carya illinoenis	Pecan
Celtis laevigata	Sugarberry
Celtis occidentalis	Hackberry
Cercis canadensis	Redbud
Cornus florida	Dogwood
Crataegus marshallii	Hawthorn
Diospyros virginiana	Persimmon
Gingko biloba	Gingko[1]
Ilex decidua	Possumhaw
Ilex opaca	American holly
Juniperus virginiana	Eastern red cedar
Liquidambar styraciflua	Sweet gum
Liriodendron tulipifera	Tulip tree
Magnolia grandiflora	Magnolia
Magnolia soulangeana	Saucer magnolia
Malus floribunda	Crabapple
Nyssa sylvatica	Black gum
Oxydendrum arboreum	Sourwood
Pinus palustris	Longleaf pine
Pinus taeda	Loblolly pine
Platanus occidentalis	Sycamore
Prunus serotina	Black cherry
Quercus alba	White oak
Quercus coccinea	Scarlet oak

Scientific Name	Common Name
Trees	
Quercus falcata	Southern red oak
Quercus nigra	Water oak
Quercus palustris	Pin oak
Quercus phellos	Willow oak
Quercus stellata	Post oak
Quercus virginiana	Live oak[1]
Sassafras albidum	Sassafras
Salix nigra	Black willow
Zelkova serrata	Zelkova[1]
Shrubs	
Abelia spp.	Abelia[1]
Azalea spp.	Azalea[2]
Berberis spp.	Barberry[1]
Buxus sempervirens	Boxwood[1]
Chaenomeles japonica	Quince[1]
Cleyera japonica	Cleyera[1]
Cotoneaster spp.	Rockspray[1]
Deutzia gracilis	Slender deutzia[1]
Forsythia spp.	Golden bells[1]
Ilex cornuta burfordi	Burford holly[1]
Ilex cornuta rotunda	Chinese holly[1]
Ilex crenata convexa	Japanese holly[1]
Ilex crenata helleri	Helleri holly[1]
Ilex crenata microphylla	Japanese holly[1]
Ilex vomitoria nana	Yaupon holly
Juniperus spp.	Juniper[1]
Mahonia bealei	Leatherleaf mahonia[1]
Philadelphus virginalis	Mock orange[1]
Prunus laurocerasus	English laurel[1]
Pyracantha spp.	Pyracantha[1]
Santolina chamaecyparissus	Gray santolina[1]
Viburnum spp.	Viburnum[2]
Weigela florida	Weigelia[1]
Cortaderia selloana	Pampas grass[1]
Hypericum patulum	St. John's wort[1]
Myrica pensylvanica	Bayberry[1]
Photinia glabra	Red tip[1]
Yucca filamentosa	Adam's needle[1]
Groundcover Species	
Ajuga replans	Carpel bugle[1]
Cotoneaster spp.	Coloneaster[1]
Gelsemium sempervirens	Carolina jessamine
Hemerocallis spp.	Daylily[1]
Hypericum calycinum	Aaronsbeard[1]

Scientific Name	Common Name
Trees	
Liriope spp.	Monkey grass[1]
Ophlopogon japonicum	Mondo grass[1]
Phlox sublata	Thrilt[1]
Ampelopsis brevipeduncalata	Ampelopsis[1]
Campsis radicans	Trumpet creeper
Clematis spp.	Clematis
Vitis spp.	Grape
Rosa hybrida	Climbing rose[1]
Parthenocissus quinquefolia	Virginia creeper
Passiflora incarnata	Passion flower
Polygonum auberti	Silvervine[1]
Rosa banksiae	Banks rose*
Axonopus affinis	Carpet grass[1]
Cynodon dactylon	Common Bermudagrass[1]
Lolium perenne var. *aristatum* (= *L. multiflorum*; = *L. perenne* ssp. *multiflorum*)	Italian ryegrass[1]

[1]Non-native.
[2]Includes at least one or more species that are native.

Table B.5.6 Undesirable Aquatic Plants Either Already Present at, or at Risk to be Introduced to Fort Benning

Scientific Name	Common Name	Remarks
Native Species		
Nelumbo lutea	American lotus	Reduces the amount of open water available for fishing in designated fish ponds.
Nymphaea odorata	White water-lily	Reduces the amount of open water available for fishing in designated fish ponds.
Zizaniopsis miliacea	Giant cut grass	Forms dense mats in Chattahoochee River backwater areas reducing their use by waterfowl and listed species.
Non-Native Species		
Alternanthera philoxeroides	Alligator weed	Can form dense mats in backwater areas and ponds.
Egeria densa	Brazilian elodea	
Eichornia crassipes	Water hyacinth	Observed by Corps in Chattahoochee River backwater areas during 1997; First major infestations of the Chattahoochee River backwater areas on Fort Benning in the summer of 2009. By 2011 there were large mats of it floating in all of the back waters areas of River Bend.
Hydrilla verticillata	Hydrilla, water-thyme	

Marsilea quadrifolia	Eurasian water-clover	
Najas minor	Water nymph	
Salvinia molesta	Giant Salvinia	Highly invasive; not yet found at Fort Benning, but documented in Russell County, Alabama.

Table B.5.7 Undesirable Non-Native Animal Species Present or at Risk to be Introduced to Fort Benning

Scientific Name	Common Name
Canis latrans	Coyote
Columbia livia	Rock dove, pigeon
Cyprinus carpio	Common carp
Dasypus novemcinctus	Armadillo
Dreissena polymorpha	Zebra mussel[1]
Passer domesticus	House sparrow
Pylodictis olivaris	Flathead catfish[1]
Sturnus vulgaris	European starling
Sus scrofa	Feral swine, wild hog, wild pig
Treptophelia decaocto	Eurasian collared-dove

[1]Undocumented at present at Fort Benning.

B.5.2 Programmatic Aerial spray statement of need

Programmatic Aerial Spray Statement of Need (ASSON)
For
Fort Benning, Georgia

Preparer Identification

Brian Waldrep, Lead Forester, Land Management Branch, DPW, (706) 544-7076 Office, (706) 392-1585 Cell, (706) 544-6570 Fax, Email: joseph.b.waldrep.civ@mail.mil

Application Area(s)

The potential aerial treatment area on Fort Benning consists of 131,555 acres. A maximum of 3,000 acres of the potential treatment area will be sprayed annually. Annual herbicide applications have averaged 2,114 acres over the past five years. Annual herbicide application acreage has increased during the past five years due to Red-cockaded woodpecker (RCW) critical habitat enhancement work required by the US Fish and Wildlife Service Biological Opinions addressing Base Realignment and Closure (BRAC) and Maneuver Center of Excellence (MCoE) activities on Fort Benning.

The vast majority of the potential aerial treatment area is comprised of upland forest habitat suitable for longleaf pine restoration. The restoration sites intended for aerial treatment have had over-story vegetation removed or reduced to below 40 Basal Area (BA) but remain vegetated with dense woody competition. Currently, 80 percent of known RCW cavities are in loblolly pine trees, which are in decline on Fort Benning. The continued survival of this Federally-listed endangered species on Fort Benning relies on the restoration of the longleaf pine forest in the area. Mature longleaf pine forests are the preferred RCW habitat but many years of logging and fire suppression have artificially shifted the installation's forest to a loblolly pine forest with a substantial component of 'off-site' hardwood species on sites that were once dominated by longleaf pine.

This off-site over-story is being strategically removed from historic longleaf areas which are then replanted with longleaf pine seedlings. Once the over-story is removed, the remaining hardwood rootstocks vigorously re-sprout and compete with planted longleaf pine seedlings for available resources on the site. This competition greatly reduces longleaf seedling survival and delays the restoration process. In areas designated for planting of longleaf seedlings, the competing vegetation is usually very dense. If an area with dense vegetation is replanted without first preparing the site with herbicide, seedling survival is greatly diminished. Dense vegetation also makes it nearly impossible to properly replant the area. In order to facilitate replanting and enhance seedling survival, herbicide application is necessary to eliminate competition from hardwood spouts and other weedy competition.

In addition to longleaf pine restoration areas, some existing pine stands require herbicide treatment to control hardwood competition in the over-story. The preferred treatment method would be capable of reaching over-story foliage while avoiding treatment to non-target seedlings and saplings in the understory that will one day replace trees in the over-story.

There are several wetland and riparian areas on the installation that are being inundated with invasive species, reducing their habitat value to Federally- and/or State-listed indigenous species. Many of these wetland and riparian areas are remote, with limited access making

herbicide application difficult and costly. Also, the use of ground-based application methods would be impossible or detrimental in these areas.

Vegetation intended for control by aerial treatment includes but is not limited to the following species:

Post Oak	Red Maple	Chinese privet
Blackjack Oak	Red Oak	Chinese tallowtree
Blackberry	Sweetgum	Chinaberry
Turkey Oak	Yellow poplar	Wisteria
Bracken (Fern)	Water Oak	Kudzu
Hickory	White Oak	Japanese honeysuckle
Loblolly Pine	Willow Oak	Giant cutgrass
Cogongrass		

Justification for Conducting Aerial Applications

The aerial application of herbicide is an important component of making the longleaf pine forest restoration process more efficient. The primary mission of Fort Benning's Natural Resource managers is to support the military's training needs through efficient management practices which sustain training lands for both military training and native wildlife. Failure to efficiently manage training lands has the potential to negatively impact the training mission of the installation. If adequate vegetation control is not accomplished in an efficient manner, a loss of training days on prime military training land may occur.

In addition to efficient vegetation control on upland forest sites, several wetland and riparian areas on the installation can only be effectively accessed for herbicide treatment of invasive plant species using aerial methods. Other invasive species treatment areas, such as isolated ponds and wet areas are inaccessible or easily degraded by ground application equipment. The loss of herbicide application as a control method would jeopardize the likelihood of returning these areas to their historical condition.

Aerial application is the preferred method for treatment of competing over-story hardwoods in existing pine stands while reducing the potential for unintentional treatment of non-target seedlings and saplings in the understory that will one day replace trees in the over-story.

Aerial application of herbicide is, by far, the safest and most economical method to control unwanted vegetation in impact areas, training areas, and range floors where: (1) Unexploded Ordnance (UXO) precludes safe access to the areas to provide any form of removal or control of vegetation; (2) The character of the terrain is such that the poor bearing soils cannot withstand ground application equipment.

Pre-treatment surveillance procedures include direct photo documentation, comparative aerial photography, base-level water quality studies, flora and fauna habitat surveys, and safety

surveys. Post-treatment surveillance procedures include photo documentation, water quality studies, erosion and sedimentation monitoring, and flora and fauna monitoring.

Environmental (Natural or Cultural Resources) Restrictions on Aerial Applications

There are currently nine (9) species of plants and eight (8) species of animals that are either Federally-listed, candidates for listing, or listed by the States of Georgia and/or Alabama and may occur on Fort Benning lands.

Plant Species: Although the treatment areas may contain some of the listed plants described above, aerial herbicide application is not considered by Fort Benning Natural Resource managers to have the potential for a significant effect on the overall population of the plants on the installation as the intended treatment areas are in previously disturbed areas.

Animal Species: If listed species are present in a treatment area, treatment timing and chemicals will be selected by Fort Benning Natural Resource managers so as not to negatively impact the species in question. The ultimate goal of these herbicide treatments is to improve habitat for both wildlife and training.

Bald Eagle: Protected areas have been established on the installation where bald eagles are known to exist. No aerial spraying will take place within the primary protection zone (1,500 foot radius from a designated protected area). In the secondary zone (1 mile radius), applications will be restricted to periods when the nests are not occupied, generally from 01 June through 30 November.

Red-cockaded Woodpecker (RCW): There are presently 370 RCW clusters distributed across the installation. Aerial application of herbicides will not be conducted within RCW cluster boundaries without the prior coordination and approval of an RCW Wildlife Biologist.

Wood Stork: The wood stork is not known to permanently inhabit the installation, but has been observed foraging on the installation. Training areas X-5, Z-1, and Z-3 have ponds known to have been used as summer feeding areas for this species. Fort Benning Natural Resource managers will survey these areas prior to any aerial herbicide treatment to ensure that spraying will not occur in areas actively being used by wood storks as feeding or roosting areas.

There are no wildlife communities, agriculture, livestock areas, or similar natural resources of significance that could be adversely impacted by proposed aerial applications on Fort Benning properties other than those previously discussed. There are no agriculture or grazing outleases on the installation at this time; however, should agricultural or grazing outleases occur in the future this ASSON will be re-evaluated at that time, as appropriate.

Topography Impact on Aerial Applications: The topography on Fort Benning varies from flat to rolling hills. Aerial applications will be performed using a rotary blade platform in order to

enhance the efficiency of the application. The use of rotary-wing aircraft will allow the pilot to more effectively stay within the treatment area reducing potential impacts to non-target areas. The aircraft will fly at the lowest safe operating altitude appropriate to the pesticide product label, thereby reducing the potential risk of drift.

Impact to Water Resources from Aerial Applications: Some application sites are in close proximity to significant water features. The application system technology is such that operations can be conducted close to ponds and streams with only a remote possibility of water contamination. The target application areas that are predominantly wetlands will be spayed with chemicals approved for use in and around water.

Affects of Climatological Factors on Aerial Applications: Successful aerial application of herbicide is dependent upon local weather conditions. To reduce drift of the pesticide from the target application sites to the maximum extent possible, ground wind velocity should not exceed 5 miles per hour (mph); however, pesticide product labels commonly use 10 mph as the wind speed max. A wind speed of 5 mph will be used as the wind speed upper limit whenever possible or practical. For herbicide application to be effective, rainfall should not occur over the treated area for four (4) hours prior to and following application. The optimal application window for herbicide is while plants are in full foliage and actively growing, which normally occurs during late spring and early summer months when local weather conditions are also the most unpredictable.

All aerial pesticide applications will be performed by a State-certified pesticide contractor under the direct supervision of a DoD-certified pesticide applicator.

NEPA Documentation

Fort Benning is in the process of updating its Integrated Natural Resources Management Plan (INRMP). The pesticide activities described in this document will be included in the updated INRMP and in the appropriate NEPA analysis required for the INRMP. However, until the updated INRMP and its NEPA analysis are available, the implementation of this ASSON will be reviewed for potential environmental impacts by submitting a Request for Environmental Analysis (Form FB 144-R) to Fort Benning's Environmental Management Division, NEPA Program. This review is expected to result in a Record of Environmental Consideration (REC). In addition to the NEPA analysis for the INRMP, each aerial pesticide application event will be reviewed individually through the FB144-R process prior to application.

Installation Integrated Pest Management Coordinator (IPM Coordinator) Validation

__X__ Concur _____ NonConcur

Theodor W. Roever *11 April 2012*

Theodor W. Roever **Date**

Integrated Pest Management Coordinator

Pest Management Consultant (PMC) Validation
__X__ Approved _____ Disapproved

John A. Wildie *16 April 2012*
John A. Wildie, Entomologist **Date**
DoD Aerial-Certified Pest Management Consultant
Army Environmental Command

APPENDIX B6 HISTORICAL BACKGROUND OF NATURAL RESOURCE MANAGEMENT AT FORT BENNING

The intent of current management activities at Fort Benning is to be proactive and efficient in compliance with Federal and state laws and regulations, as well as applicable EOs, Army regulations, and requirements of the Endangered Species Act. The various types of natural resource management activities that are currently being implemented at Fort Benning are discussed in Chapter 5 and the ESMCs included in Appendix E. This appendix provides an overview of the historical land and natural resource management practices that have occurred across the Fort Benning landscape. Many of the historical management practices (or lack thereof) discussed in this appendix pre-date many of the Federal, state, and Army regulations that are in place today.

B.6.1 HISTORY OF THE SOIL CONSERVATION PROGRAM

Beginning in the 1830s, the farmers who owned the land that would later be known as Fort Benning cleared trees to make room for crops and houses. Cotton was the principle cash crop of the time and Best Management Practices (BMP), such as contour plowing and terracing, were not implemented. The farming practices during the 1800s and early 1900s resulted in a loss of topsoil and decrease in soil fertility.

On 7 October 1918, Camp Benning was established through condemnation of about 96,500 acres. During 1941–1942, the Installation expanded through the acquisition of about 85,500 additional acres. With the beginning of World War II in the 1940s, mechanized training became a major emphasis on Fort Benning. Tracked vehicles traversed the slopes of Fort Benning, causing erosion and sedimentation on a large scale.

Although there were no soil conservation efforts in the Installation's early years, in 1967 a few projects were undertaken to stabilize road shoulders and reclaim borrow areas. After the Georgia Erosion and Sedimentation Act was passed in 1975, soil conservation became a regulatory concern. Initially, confusion existed about who had jurisdiction over Fort Benning to enforce the Act. Finally, the state of Georgia determined that it—and not the City of Columbus—was responsible for the enforcement of the Act. After 1988, the need for soil conservation planning assistance became especially apparent when the McKenna Drop Zone was cleared and severe erosion and sedimentation resulted. A formal relationship to address soil conservation issues began in 1993 with the establishment of an Interservice Support Agreement between Fort Benning and the Soil Conservation Service (now known as NRCS). In 2001 the Fort Benning Garrision Commander signed a Memorandum of Understanding with the NRCS.

In August 1994, Fort Benning hired a Soil Conservationist to administer the Soil Conservation Program. In September 1994, the USFWS issued its BO and soon thereafter funding became available for rehabilitation of McKenna Drop Zone and other sites. In September 2002, the USFWS issued another BO that requires Fort Benning to maintain a soil conservation program to minimize erosion and siltation impacts to RCW clusters and cavity trees. One of the reasonable and prudent alternatives listed in the BO requires Fort Benning to repair existing and prevent future soil erosion in clusters that threatens individual cavity trees and the integrity of the cluster.

In addition to the requirements of the 1994 and 2002 BOs issued by the USFWS for soils erosion in RCW habitat, the Soil Conservation Program expanded its purpose to comply with the requirements of the CWA and NPDES programs in both Georgia and Alabama, and began coordination with with other organizations on the Installation to implement soil conservation practices. The coordination of soil conservation related work resulted in a collaborative effort between the Conservation and Land Management Branches, ITAM, DPW, and the BASOPS contractor to implement BMPs for construction activities, road and trail maintenance, and erosion resulting from military training.

B.6.2 History of the FOREST MANAGEMENT Program

Records of forest management on Fort Benning date back to 1918 when Camp Benning was established. About 76,000 acres were condemned and purchased prior to July 1919 and an additional 22,000 acres were assured by President Wilson in February 1920. Of the 98,000 total acres, about 23,000 acres were in Muscogee County and about 75,000 acres were in Chattahoochee County. An initial site visit and report by H.O. Stabler, Assistant District Forester, USFS, in February 1920 indicated that about 40 percent of the land at that time was cleared and Camp Benning's intention was to maintain about 40 percent as cleared land for military training. It is thought that approximately 75 percent of the land had been cleared at some time in the past. About 60 percent of the land was forested in some form. Pine-forested areas varied from former cleared areas with a scattered mix of longleaf), shortleaf, and loblolly pine reproduction to areas having pure longleaf pine or a mixture of longleaf and shortleaf pines. As a general rule, the forested areas were either along the streams or on the breaks immediately above the stream bottoms, and mostof the clearings were along the ridge tops. It was estimated that there was a total of 8,000 to 10,000 MBF of merchantable longleaf and about 15,000 to 20,000 MBF of merchantable shortleaf and loblolly pines at the time of this inspection. Camp Benning had a total merchantable pine volume of 30,000,000 board feet of pine timber, assuming 60,000 acres of the 98,000 acres were forested with an estimated average of 500 MBF per acre. According to Stabler, "There is a great deal of unmerchantable pole stand, mainly shortleaf pine, which unquestionably has come in after clearing at the expense of the original stand of longleaf. This young timber is in a thoroughly healthy condition, and it is not apparent that the timbered portions of the reservation have been subjected to repeat annual burnings."

The initial interest of the Commanding Officer, Major General Farnsworth, was to make use of the Installation's natural resources, insofar as the use would not interfere with the primary military needs. He understood that the capability of producing timber was far in excess of the Installation's needs and wanted to administer a system that would permit utilization of the timber products. He also saw the need for a professional forester to protect and manage the lands and determine what timber should be harvested. In March 1920, Farnsworth recommended to the War Department that Camp Benning Military Reservation be designated a National Forest. The USFS welcomed the idea of creating Camp Benning National Forest to serve as a demonstration forest and to carry on naval stores operations. The recommendation was approved and Camp Benning became a Military National Forest managed by the USFS beginning in 1924. The National Forest status was cancelled, however, in December 1927 at the request of the USFS. The reason for termination was summed up in an inspection report by the District Forester when he stated, "A forest land use policy cannot be founded upon the notions and absent interest of a shifting Army personnel."

In 1923, Fort Benning installed a saw mill to allow for continuous logging and milling. Cutting of timber mainly occurred in areas of firing ranges and was conducted by Black Soldiers and Civilian Conservation Corps (CCC) labor using tractors, four-mule teams and wagons, and 1.5 ton trucks. Haul distances were one-half mile to four miles to a narrow gauge railroad, which had a haul of 8.5 miles to the mill at Main Post. There were normally two haul trips made each

day. The mill, which was used for 13 years, experienced many breakdowns and had a limited logging radius due to the railroad limits. The annual cut between 1930 and 1935 was approximately 957 MBF, principally longleaf. In 1936, it was recommended that a new portable saw mill be procured and at least one truck and trailer be obtained for logging the long logs used for special items.

Professional forester services were requested from the USFS by the Army in 1936 and again in 1943. In 1936, the USFS responded with a forest management plan for Fort Benning. The plan covered a total area of 68,000 acres that was forested at the time and set up a 20-year cutting cycle. It was estimated that there was a total of 231,000 MBF with an annual increase of 6,500 MBF and a proposed annual cut of 2,500 MBF, principally loblolly and shortleaf. The plan indicated that the current distribution of sawtimber volume was 56 percent loblolly pine, 19 percent longleaf pine, 15 percent shortleaf pine, and 10 percent hardwood. The main objectives of the plan were to: (1) produce 2,500 MBF annually for the use of units at Fort Benning; (2) build a reserve of large, clear, dense sawtimber for the use of the 4th Corps Area in times of National Emergency; (3) mark trees in advance of logging; (4) release young longleaf stands being choked by hardwoods; (5) plant longleaf seedlings in areas understocked; and (6) protect growing timber from wildfires. The plan, however, was not followed very well. In fact, it could not even be located a few years later in 1938 when the CCC camp was abandoned.

An additional 85,000 acres was acquired by Fort Benning prior to 1941, of which 73,000 acres were in Georgia and 12,000 acres in Alabama. Approximately two-thirds or more was open land, and there was no basic difference between the old area and the new area with regard to timber production capabilities. Most of the areas covered by timber at the time of acquisition do not support any appreciable number of trees of sawtimber size. Except for some small patches, most of the timber was cutover for sawtimber prior to transfer to the government. By far, the majority of the forestland was located along the stream bottoms unsuitable for cultivation. In response to a request for assistance in 1943, the USFS sent E.J. Schlatter, Logging Engineer, USFS, Region 8 to inspect the situation at Fort Benning. Mr. Schlatter discovered that the 1936 management plan had been lost and that approximately 3,000 MBF had been harvested annually using a diameter limit cut. Mr. Schlatter recommended that Fort Benning immediately readopt the practice of marking all trees in advance of cutting in accordance with silvicultural requirements, follow the provisions of the 1936 plan, put a professional forester in charge of the forest management plan execution, and maintain 3 CCC companies at Fort Benning for support.

The Army hired the first full-time professional forester in the 1950s, at which time the Forestry Branch was established. Since that time, many changes in management techniques, philosophies, operations, responsibilities, and personnel have occurred. Today, the Forest Management Program has 17 staff positions with an annual budget of approximately two million dollars. The program is executed by Fort Benning's Land Management Branch of EMD, DPW.

B.6.3 History of the Prescribed burning program and wildfire Management

The prescribed burning program was established in Region 8 on 3 August 1943. The purpose of the program was to apply fire to the land under such conditions of weather, soil moisture, time

of day, and other factors that would allow confinement of the fire to a predetermined area, while at the same time producing the intensity of heat and rate of spread required to accomplish planned benefits to one or more objectives of silviculture, wildlife management, grazing, or fire hazard reduction. The goals of prescribed burning were rough and hazard reduction, control of undesirable species, brownspot disease control, seedbed preparation, planting site preparation, and habitat improvement for wildlife.

When the prescribed burning program was established, it was limited to forests of longleaf and longleaf-slash pine types. On 14 January 1949, the prescribed burn policy was broadened to permit the administrative use of fire in loblolly pine types. On 1 November 1957, the prescribed burning policy was again broadened to include pure or mixed stands of loblolly, slash, shortleaf, and longleaf pines on slopes under 15 percent. From the 1960s through the 1980s, prescribed burning was conducted in pure and mixed pine stands during the dormant season (from December through March). Burning was suspended when the first blossoms appeared on fruit trees such as wild plums. The goal was a two- to five-year burn cycle to reduce fire hazards, control unwanted understory brush, and improve wildlife habitat. The goal was to burn longleaf pine stands every second year and large loblolly-shortleaf stands on 1919-acquisition land every third year. Small stands on the 1942–1943 acquisition land were burned every fifth year. Burning was confined to individual pure or mixed pine stands requiring the construction of numerous trails and firebreaks around all hardwood drains. All prescribed burning was conducted with hand crews and drip torches. Prescribed burn and wildfire maps from the 1970s show a majority of the burn acreage occurring in the Alpha and Kilo impact areas and the Malone Complex ranges, which comprised 58,000 acres. Although there is no historical summary of prescribed burning burn or wildfire acreage from the 1960s through the 1970s, the summary for fiscal years 1981 through 2012 shows a significant increase in burn acreage from the 1980s to the 2010s (Figure 5.4.1 in Chapter 5). Prescribed burn plans and maps were general and consisted of a one-page form (3AA Form 155-R) and a 1:100,000-scale map. All training fires, including those in the impact areas, were suppressed. Fires were suppressed with tractor-plow units and backpack pumps. A 55-gallon plastic drum was mounted on a three-quarter-ton, four-by-four, Dodge Ram Charger truck. The 55-gallon drum was used to fill the backpack pumps. A large bucket, for water drops in impact areas, was located at Lawson Army Air Field. The forest supervisor and his assistant suppressed most of the fires, worked “stand-by” on weekends, and lived at the office (an old World War II barracks).

The Department of the Army’s 1984 *Policy and Management Guidelines for the Red-Cockaded Woodpecker on Army Installations* required that pitch-covered cavity trees within a colony be protected from fire by removing the straw to a distance of three meters around each tree. This was a labor-intensive process. All pitch-covered trees in a colony were protected in this manner before executing the burn. About 75–80 clusters were burned annually in this manner. In 1990, summer burning was implemented in RCW clusters. During this time, prescribed burning in clusters was only permitted from August through mid-October. Additionally, burning was permitted only within the colony. This required the construction of firebreaks around each cluster. After the 1994 BO was issued, prescribed burning was extended to the stands and foraging habitat around the cluster (formerly referred to as a colony). Additionally, prescribed

burning was shifted to the growing season to achieve the full benefits of fire in regard to mid-story hardwood control. Winter (dormant season) burns were still used to reduce high fuel loads and, as a result, minimize situations in which there could be delayed mortality of pines from extreme burn temperatures. Dale Wade of the USFS Southern Forest Fire Lab has conducted extensive research on delayed mortality due to burning in late summer and fall and expressed concern on the subject during site visits to Fort Benning (Wade 1989). Due to delayed mortality concerns, understory burning was suspended during the 1 September to 30 November timeframe. Because of the BO and Army guidelines, firebreaks are no longer required around clusters. RCW cavity trees can be protected with backpack pumps as well as raking the straw to a distance of three meters.

An aerial ignition contract was conducted in Fiscal Year 1992. The contract was terminated after 10.9 hours of flight time due to smoke in the main cantonment area, contractor availability, and scheduling problems with travel routes to and from the burn locations. The contract was for 100 hours of flight time at $525 per hour.

Currently, all pine and pine-hardwood stands are being burned on a one- to three-year rotation in accordance with the BO and Army guidelines. All burn planning is coordinated with game management, timber management, RCW management, threatened and endangered species management, and soil conservation programs. Additionally, all prescribed burns are coordinated with Range Control Division, DPTMS. All burning is planned four to eight weeks ahead and is designated on the 1:25,000-scale training maps at Range Control. Also, a prescribed burn notice is published weekly in the Bayonet. The Public Affairs Office is also notified daily of prescribed burning locations.

Prescribed burn plans today are much more thorough than those developed from the 1960s through the 1980s. A one-page form (3AA Form 155-R) has been replaced with a comprehensive burn folder for each burn unit. This folder contains a detailed two-page burn plan, GIS orthophoto of the burn unit, identification of RCW cavity tree locations, GFC fire weather forecast, coordination list, prescribed burn check-list, field-fire weather form, smoke screening form, and smoke screen map (see Appendix B-2 for additional details).

The prescribed burning management program comprises four major functions—fire detection, fire suppression, prescribed burning, and trail maintenance. The fire detection function includes locating wildfires from fire towers, coordinating fire suppression activities, and dispatching personnel and equipment to the fire scene. The fire suppression function is synonymous with fire fighting and includes containing, controlling, and mopping up wildfires. Fire suppression is necessary to protect lives, property, and natural resources on Fort Benning and to prevent wildfires from causing adverse impacts outside the Installation's boundaries. Fire suppression is accomplished through the combined efforts of vigilant fire detection and rapid response of a well-equipped fire-fighting team. In brief, fire suppression protects military personnel and assets, adjacent private lands, and the natural resources found on Fort Benning.

B.6.4 History of the Threatened and Endangered Species Management Program

Endangered species management activities began around 1980, when individual RCW cavity trees were first painted with a 12- to 15-inch white band. Beginning in 1982, metal numeric identification tags were added to all previously painted RCW cavity trees; all newly discovered trees are painted and affixed with these identification tags. These activities were primarily performed by forestry technicians until March 1990, at which time a professional wildlife biologist was hired to manage the endangered and threatened species on the Installation. A second biologist was hired in October 1991. With the addition of three biologists in 1993, Fort Benning had a total of four wildlife biologists to manage the Threatened and Endangered Species Program (one biologist was promoted to Chief, Natural Resource Management Branch, in 1993). The first attempt at a 100 percent survey of the Installation for threatened and endangered species occurred in 1991 through a contract with Gulf Engineers and Consultants, Inc. and Geo-Marine, Inc. who surveyed 12 percent of the installation. In 1994, the USFWS was contracted to conduct a complete 100 percent survey for threatened and endangered species.

Three populations of relict trillium (*Trillium reliquum*) were first discovered in 1991. Two of these populations were initially monitored that year as Land Condition Trend Analysis special-use plots from 1991 through 1995. All three sites, plus two additional sites, are now monitored by the Conservation Branch. The other three sites have been monitored annually since 1997. Spotlight surveys for the American alligator (*Alligator mississippiensis*) have been conducted since 1994. Annual summer surveys will be conducted for the presence of wood storks (*Mycteria americana*) on Fort Benning. When individuals are spotted, the location is noted and a more thorough search may then be initiated.

In February 1994, a Biological Assessment of the ongoing mission at Fort Benning was prepared to initiate formal consultation with the USFWS as required by the ESA. In September 1994, the USFWS issued a BO in which it determined that actions on Fort Benning are likely to jeopardize the continued existence of the RCW. The BO listed six Reasonable and Prudent Alternatives for the RCW that had to be implemented.

TNC conducted several projects at Fort Benning from 1993 to 1996. The first project was a 100 percent survey of Fort Benning for all RCW cavity trees. All trees identified in the survey were documented, various data were collected for each tree, and maps were compiled for each operational compartment. A one-year project was conducted to evaluate the effects of prescribed burning on the breeding success of the RCW, and results indicated that prescribed burning was not adversely affecting breeding success. A third project involved a three-year evaluation of the effects of military training (at established ranges) on the breeding success of the RCW in which no adverse effect was documented. The fourth project consisted of a population dynamics study of 30 active clusters, and the results indicated that Fort Benning had a stable RCW population. The fifth project involved the installation of artificial cavities for the RCW. Each installed cavity was evaluated to determine if a RCW was roosting/nesting in the cavity. The artificial cavities showed significant use for roosting and nesting. The sixth project involved habitat restoration and population enhancement of sweet pitcherplant (*Sarracenia rubra*) populations.

Fort Benning has one of the largest RCW populations in the southeastern United States. The population is well dispersed over the entire Installation, except that no active clusters are located on the Alabama portion. Subsequent to the 1994 BO, intense efforts were implemented to enlarge the endangered species staff and greatly increase management activities as outlined in the Reasonable and Prudent Alternatives. These efforts have increased with the issuance of the 2002 BO, which approved Fort Benning's ESMP for the RCW and outlined many Reasonable and Prudent Measures as well.

The other listed species are present in small numbers (bald eagle and American alligator), occur as transients (wood stork), or are found in a few localized areas (relict trillium). Two other species are currently considered as candidates for Federarl listing are the Gopher Tortoise and the Gerogia Rocckcress. Management activities consist mainly of surveys, monitoring efforts, and protection of sensitive areas.

B.6.5 history of the Game and Sport Fish Management program

It is not clear when the Fish and Wildlife Program began on Fort Benning, but an organization known as The Fort Benning Fish and Game Association sponsored a conference in 1960. Based on recommendations from this conference, a wildlife coordinator was employed in 1961 under the supervision of the Assistant Chief of Staff. The first cooperative agreement (CA) was signed in 1963 by the Commanding General, the Regional Director of The Bureau of Sport Fisheries and Wildlife, the Director of the Georgia Game and Fish Commission, and the Director of Conservation of the State of Alabama. In July 1964, the staff responsibility for the program was transferred from the Assistant Chief of Staff to the Post Engineer in the Directorate of Logistics. The Chief, Buildings and Grounds Division, supervised the program. U.S. Army Infantry Center Memorandum 210–1 (Natural Resources Management Program, 6 April 1966) was developed to accomplish the requirements of AR 420–74 (Natural Resources—Land, Forest and Wildlife Management, dated June 1966). The memorandum divided responsibilities for the natural resource program among the Director of Logistics, Director of Operations and Training, Director of Personnel, Staff Judge Advocate, and the Information Officer. Its stated purpose was to "develop a coordinated program of land management which when applied on a multiple use basis, will provide the maximum military use of available land; protect and preserve the watershed and soil; encourage forest and timber growth; control erosion and sustain productivity of grassed lands; and encourage the development of the optimum in a fish and wildlife program." The memorandum also directed that a Natural Resources Management Board be appointed. The board's purpose was to "assure a balanced action and continuity of application on the part of a number of installation activities for the development of a coordinated program of land management and improvement." During this period, the Fish and Wildlife Program was focused on game and sport fish species. There is no mention of threatened and endangered species, songbirds, or other forms of nongame wildlife in an extensive 1967 report on the Fish and Wildlife Program.

The Fish and Wildlife Program eventually moved to the Directorate of Facilities Engineer, which became the Directorate of Engineering and Housing and then the Directorate of Public Works

(DPW). The Natural Resources Management Board name was changed to the Commanding General's Natural Resources Advisory Council. The 1963 CA was updated in 1983 and again signed by the Commanding General, Regional Director of the USFWS, Commissioner of the GADNR, and Director of the Alabama Game and Fish Division. Since that time, only one minor revision has occurred.

The peak of game and sport fish management occurred in the mid 1960s and through the 1970s. During this period, 17 fish ponds (300 acres) were managed; 2,500 to 3,000 acres of wildlife foods (bicolor lespedeza, rye, millet, peas, clover, and corn) were planted in 183 openings; 22 water holes were developed; and 60 miles of scrub-oak were cleared with a brush chopper and planted in a seed mixture. Collection of biological data at the deer check station began in 1973. Quail and turkey roadside poult surveys were started in 1988, quail call counts were begun in 1988, and deer track counts were initiated in 1982. In 1990 and 1993, deer herd health checks were conducted by the Southeastern Cooperative Wildlife Disease Study based at the University of Georgia, School of Veterinary Medicine.

From 1964 to 1967, military personnel provided the entire Fish and Wildlife Program labor force. In 1967, the first civilian positions were established. The staff consisted of four civilian employees and eight Soldiers. Beginning in the 1980s, endangered species became the focus of the Fish and Wildlife Program and in conjunction with the Army downsizing initiative, game and sport fish management activities continued to decline—reaching their lowest point in the late 1990s.

A series of planning meetings were conducted between 1997–1998 with the intent of revitalizing and restructuring the Game and Sport Fish Program. Attendees included personnel from the Conservation and Land Management Branches, Outdoor (now Community) Recreation Division, Staff Judge Advocate, and Directorate of Public Safety. These meetings developed the following vision statement: "To provide a safe, quality hunting and fishing experience consistent with mission requirements and sound land management practices that will be a model for other game and fish programs."
Beginning in the early 2000's an effort was initiated to begin hiring staff to facilitate management of the program. A fish and wildlife technician was hired in 2002 and a biologist in 2005. Various types of census and survey work are conducted to monitor populations, determine trends, evaluate physical condition, and determine harvest goals. Volunteers have provided some assistance in the past, to assist in planting wildlife openings; fertilizing sawtooth, apple, and persimmon trees; maintaining wood duck boxes; posting signs; conducting deer track counts, quail whistling cock counts, and other census work; fertilizing fish ponds; and conducting other activities as needed.

The biological aspects of game and sport fish populations and habitat management enhance and support outdoor recreational activities with an emphasis on hunting and fishing. Other outdoor recreational opportunities such as hiking, bird watching, boating, and camping are also enhanced by the management activities conducted by the game and sport fish program at Fort

Benning. A more detailed discussion of outdoor recreation opportunities and programs is provided in Appendix C6.

B.6.6 history of the natural resources component of the Pest Management program

Before development of the INRMP, pest management as a program at Fort Benning focused on traditional pest management activities such as insect and rodent control in the housing areas. Pest management activities at the Follow Me Golf Course also received some attention; however, with the exception of reporting on pesticide usage, the natural resource aspects of pest management generally received little attention insofar as a comprehensive, integrated program was concerned. Traditional cantonment area pest management activities were handled by the Pest Control Branch in the DPW. The then Natural Resources Management Branch (now Conservation Branch) handled the nuisance vertebrate control actions in the cantonment area, with the exception of rodents, dogs, and cats.

Because of funding shortages and staff reductions, the Pest Control Branch was eliminated in 1999. During 1999, planning also began to develop an integrated pest management program as required in the AR 200-5 Pest Management, 29 October 1999. In the early 2000's, the integrated pest management coordinator position was created. This position collects and reports pest management activities for the Installation. This regulation was superseded by AR 200-1 Environmental Protection and Enhancement, 13 December 2010. The Fort Benning Integrated Pest Management Plan was approved on 13 March 2013.

B.6.7 history of the Army Compatible Use Buffer program

Development of an ACUB is authorized by legislation passed as part of the 2002 Readiness and Range Preservation Initiative (RRPI), specifically amending the U.S. Code (Section 2684a, Chapter 159 of Title 10) as follows:

> The Secretary of Defense or the Secretary of a military department may enter into an **agreement** with an eligible entity … to address the use or development of real property in the vicinity of a military installation for purposes of (1) limiting any development or use of the property that would be incompatible with the mission of the installation; or (2) preserving habitat on the property in a manner that-- (A) is compatible with environmental requirements; and (B) may eliminate or relieve current or anticipated environmental restrictions that would or might otherwise restrict, impede, or otherwise interfere, whether directly or indirectly, with current or anticipated military training, testing, or operations on the installation.

The "eligible entity" cited above can be either a state or local government agency, or "a private entity that has as its stated principal organizational purpose or goal the conservation, restoration, or preservation of land and natural resources, or a similar purpose or goal…" Agreements with more than one eligible entity may be used to address the goals of the ACUB.
The DA provided guidance in a May 2003 Memorandum *Army Range and Training Land Acqusitions and Army Compatbile Use Buffers* that defined ACUBs as "Formal agreements

between the Army and eligible entities for acquisition by the entities of land or interest in land and/or water rights from willing sellers." The ACUB is part of a comprehensive training land master plan to reduce the negative effects of encroachment and environmental regulations on mission activities. The guidance further states that development and implementation of an ACUB does not constitute the acquisition of land or interests in land for range or training purposes. A separate Range and Training Land Acquisition program may be utilized for acquisition of land or interests in lands for mission purposes. Therefore, coordination between the ACUB program and Range and Training Land Acquisition program will be vital for successful sustainment of Fort Benning.

Acquisition of ACUB property rights is by the eligible entities and only from willing sellers; however, the Army may contribute to any acquisition costs. Should the entity holding property interests acquired with Army funds fail to uphold ACUB objectives, the agreement also must provide that the eligible entity will transfer to the United States the minimum property rights necessary to meet the ACUB purposes upon request of the Secretary of Army. The May 2003 guidance also provides for surplus Installation land to be conveyed to eligible entities as part of an ACUB; however, no surplus Installation lands exist at Fort Benning, other than a narrow right-of-way extending into the city of Columbus, which has no buffering value (DeCarlo pers. com).

An ACUB Proposal for Fort Benning (see Appendix F1) was developed during 2004-2005 that outlines the rationale and approaches to establish an ACUB around portions of Fort Benning, using a combination of no-development easements, conservation easements, and conservation-focused land acquisitions. The buffer lands will facilitate training activities and expansion of training infrastructure inside the Installation by (1) channeling incompatible growth and development away from critical portions of the Installation boundary, and (2) reducing conflict between Fort Benning's training mission and its environmental stewardship responsibilities. Fort Benning's ACUB Proposal was developed by TNC in close partnership with Fort Benning's EMD, DPTMS Range Division, and Staff Judge Advocate (SJA).

APPENDIX C

OTHER PROGRAMS AND POLICIES

APPENDIX C1 NATIONAL ENVIRONMENTAL POLICY ACT

C.1.1 PURPOSE AND APPLICABILITY

The National Environmental Policy Act (NEPA) of 1969 (Public Law 91–190) is the nation's charter for protecting and enhancing the environment. NEPA sets forth a national policy for attaining harmony between people and nature, for promoting efforts to eliminate damage to the environment, and for better understanding of ecological systems and natural resources. It establishes the Federal government's policy to use all practical means to create and maintain conditions under which people and nature can exist in productive harmony. NEPA is a vehicle to secure national goals of: fulfilling responsibilities as trustees for future generations; assuring safe, productive surroundings; attaining beneficial use of the environment; preserving important historic, cultural, and natural aspects of our national heritage; achieving a balance between population and resources; and enhancing the quality of renewable resources and the recycling of non-renewable resources.

NEPA requires Federal agencies and officials to analyze potential environmental effects of proposed actions and their alternatives prior to making decisions and implementing any actions. Consideration of environmental and socioeconomic effects of proposed actions and their alternatives are documented with the appropriate level of NEPA analysis commensurate with the significance of the environmental effects. This law applies to all Army personnel (military and civilians), their activities and agents (such as contractors or representatives from other Federal agencies).

The Council on Environmental Quality (CEQ), established as part of the Act's enactment, is responsible for issuing regulations implementing the provisions of NEPA. The CEQ Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR Parts 1500–1508) define the basic levels of documentation required by NEPA. Section 103 of NEPA requires all Federal agencies to create their own regulations for implementing the procedural provisions of NEPA. 32 CFR Part 651 further defines NEPA guidelines for the Army and establishes documents required in meeting NEPA's goals:

Record of Environmental Consideration (REC). The majority of proposed actions normally do not have significant environmental impacts. 32 CFR Appendix B to Part 651, Section II provides a list of "categorical exclusions" (CAT-X). The Form FB 144-R Request for Environmental Analysis (REA) process and Record of Environmental Consideration (REC) documentation is described in more detail in section C.1.2.1.

Environmental Assessment (EA). This document is an abridged form of the statutory "detailed statement." An EA indicates whether a proposed action (or its alternatives) would have environmental impacts (either, significant or non-significant; adverse or beneficial). It would lead to either:

a. **Finding of No Significant Impact (FNSI).** This document summarizes why a proposed action would not result in significant impacts. Prior to the issuance of a FNSI. 32 CFR Part 651 requires a 30-day minimum public comment period. The action may be implemented after appropriately addressing any comments, and incorporating any required mitigation actions.

b. **Notice Of Intent (NOI).** When an EA indicates that the environmental impacts of a proposed action would be significant, a NOI to prepare a "detailed statement" is published in the Federal Register should it be decided to continue to pursue the project or activity under consideration. If it is clear that an action or project may result in significant environmental impacts, a NOI may be issued without first developing an EA.

Environmental Impact Statement (EIS). This document is the "detailed statement" of the potential environmental impacts that a proposed action and its alternatives could cause. It is preceded by a "Draft EIS" that is made available to the public and other agencies for their review and comment. An EIS aids in deciding whether and how to implement an action. It would lead to:

a. **Record Of Decision (ROD).** This document states the decision reached after consideration of the environmental impacts of a proposed action and its alternatives in an EIS. Mitigation actions specified in the ROD must be incorporated into the proposed action implementation.

C.1.2 RESPONSIBILITIES AND IMPLEMENTATION

Commanders and directors, as well as all military and/or civilian personnel under them, at Fort Benning are responsible for the quality of the general environment (natural and human) and certain protected cultural and natural resources. The DPW and EMD staff is responsible for screening all activities taking place on the Installation and its satellite sub-Installations. This measure is intended to ensure compliance with NEPA, as well as to ensure that those in a responsible position do not inadvertently impact any protected resources or degrade the environment while implementing a project or proposed action.

C.1.2.1 REQUEST FOR ENVIRONMENTAL ANALYSIS

Submittal of Fort Benning's Form FB 144-R, Request for Environmental Analysis (REA) constitutes the first step in NEPA compliance at Fort Benning. Each organization at Fort Benning that conducts projects or activities that may impact natural and/or cultural resources must follow the NEPA review process and submit a Form FB 144-R to EMD. Form FB 144-Rs are submitted electronically via an established web-based portal that is accessible by Installation personnel, and other entities outside of the Installation who do not have access to Fort Benning's shared computer system. With the submission of the Form FB 144-R, the proponent of the action must clearly identify the purpose and need for the action, as well as provide all supporting documentation, (e.g. maps, project scope of work, ESPCP, etc.), which

can also be submitted electronically as attachments to the Form FB 144R submittal. The entire electronic package is then distributed to EMD personnel for review.

After review of the Form FB 144-R by EMD, a determination of “Concur”, “Concur with Conditions”, or “Non-concur” is provided to the proponent. A finding of “Concur” allows the project/activity to move forward as proposed. A finding of “Concur with Conditions” allows a project to move forward only after all comments are addressed and plans are in place to comply with the comments and concerns. When a finding of “Non-concur” is received, a project/activity cannot take place until it either has been modified as necessary to qualify for a CAT-X (requiring re-submittal of an Form FB 144-R), or an additional level of NEPA analysis (such as an EA or EIS) must be prepared before the action can proceed. For certain Fort Benning recurring activities, (e.g. field training exercises), a single REC can be prepared that covers the activity for a year before a new FB 144-R must be submitted.

The proponent is responsible for reading and implementing EMD’s recommendations in the REC, and responsibility for compliance with associated environmental requirements remains with the proponent. Non-compliance with the NEPA review process will result in the proponent of an action being held responsible for adverse impacts to Fort Benning’s natural or cultural resources. The proponent may be held responsible for the cost of repair, replacement, or mitigation required to correct any impacts of the unapproved action.

C.1.2.2 OTHER DOCUMENTATION

Some proposed actions and projects do not meet the eligibility criteria of 32 CFR Part 651 for use of a CAT-X. The reason for their ineligibility can be related to the nature and scope of the action/project or to the environmental sensitivity of the proposed sites. Some proposed actions and projects also may be included in the lists of specific conditions and / or typical actions that require the preparation of an EA or EIS contained within 32 CFR Part 651. These documents and their finding and decisional documents are summarized in section C.1.1. If any proposed action or project is not adequately covered in an existing EA or EIS, the preparation of appropriate documents will be required before the action/project can be implemented.

The preparation of an EA or EIS is usually costly and time consuming. As a result, they generally are out-sourced to obtain the services of specialized firms or Federal agencies with the capability to prepare these documents (for example, USACE or USFS). The proponent of action is responsible for the contents and conclusions of all EAs and EISs, as well as their resulting finding and decisional documents: FNSI, NOI, and ROD. The Fort Benning EMD assists in the review, approval and coordination of NEPA documents.

C.1.3 ROLE IN ECOSYSTEM MANAGEMENT AND BIODIVERSITY PROTECTION

About 1500 proposed actions are analyzed every year at Fort Benning. Through the Fort Benning NEPA process, all proposed actions, and as appropriate their alternatives, are reviewed for their potential effects on the human environment and on natural resources. Actions

that are analyzed may be specific to natural resource management actions (e.g. prescribed burning or timber harvest), or related to military training activities (e.g.range construction training exercises).

Other natural resource activities that may be analyzed using the NEPA process are management actions associated with forest insect and disease control, site preparation for tree planting, hardwood mid-story control, and noxious weed eradication. Other military training activities may include digging, grading, plowing, using obscurant smoke and teargas-like agents, munitions detonation, tactical training with mechanized and wheeled vehicles , constructing and using bivouacs, airborne training, motor-pool activities, and infrastructure maintenance and construction.

The sheer number and scope of activities at Fort Benning highlight the need for an efficient yet comprehensive process that is protective of the overall ecological integrity of the Fort Benning landscape within a regional context. Traditionally, however, the NEPA process, as practiced by the non-resource management agencies, principally focused its impact analysis in regard to natural resources on those resources that had some form of regulatory protection: listed species, jurisdictional wetlands, designated wilderness areas, and so on. Proper application of the NEPA process, when viewed as a planning tool provides a mechanism for considering the overall ecological integrity of the landscape and can reduce conflicts with such laws as the ESA by providing for the needs of specific species before they become eligible for listing (CEQ 1993).

As implementation of this INRMP transitions Fort Benning to an ecosystem-based management approach, the supporting NEPA planning and analysis process also will focus on higher levels of the biodiversity hierarchy. Rather than planning for and analyzing each proposed action separately using human-created boundaries, an ecosystem-based approach uses natural boundaries (e.g. UEAs and watersheds) and evaluates the effects of all projects ongoing and proposed for a given area. As a result, this approach better captures the environmental impacts on ecologically relevant spatial and temporal scales.

Because an ecosystem-based management approach uses a variety of scales—across both time and space—to conduct assessments and make decisions, the scale to be considered depends on the proposed activity and the magnitude of the potential effects associated with the activity if it occurs. The CEQ regulations (sections 1502.16 and 1508.7) require that NEPA address the direct, indirect, and cumulative effects of a proposed action. Direct effects are those occurring at the same place and time as the proposed action. Indirect and cumulative effects are those occurring at a later time, at another location, or in conjunction with other impacts in the vicinity of the proposed action.

Because biodiversity encompasses all of the components of a particular biological system of interest, consideration of the impacts to biodiversity can assist in the analysis of cumulative effects. The analysis of cumulative effects identifies the impacts from incremental changes that accumulate over space and time. When considering impacts to biodiversity as a cumulative

effects analysis issue, an ecosystem perspective is an important principle. An ecosystem perspective inherently addresses all of the components required for a functioning, healthy biological environment (CEQ 1997).

Numerous policy and guidance documents specify the need for incorporating ecosystem management and biodiversity conservation considerations into natural resource management decisions and the NEPA process. DoDI 4715.03 (Natural Resource Conservation Program, 8 March 2011) specifies procedural requirements that specifically address these considerations. The CEQ points out that the shift to ecosystem management enables resource professionals to better assess impacts to biodiversity (CEQ 1993).

A 1996 policy dialogue on DoD biodiversity management identified installation INRMPs as the best way to implement biodiversity conservation on military installations (The Keystone Center 1996). The dialogue also identified joint planning as an important principle for achieving this conservation. As a result, the NEPA process, when used as a planning tool, creates a link between mission accomplishment and natural resources management.

A study prepared by the Army Environmental Policy Institute points out that “the intent of NEPA was to promote biodiversity and ecosystem integrity among other environmental goals" (Army Environmental Policy Institute 1997). The study's authors concluded that by appropriately implementing the NEPA process, which includes planning level surveys, development of viable alternatives, environmental analysis, and identification of mitigation measures, ecosystem management and biodiversity protection will be accomplished more easily. The NEPA process becomes the tool that implements planning and analysis using an ecosystem perspective that acknowledges the importance of biodiversity considerations.

As Fort Benning implements the INRMP, the shift in approach outlined in the preceding paragraphs will occur over time. Some initial steps can be outlined here. First, by including, when appropriate, the analysis of potential impacts to Unique Ecological Areas (Appendix A2), the Installation shifts some of its evaluation focus to communities and landscapes. Second, by analyzing the potential impacts of Installation activities on the recovery of the Federally endangered RCW population at Fort Benning, the Installation can address cumulative effects more effectively. Moreover, to the extent that the woodpecker is a surrogate for gauging the condition of the longleaf pine ecosystem, the effects on the overall ecological integrity of the Installation's forested landscape can be evaluated more accurately. Third, by implementing an ecological monitoring strategy based on watersheds, Fort Benning can better assess both the impacts of its actions and the effectiveness of mitigation measures. Fourth, as more is learned about the status of biodiversity outside the Installation's boundary, future NEPA analyses will be able to consider more regional contexts.

C.1.4 PLAN NATIONAL ENVIRONMENTAL POLICY ACT DOCUMENTATION

The Army NEPA regulation (32 CFR 651) identifies those actions that normally require an EA. Included in this are the development and implementation of management plans such as this INRMP. Therefore, an EA was prepared in conjunction with this Plan. The scope and contents

of the EA follows the guidance included in: 32 CFR 651; the CEQ regulations; the NEPA Compliance Guide (40 CFR parts 1500-1508), Army Environmental Manager's Handbook, titled "Compliance with The National Environmental Policy Act"; and the CEQ report on incorporating biodiversity considerations into NEPA analyses (CEQ 1993).

The initial scope of the EA was defined during planning sessions facilitated by Fort Benning personnel. Input was provided by a work group composed of members of the Fort Benning EMD and the Fort Benning SJA environmental attorney.

State and Federal agencies, TNC, Tribal governments, and military personnel are involved as appropriate in developing policies and guidance related to the development, updates, revisions, and implementation of the INRMP (Tripartite MOU, July 2013), and its associated EA.
The proposed action for the EA is to integrate natural resources management with the military training mission through the development and implementation of a natural resources management plan. The EA analyzes implementation of the INRMP at a broad scale, or landscape level. The EA does not analyze particular environmental consequences associated with each individual project specified in the INRMP. Therefore, the EA will not completely substitute for future NEPA analysis of projects specified in the INRMP. The decision to prepare an EIS, EA, or REC must be made when individual projects are reviewed prior to on-the-ground implementation.

The EA analyzes the environmental consequences of implementing integrated management at Fort Benning. The alternatives provide a variety of focuses for that integration: ecosystem management and recreational and wildlife emphasis, as well as the "No Action" alternative (i.e. not to implement the management programs identified in this INRMP). . The disclosure of environmental consequences associated with each of these alternatives provides the necessary information for the Garrison Commander to select an alternative to implement. The preferred alternative is the Ecosystem Management approach to integrating natural resource management with the military mission. The FNSI explains why a particular alternative was selected and presents a determination that the alternative selected results in no significant environmental impacts. The EA and Draft FNSI is required to be published locally for 30 days, as well as provided to local, state, and Federal agencies, local public libraries, Tribes, and other individuals and organizations that expressed an interest in the INRMP. These documents can be found on Fort Benning's website under "Legal and Public Notices".

Specific requirements for mitigation and monitoring are indentified through the NEPA process. Reasonable and practicable mitigation measures must be included in environmental documentation and the FNSI. Monitoring and/or enforcement of mitigation measures are required in certain cases in which serious consequences are involved. These requirements are detailed in 32 CFR Part 651

APPENDIX C2 ENVIRONMENTAL AWARENESS AND TRAINING

C.2.1 Purpose

The EMD of Fort Benning's DPW conducts a variety of environmental training specific to the needs of this Installation. Most of this training is meant to enable Installation personnel to comply with environmental laws and regulations such as the ESA, the Resource Conservation and Recovery Act, and the CWA. NEPA serves as the focal point for these legal drivers by combining the requirements of various laws into a unified system of documentation and administration.

The Staff Judge Advocate's office supports the Installation with an environmental attorney. The attorney monitors and interprets environmental laws, regulations and guidance, participates in environmental training, reviews environmental plans and documents, assists in planning of projects to facilitate environmental stewardship, and assists in the negotiation and resolution of any violations or enforcement actions.

All other tenant units, organizations and government agencies on Fort Benning that conduct activities requiring some form of environmental review, must follow applicable procedures, rules, and guidelines established by various laws and Army regulations. It is the responsibility of the project proponent to ensure that a NEPA review has been completed before the training exercise/project is undertaken. This legal compliance justifies the investment of funding and manpower in environmental training. Once established, the training also can inform students about the value of the resources being protected and promote good environmental stewardship.

C.2.2 Training Audiences

As complex as Fort Benning's natural environment is, its cultural landscape is equally diverse. The Installation serves not only as a military training ground, but also as a residential community for thousands of people and as a place of daytime employment for thousands of others. With such large and varied audiences, environmental training must be applied judiciously to maximize its effectiveness. Leadership audiences are, therefore, crucial.

C.2.2.1 SENIOR LEADERSHIP

Fort Benning offers a Senior Environmental Compliance Officer (SECO) Orientation to representatives of garrison directorates and brigade- or battalion-sized military units. The SECO is commonly a field-grade officer, usually the executive officer of such a unit. The SECOs advise their commanders on environmental issues and set environmental policy for their organization. The SECO Orientation is a four-hour class offered monthly. A similar class is offered to Environmental Compliance Officers of smaller units, such as companies. The Garrison Commander's EQCC meeting, held quarterly, is frequently used to convey new environmental information to the Installation's SECOs. The EQCC keeps Installation Commanders informed on how well the Installation is protecting the environment and cultural resources, and advises on

environmental priorities, policies, strategies, and programs. Environmental awareness is also part of Fort Benning's First Sergeant/Commander Orientation, an every-other-month training for unit leaders new to this post.

C.2.2.2 UNIT LEADERSHIP

While unit leadership may fully support environmental compliance, poor decisions by people in the field can cause environmental incidents. For example, simply digging in the wrong spot could lead to environmental damage and legal or financial consequences that could have been avoided by training. Individual soldiers have little choice about their actions during field training; mid-level unit leadership bears most of the practical responsibility for the operations that can threaten Fort Benning's natural resources. For these reasons, much of Fort Benning's environmental training is delivered in a train-the-trainer fashion. An environmental lesson has been included in the Army Instructor Training Course and the Range Safety Briefing, both held twice per month.

C.2.2.3 UNITS

At times, it is appropriate to teach military units as a group. Fort Benning policy provides for environmental awareness training to units that are preparing to conduct field training exercises. Units visiting the Installation for a short time also need environmental information to avoid negative incidents. Such groups can be trained upon arrival, or can access much environmental awareness information on Fort Benning's internet website.

C.2.2.4 RESPONSIBLE INDIVIDUALS

Within these units and organizations, certain individuals have specific responsibilities that require specialized environmental training. Fort Benning's first environmental training was directed at Hazardous Waste Managers; 8-hour training for these personnel is offered twice per month. Once trained, each Hazardous Waste Manager must complete a four-hour refresher training every year. Activity Coordinators have legal responsibility for preventing storm water runoff pollution; they also have to be trained once per year. Other personnel are taught how to properly use Fort Benning's Request for Environmental Analysis (FB Form 144-R) process, a requirement of AR 200-1 and NEPA.

C.2.3 Future Opportunities

The Army has established that good stewardship of natural resources and attainment of sustainable training lands go hand-in-hand. The Army is placing increased emphasis on sustainability as a guiding management principal. The two primary Directorates responsible for natural resources management and management of mission lands at Fort Benning are the DPTMS and DPW. Close coordination between these two directorates are key to achieve military mission requirements and natural resource management goals and objectives. Coordination ensures a common direction, conflict resolution, and that manpower, equipment,

and funding resources are used efficiently. New opportunities for environmental training may become available through new sustainability initiatives.

APPENDIX C3 ENVIRONMENTAL COMPLIANCE

Compliance and enforcement play a vital role in the system of protection and enhancement of the environment. Fort Benning's goal is to be proactive and efficient in meeting its environmental requirements. The Installation attempts to implement plans, procedures, and specific projects to meet Federal and state laws and regulations, as well as to meet applicable EOs, Army regulations, and other guidance in everyday operations and over the long term. Limited resources or other challenges, however, may interfere with achieving compliance in all environmental areas and media. The potential for an enforcement action can assist in focusing on those areas of environmental compliance that need improvement.

C.3.1 history and Authority

Environmental laws have been evolving rapidly over the last 50 years. During this period, a series of environmental incidents resulted in the gradual development of environmental law. As incidents have occurred, Congress has considered new legislation, debated stiffening existing requirements and penalties of existing laws, and ultimately developed a comprehensive system of regulation for activities that impact the environment.

Fort Benning is subject to numerous environmental requirements stemming from laws, regulations, EOs, or policy. Army and Installation policy and regulations present interpretations of specific parts of environmental laws as they apply to actions of the Army or the Installation. These policies may apply only to those individuals in the Army, civilian employees, or their agents (e.g., contractors).

C.3.2 Jurisdiction

Jurisdiction refers to which laws pertain to the facility location and activity and who are the authorized enforcers of those laws. Fort Benning is required to comply with all Federal environmental laws and regulations. The Federal agency responsible for oversight of those laws and regulations would have enforcement responsibilities; however, many of the environmental requirements for certain environmental topics or programs have been delegated from the Federal level to the State enforcers. For those programs that have been delegated, Fort Benning is required to follow the applicable Georgia and/or Alabama laws and regulations in addition to the Federal requirements.

Many of these environmental laws and regulations overlap so that besides adhering to applicable Federal and State regulations in one program, Fort Benning actions may need to comply with requirements of more than one program. More specific requirements may be placed on Fort Benning through permits specific to an Installation action or resource. Plans and procedures adopted for Fort Benning attempt to concretely consolidate the various requirements and provide practical guidance where possible. Because of the complexity of jurisdiction in the

environmental arena, the environmental attorney in Fort Benning's Office of the Staff Judge Advocate (OSJA), or program managers in Fort Benning's EMD and other environmental specialists can research issues on a case by case basis.

The Federal Facilities Compliance Act (FFCA) is a particularly important law in regard to defining jurisdiction for the military community. Prior to Congress passing the FFCA in 1992, the Federal government and its agencies generally were not subject to environmental liabilities under sovereign immunity. The FFCA declared that all Federal facilities must comply with specific solid and hazardous waste laws under the Resource Conservation and Recovery Act (RCRA).

The trend has been for Congress to take more initiative to waive the Federal government's sovereign immunity, which would subject the Army to punitive fines and possibly other enforcement actions that had previously not been applicable.

C.3.3 Overview of Environmental Laws, Regulations, and Executive Orders

C.3.3.1 Environmental Laws and Regulations

A multitude of both Federal and state laws and regulations apply to Fort Benning activities. Their applicability depends on several factors. Additionally, numerous EOs and Army regulations govern natural resources management at Fort Benning. Too many laws and regulations exist to list them all here, but a list of many of the Federal laws and regulations that mandate natural resource or conservation actions is provided in Table C.3.1.

Fort Benning also is required to comply with numerous state environmental laws and regulations if the Federal government allows the state to regulate Federal facilities. Often these laws and regulations mirror their Federal counterpart, but the state laws can be more protective of the environment. Fort Benning works to comply with other state laws that are not legally enforceable against the Installation to promote good stewardship and consistent management of natural resources in the region. Through various sources, Fort Benning monitors and complies with applicable Georgia and Alabama laws and regulations.

C.3.3.2 Executive Orders

Several of the EOs that may impact management of natural resources on Fort Benning are listed in Table C.3.1. Fort Benning strives to comply with all EOs as they represent direction from the highest level. EOs have no regulatory enforcement; however, they may be based on requirements from laws or regulations that may be enforceable. Fort Benning monitors failure to comply with an EO and attempts to correct any deficiency.

C.3.3.3 Army Regulations and Guidance Documents

Army regulations further clarify how the Army will implement laws, regulations and EOs. AR 200–1 (Environmental Protection and Enhancement, 13 December 2007) is the primary Army regulation for natural resources. Copies of Army regulations are publicly accessible upon request or via the internet. In addition to Army regulations, Fort Benning has Installation-specific regulations that direct environmental compliance and conservation actions. Army regulations

and Fort Benning regulations are not enforceable punitively against an individual unless the regulation specifically states as such, but failure to comply may be the basis for personnel action based upon dereliction of duty or poor performance of duties. Other guidance documents may assist in implementing and incorporating environmental responsibilities on the Installation. Guidance documents may originate from higher commands or other resources. Guidance documents do not contain any enforcement provisions but may be based on laws or regulations that can be enforced. Fort Benning strives to comply with Army regulations, Installation regulations, and guidance documents.

Table C.3.1
Federal Laws, Regulations, and Executive Orders Regarding Conservation Actions[1]

Law, Regulation, or Executive Order
American Indian Religious Freedom Act of 1978, as amended [42 USC 1996] [PL 95-341]
Antiquities Act of 1906 [16 USC 431] [PL 59-209]
Archaeological and Historic Resources Management [DoDD 4710-1]
Archaeological and Historic Data Preservation Act of 1974 [16 USC 469]
Archaeological Resources Protection Act of 1979 [16 USC 470] [PL 96-095]
Bald Eagle Protection Act of 1940 [16 USC 668]
Clean Air Act (CAA) (1963) [42 USC 7401]
Clean Water Act (CWA) (1972) [33 USC 1251] [PL 92-500]
Conservation and Rehabilitation Program on Military and Public Lands (PL 93-452)
Conservation Programs on Military Reservations (Sikes Act) [16 USC 670] [PL 86-797]
Curation of Federally Owned and Administered Archaeological Collections [36 CFR § 79]
Determination of Eligibility for Inclusion in the National Register of Historic Places [36 CFR § 63]
Emergency Wetlands Resources Act of 1986 [16 USC 3901]
Endangered Species Act (ESA) [PL 93-205]
Environmental Protection and Enhancement: Subpart H Historic Preservation [32 CFR § 650]
Erosion Protection Act [33 USC 426]
Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations [EO 12898]
Federal Compliance with Pollution Control Standards [EO 12088]
Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), as amended [7 USC 136]
Federal Land Policy and Management Act of 1976 [43 USC 1701]
Federal Noxious Weed Act of 1974, as amended [7 USC 2801]
Fish and Wildlife Conservation Act of 1980 [16 USC 2901] [PL 96-366]
Fish and Wildlife Coordination Act of 1934 [16 USC 661]
Floodplain Management [EO 11988]
Food, Agricultural, Conservation and Trade Act of 1990 (Pesticide Reporting) [7 USC 136l]
Historic Preservation Certificates [36 CFR § 67]
Historic Sites Act of 1935 [16 USC 461] [PL 74-292]
Historic Preservation [AR 420-40]
Hunting, Fishing and Trapping on Military Lands
Indian Sacred Sites [EO 13007]
Invasive Species [EO 13112]

Intergovernmental Coordination Act (1968) [42 USC 4231] [PL 90-577]
Lacey Act of 1900
Migratory Bird Treaty Act (1918) [16 USC 703] [PL 65-186]
Multiple-Use Sustained Yield Act of 1960 [16 USC 528]
National Environmental Policy Act of 1969 (NEPA) [42 USC 4321] [PL 91-190]
National Historic Landmarks Program [36 CFR § 65]
National Historic Preservation Act of 1966, as amended [16 USC 470] [PL 89-665]
National Register of Historic Places [36 CFR § 60]
Native American Graves Protection and Repatriation Act of 1990 [25 USC 3001] [PL 101-601]
Native American Graves Protection and Repatriation Act Regulations
North American Wetlands Conservation Act [16 USC 4401]
Outdoor Recreation on Federal Lands
Outleasing for Grazing and Agriculture on Military Lands [10 USC 2667]
Preservation of American Antiquities [43 CFR § 3]
Protection and Enhancement of the Cultural Environment [EO 11593]

Table C.3.1
Federal Laws, Regulations, and Executive Orders Regarding Conservation Actions[1]
(continued)

Law, Regulation, or Executive Order
Protection and Enhancement of Environmental Quality [EO 11514]
Protection of Archaeological Resources: Uniform Regulations [32 CFR § 229]
Protection of Historic and Cultural Properties [36 CFR § 800]
Protection of Wetlands [EO 11990]
Recreational Fisheries [EO 12962]
Religious Freedom Restoration Act
Rivers and Harbors Act of 1899 [33 USC 401]
Safe Drinking Water Act of 1974, as amended [42 USC 300] [PL 93-523]
The Secretary of Interior's Standards for Historic Preservation Projects[36 CFR § 68]
Soil and Water Resources Conservation Act of 1977 [16 USC 2001]
Taylor Grazing Act (1934) [43 USC 315] [PL 73-482]
Timber Sales on Military Lands [10 USC 2665]
Use of Off-Road Vehicles on Public Lands [EOs 11644 and 11989]
Waiver of Federal Agency Responsibility under Section 110 of the National Historic Preservation Act [36 CFR § 78]
Water Resources Planning Act [42 USC 1962]
Watershed Protection and Flood Prevention Act [16 USC 1001] [33 USC 701]
Wild and Scenic Rivers Act of 1968 [16 USC 1271] [PL 90-542]

[1]This table provides a list of many of the conservation related Federal laws and EOs; however, this list is not inclusive of all Federal laws pertaining to conservation actions and that Fort Benning is mandated to follow.

C.3.4 Enforcement Activities

Environmental requirements can be enforced by Federal or state regulators, Army action, or civilian/public action. Fort Benning also seeks compliance with those environmental laws, regulations, and EOs that may have no specifically associated enforcement action. Finally, to meet its overall environmental stewardship responsibilities, the Installation has Fort Benning-specific regulations and environmental policies that it enforces.

C.3.4.1 REGULATORY AGENCIES

Laws and regulations identify types and extent of enforcement options and identify the regulating agency. Each environmental statute specifies the maximum civil and/or criminal fines and penalties available to the regulator. Potential civil and criminal enforcement options and fines for specific laws and violations are summarized in 40 CFR Parts 19 and 27 (11 December 2008). Additional information on civil monetary penalties can also be found in the EPA's Memorandum *Modifications to EPA Penalty Policies to Implement the Civil Monetary Penalty Inflation Adjustment Rule (Pursuant to the Debt Collection Improvement Act of 1996, Effective October 1, 2004"* (21 September 2004). The regulator often has general guidelines in determining what type of enforcement action is appropriate for a given case, but the regulator retains much discretion.

Regulators can use their administrative powers to cite a violation in a Notice of Violation (NOV) or Notice of Deficiency (NOD). The regulators may provide the Installation a chance to correct minor deficiencies without further enforcement action. Alternatively, a NOV can contain civil fines or can require a consent order. Civil fines against the Installation are paid out of operational funds, which can impact mission resources. A consent order is a binding agreement in which the Installation promises compliance action in return for the regulator's agreement to withhold any further enforcement action.

Regulators may have the option of pursuing a more formal civil action, such as a civil suit, but generally Federal regulators and Federal facilities are able to resolve an enforcement action before lawsuit. Federal regulators also may pursue civil suits against non-Federal entities or individuals. In lieu of civil action, regulators may initiate criminal enforcement actions against individuals, including Army employees. Criminal action can be taken against an individual directly involved in the violation or indirectly involved (that is, the individual knew of the prohibited condition but took inappropriate or no action). Additionally, under the Responsible Corporate Officer Doctrine, a person in a position of authority who has the responsibility to ensure environmental compliance and who should have known of the related requirement may be criminally liable, even if they did not know of the violation. This extension of criminal liability is based on the notion that environmental crimes are treated as public welfare offenses.

Individuals have the right under some environmental regulations to initiate enforcement actions. Some laws allow a citizen suit against an alleged violator or against the regulators. Citizen suits may result in an injunction (halting of action until full case is heard or until violation remedied) or other enforcement action.

C.3.4.2 FORT BENNING

The Army may initiate action against violators, both Army personnel and civilians. Administrative action can be taken against civil service and military personnel who disregard their environmental responsibilities. Additionally, certain laws allow the Army to recoup damage to government property or natural resource damage, as may occur with illegal dumping or releases into the environment. Fort Benning is committed to investigating environmental violations and taking appropriate actions. The military police and the Criminal Investigative Division of Fort Benning have investigated prior environmental violations. The aim is proactive management of environmental resources, while meeting mission requirements, to minimize or eliminate violations. Fort Benning works in partnership with regulators and the public whenever possible to meet this goal.

Fort Benning's enforcement of environmental violations does not substitute for any actions required by law or regulations (for example, notifications to regulators). Fort Benning's enforcement is not a guarantee against regulator enforcement actions against an individual, a unit, or the Army. The Installation maintains environmental compliance through a program that includes appropriate training, resourcing, and monitoring, as well as enforcement. This compliance program supports the Fort Benning training mission.

C.3.4.2.1 Range and Terrain Regulation

United States Army MCoE Regulation 350-19 (Range and Terrain Regulation, March 2013) provides guidance, standards, procedures, and requirements for the management of ranges, training areas, and airspace at Fort Benning. The regulation includes environmental protection requirements (section 5–17). Although the regulation does not contain language that specifies that violations of the regulation could result in disciplinary actions, actions that violate the environmental protection provisions of MCoE 350-19 also may violate other laws or regulations that may subject an individual to liability. Violation of the regulation may also be grounds for dereliction of duty or unacceptable performance.

The regulation also includes a requirement for a quality assurance program (section 5–27). Range/Training Area Quality Assurance Inspectors conduct quality assurance inspections of all ranges and training areas on a periodic basis for safety, environmental, and functional use compliance (as well as for unauthorized activities and uncontrolled forest fires). Inspectors are authorized to stop training until major environmental violations are corrected (for example, unauthorized digging within a RCW cluster location). Inspectors use checklists as a foundation for conducting their inspections and evaluations.

C.3.4.2.2 Environmental Awareness

Fort Benning's mission requires military units and thousands of individual Soldiers and civilian employees to train and/or travel over most of the Installation's 182,000 acres. These units and individuals often travel through isolated areas of the Installation. Individuals on the Installation

need to understand the environmental considerations associated with their training and/or work activities and the location in which these activities are performed.

Any training involving digging has specific environmental considerations. Driving and maintaining vehicles also require special precautions. Any work with petroleum, oil, lubricants, or other hazardous materials must follow well-defined procedures. Units completing field-training exercises must completely police the training area before leaving it. Environmental awareness training must convey information to enable unit personnel to understand their responsibilities. Special care is required in certain areas such as RCW clusters, sensitive areas, wetlands, and UEAs.

Knowledge of environmental considerations by itself, however, is not enough to ensure environmental compliance. The isolated nature of field-training exercises requires personnel to make good decisions in the absence of supervision. Environmental awareness training must attempt to instill an environmental ethic in the Installation's personnel by emphasizing concepts such as the following:

- Conservation is an integral part of the Army's mission.
- The Army is dedicated to leading the rest of the country in environmental compliance.
- Degrading the environment and wasting natural resources weakens the Nation.
- Military training must not threaten the health of the citizens it is sworn to protect.
- The Army has an obligation to provide its personnel with a safe and healthy working environment.
- Sustaining Infantry training on Fort Benning requires restoring and maintaining the ecological integrity of the Installation's forested ecosystems. An intact forest preserves training options.
- Environmental fines and clean-up activities are costly and drain funds from the training mission.

The Environmental Incident Report Form, FB Form 31, is a good example of an environmental compliance tool that depends on the internal motivation of the Installation's personnel. The form is used to inform Fort Benning's environmental oversight personnel of incidents that have occurred in the field. When used regularly, this form can speed the Installation's response to environmental incidents. If it is not used, many environmental incidents will go unnoticed, which could lead to a gradual degradation of the environment at Fort Benning.

C.3.4.2.3 Individual Accountability

Compliance with environmental requirements depends on actions by individuals who are trained to know the requirements and who incorporate those requirements into daily activities. Fort

Benning also has responsibilities to safeguard the natural and cultural resources on the Installation. As a result, the Installation may be required to investigate incidents in which amilitary or non-military personnel damages those resources or otherwise does not comply with environmental requirements. The specific facts for a situation and the status of the accused define what range of enforcement actions can be taken. The Commander or supervisor tailors the enforcement action to the specific situation to ensure that appropriate deterrence and justice are achieved.

Fort Benning supervisors have a range of actions available to them for addressing military individuals who do not comply with laws and regulations, including environmental laws and regulations. Serious infractions may require reports to regulators and formal military or non-military investigations. These investigations may lead to court or administrative disciplinary action. For less serious violations civilian and military supervisors on the Installation have processes in place for disciplinary actions, including verbal or written performance counseling for an individual. Questions about the disciplinary actions available to address environmental violations by civil service employees should be directed toward the civilian personnel advisors.

C.3.4.2.4 Military Unit Accountability

The commander of the military unit is ultimately responsible to ensure that the unit's personnel complete their mission while complying with environmental requirements. Coordination with EMD staff early in the planning stages promotes compliance by incorporating environmental requirements into mission planning. When implementing actions to meet the mission, the commander and other individuals can be held individually accountable. In some situations, however, it is more appropriate to hold an entire military unit accountable. An EQCC has been established at Fort Benning and meets quarterly, which can be used to oversee the assessment of damages caused by military units.

C.3.4.2.5 Contractors

Environmental requirements are incorporated into contracts that have the potential to impact the environment. The program managers in EMD and the Installation's environmental attorney should review contracts in draft stages so that any additional requirements or changes can be incorporated easily into the contract. The proponent of the project that is using the contract typically submits the project details to EMD for an environmental review, as required by NEPA. The proponent generally initiates the NEPA review early in the planning process by submitting project details on a Form FB 144-R, Request for Environmental Analysis, (see Appendix C2 for details). The proponent includes draft contracts with the Record of Environmental Consideration, if available. If the contract or contractor's actions for the project change, the proponent coordinates with Environmental Management Division to determine if additional actions are required to protect the environment.

Fort Benning strives to ensure that personnel responsible for overseeing or inspecting contractor operations are familiar with the contract's environmental provisions and are trained in basic environmental compliance. If the contracting officer or inspector suspects environmental violations, that person confers with the Environmental Attorney and the Environmental

Management Division program experts to determine if the contractor is meeting the environmental requirements specified in the contract. Contract officers generally specify enforcement provisions in the contract in addition to standard enforcement actions that may not be listed in the contract. Common examples of actions a contract officer may take to remedy environmental problems include requiring the contractor to repair or replace items or reducing the amount paid to the contractor because of inadequate work.

Any violations of environmental law or regulations are documented thoroughly. Fort Benning may have reporting requirements, such as for spills of petroleum products or hazardous materials on the Installation, even if a contractor caused the spill.

C.3.4.2.6 Affirmative Claims

Under the Federal Tort Claims Act, Fort Benning may initiate a claims process to recoup damage to government property, which includes natural resources. Claims for the cost of Fort Benning supplies and personnel efforts to assist in containing or correcting an environmental problem also may be recovered. The Fort Benning OSJA, Claims Division handles such cases and coordinates with EMD.

Another law that allows the DoD to recover damages to natural resources is the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which is sometimes referred to as Superfund. The Secretary of the DoD has trusteeship over the natural resources on all lands managed by the Army and other service branches of the DoD. In certain circumstances Fort Benning may initiate a request via the DA that DoD pursue natural resource damages against a person or entity who has contaminated natural resources with a discharge of oil or release of a hazardous substance. Generally, the responsible person or entity will first clean up the oil or hazardous substance release before natural resource damages would be pursued. The clean up and damage assessment is a lengthy process that is not appropriate for most releases, but it may be required in certain circumstances to protect the natural resources on Fort Benning.

C.3.4.3 PUBLIC ACTION

The public, or community, also plays a role in enforcement of environmental laws and regulations. A number of environmental laws allow citizens to provide input and even initiate some form of enforcement. Through public meetings, public notices, and/or web page postings, Fort Benning provides information to the community about Installation projects that may impact environmental resources, and requests comments in accordance with NEPA procedures. These comments provide a means for Fort Benning to identify a community's or an individual's concerns on environmental or socioeconomic impacts of the project. Various regulations require permitting agencies to notify the public of a pending permit application and to request comments.

Citizens may have the option to take enforcement action, even if a regulator has not. This may be done by a citizen's suit filed by an individual or a group against either the offender for the violation or the regulator for improper enforcement against the offender. Fort Benning wants to

avoid the need for citizen suits by continuing good relations with the community through information exchange and environmental compliance.

C.3.5 Tracking Compliance

Fort Benning takes advantage of a variety of mechanisms to track environmental compliance. These tracking mechanisms are described in the sections below.

C.3.5.1 Environmental Performance Assessment System

The Environmental Performance Assessment System (EPAS) program is intended to provide the installation with a framework to identify and track environmental compliance deficiencies and suggest corrective actions. External inspections are conducted every three years by a U.S. Army Installation Management Command (IMCOM)/Army Environmental Command (AEC) combined team. The EPAS inspection represents a "snapshot in time" assessment of Fort Benning's environmental compliance. Findings are classified in terms of existing or future noncompliance with state/Federal environmental laws and/or noncompliance (existing or future) with Army/DoD environmental regulations. The EPAS reports describe the findings, analyze the root-causes of any problem areas encountered, and recommend corrective actions. Inspections cover more than 20 different environmental areas—essentially all environmental management programs under AR 200–1. Also, IAW AR 200-1 and DA Memo *"Environmental Management Assessment Requirements"* (12 October 2010), installations are required to conduct an annual EPAS of all compliance media that is not assessed under the IMCOM/AEC external EPAS audit.

C.3.5.2 Annual Installation Status Report, Part II

The Installation Status Report (ISR) is an Installation status self-assessment program mandated by HQDA and TRADOC. The ISR, Part II is the portion of the assessment that covers environmental compliance. The assessments are not made in terms of environmental compliance alone, but also account for the resources available to correct known compliance problems. The prescribed questionnaires, however, lack the sophistication needed to produce a comprehensive assessment. The ISR provides only a macro-level management tool and does not fully or accurately capture the Installation's environmental conditions. Media covered and methodology used by the ISR, Part II have changed from year to year; as a result, it is not a valid tool to track Installation environmental compliance over time.

C.3.5.3 Environmental Quality Report

The EQR is a broad, comprehensive, automated environmental compliance tracking and reporting system. It is a DoD-wide system that feeds information through the formal chain of command. One formal submission is required annually, but monthly updates are provided to TRADOC. The program covers permits, results of inspections, Notices of Violation or Deficiencies, fines, lawsuits, and corrective actions. It is organized by environmental pillars—compliance, restoration, prevention and conservation—and covers all environmental management programs under AR 200–1.

C.3.5.4 Defense Site Environmental Restoration Tracking System

The Defense Site Environmental Restoration Tracking System is an automated tracking and reporting program that feeds information about the Installation restoration status through the

formal chain of command. It is used to assist the DoD in the preparation of the annual Defense Restoration Report to Congress. The Installation provides two semi-annual updates AEC.

C.3.5.5 TOXIC RELEASE INVENTORY REPORT

The Toxic Release Inventory (TRI) report is required when specific, toxic product(s) are present on the Installation in a quantity exceeding the reporting threshold prescribed by the US EPA. It is a formal report presented in a format also prescribed by the EPA and submitted directly to them. Information copies are provided concurrently to the state of GADNR and to the DoD through the formal chain of command. This report covers only the particular product(s) present in a reportable quantity; however, thorough investigative inventories are conducted to achieve compliance. These exercises are performed usually by a contracted consultant with specific field expertise.

C.3.5.6 INSTALLATION HAZARDOUS WASTE MANIFEST DATABASE

This database was produced and is updated and maintained locally. It tracks all hazardous waste manifests initiated at the Installation and enables the production of a variety of reports instantaneously. Reports are used to answer Installation management, chain of command, or any outside agency's inquiry on a case-by-case basis.

C.3.5.7 FORT BENNING'S RECORD OF ENVIRONMENTAL CONSIDERATION DATABASE

Fort Benning has developed an electronic system for submittal and review of proposed actions on the Installation. Through the utilization of the "NEPA Web-Tool", project submittals are assigned a tracking number and distributed to the Environmental Management Programs Branch (EPMB) Subject Matter Experts (SMEs) for review. Comments and guidance provided by the SMEs is consolidated by the Web-Tool which produces a Record of Environmental Consideration (REC) for the proponent. The Web-Tool also provides a searchable database that tracks the cataloging, progress, and filing of all NEPA compliance via the RECs initiated at the Installation and enables the production of a variety of reports instantaneously. Reports are used to answer Installation management, chain of command, or any outside agency's inquiry on a case-by-case basis.

C.3.5.8 CONTROL BURN TRACKING SYSTEM

The Control Burn Tracking System is an informal, locally designed, updated, and maintained database used to track areas treated and to aid in formulating future plans and scheduling. Information is used internally to inform Installation management and chain of command on a case-by-case basis.

C.3.5.9 WATER QUALITY

Columbus Water Works provides Tap Water and Well Water reports to GADNR on at least a yearly basis. These reports are legally mandated and include water analyses for detection of lead, copper, or nitrate contents. Although no formal database exists, compliance is tracked by following guidance provided to Fort Benning from the GADNR, annually preparing the water quality report to Installation consumers, and manually filing various documents shared with the state such as the results of water analyses. Continuous review of the state water rules and state permit requirements sustain a tracking focus.

C.3.5.10 INSTALLATION NOTICE OF VIOLATION REPORT

The Installation Notice of Violation (NOV) report is a monthly report that is used internally to track Notice of Violations and to provide a status to the local chain of command. It covers only media that are the object of a Notice of Violation at the time of the report.

C.3.5.11 ANNUAL REVIEW MEETINGS WITH THE U.S. FISH AND WILDLIFE SERVICE

An annual meeting is held with the USFWS to review the status of implementing the reasonable and prudent alternatives, and reasonable and prudent measures, and associated management plans contained in all of the Service's existing BOs. The USFWS contends that following these alternative actions and measures avoids jeopardizing the continued existence of RCW at Fort Benning. The meeting also is an opportunity to update the population demographics of the species. Attendance usually includes the Fort Benning Director of Public Works, along with his key RCW management and technical staff, the Installation's Environmental Attorney, and the USFWS Regional Office Supervisor, along with his/her key field officer and technical personnel. Minutes to the meeting that outline the yearly status of Fort Benning's compliance with the BOs are provided to the local chain of command and IMCOM.

C.3.5.12 PESTICIDE USAGE REPORTS

Records of pesticide applications and non-chemical pest management operations are maintained on a daily basis using DD Form 1532–1 (Pest Management Maintenance Record) or a computer-generated equivalent. A monthly summary, based on the preceding daily information, is prepared by each appropriate organization using DD Form 1532 (Pest Management Report) or a computer-generated equivalent. The Installation Pest Management Coordinator is responsible for summarizing the monthly reporting information at the Installation level and for forwarding this information at least annually to the Army Environmental Command, Pest Management Consultant. All records and reports are archived after two years for permanent retention.

C.3.5.13 FORMAL INSPECTIONS BY REGULATORY AGENCIES

Formal inspections by regulatory agencies can be announced or unannounced. They may cover individual programs, or they can be comprehensive in nature. For example, the "Multimedia" type inspection is conducted by a combined team of inspectors from the EPA Region IV and GADNR. Media normally covered include water quality, air quality, safe drinking water, underground storage tanks, hazardous waste, toxic chemicals, PCBs, asbestos, and lead management programs. Fort Benning uses each regulator inspection as a measure of environmental compliance. If a regulator proposes a violation, Environmental Management Division contacts the unit to investigate the violation, takes appropriate corrective action, and responds to the regulator. The status of any Fort Benning enforcement action is reported to higher Army levels through a computer database. Additional emphasis is placed on ensuring timely and adequate responses to any Notice of Violations. EMD immediately provides the SJA environmental attorney a copy of any NOVs or non-compliance notices. The environmental attorney coordinates with higher level Army legal offices regarding the status of any NOV. The environmental attorney also assists in enforcement action research negotiation and response.

C.3.5.14 INTERNAL STAFF INSPECTIONS AND ASSISTANCE VISITS

EMD provides courtesy inspections or reviews of environmental conditions (assistance visits), when requested by a Fort Benning client organization or unit. This program is designed to emulate state or Federal regulatory inspections. Courtesy reviews can assist a commander in determining his compliance stance, particularly for management of hazardous substances and hazardous waste. Although many of these courtesy inspections are conducted in cantonment areas, they can be conducted virtually anywhere on Fort Benning to ensure natural resources are protected. Areas of inspection are primarily unit satellite and central accumulation points, as well as motor pools and supply storage areas. Media inspected include hazardous materials and waste. The goal is to provide every client unit with two inspections each year, (one informal and one formal). Reports of inspection results and recommended corrective measures are provided to the local chain of command. Each military unit also has a designated SECO that has access to checklists to conduct unit level self-inspections on a routine basis.

C.3.6 Regulation of Hunting and Fishing

The MCoE Regulation 200-3 (Hunting, Fishing and Recreation) is developed by the EMD, Conservation Branch; the proponent for the regulation. The regulation closely follows state and Federal natural resource regulations with some specific exceptions which are more restrictive than state and Federal regulations. MCoE 200-3 is a Fort Benning specific document that covers responsibilities, access, permits, fees, hunter call-in/call-out procedures, season dates and bag limits and administrative penalties for various violations. Recommendations for changes to the regulation may come from many sources, but most proposed changes are reviewed by the Commanding General's Natural Resources Advisory Council. According to their charter (updated 21 Nov 2012), the Council will "Provide advice on the management of fishing and hunting on Fort Benning. Cooperate with and provide recommendations to, Chief, Conservation Branch, Director of Public Works (DPW) on fishing and hunting programs on Fort Benning." Publication of MCoE 200-3 requires an annual decision paper be routed through Staff Directorates and all Major Subordinate Units on the Installation to the Chief of Staff for approval. The Conservation Branch consolidates comments and prepares responses. Final approval authority lies with the Chief of Staff. Upon approval, the regulation is reviewed by the Directorate of Human Resources, Administrative Services signed, then posted on the Fort Benning Fish and Wildlife Website, printed and distributed. The goal is to make the documents available by 15 August each year (opening day of squirrel season in Georgia).

The Directorate of Emergency Services enforces the provisions of MCoE Regulation 200-3 as well as state and Federal natural resource laws and regulations. The Conservation Law Enforcement Officers (Game Wardens) are DoD civilian law enforcement officers though active duty military police personnel do provide support.

APPENDIX C4 CULTURAL RESOURCES MANAGEMENT

Fort Benning desires to follow good stewardship practices in the conservation of its cultural resources, sacred sites, and traditional cultural properties. The Cultural Resources Management (CRM) Program assists the Commander of Fort Benning in meeting mission requirements of military training, power projection, and maintenance of a high quality of life for the military and civilian community. The CRM Program accomplishes its mission by conserving cultural resources through compliance with applicable Federal laws, regulations, and guidelines. Good cultural resources management does not entail the preservation of all cultural resources on Fort Benning. Rather, the CRM Program primarily attempts to conserve those cultural resources that are shown to have at least the potential of contributing to the understanding of our collective past in a manner that is compatible with Fort Benning's mission.

Funding for the CRM Program comes from the Installation Management Command as formulated with a standard level of service. Specific projects or undertakings such as the construction of a new range, however, should have funds programmed as a line item to comply with legal requirements.

C.4.1 CULTURAL AND HISTORICAL RESOURCES

Cultural resources consist of archeological sites, historic structures, and historic landscapes, and may include American Indian sacred sites and traditional cultural properties. Archeological sites are the material remains of past human activity, regardless of ethnic, racial, or otherwise culturally defined origin. Historic structures are those buildings, structures and objects that are over 50 years of age and/or those meeting the Secretary of Interior's Guidelines for eligibility for inclusion on the National Register of Historic Places (NRHP). Sacred sites and traditional cultural properties may be archeological sites or other locations that are recognized as having religious importance or importance in the cultural practices or history of a Federally recognized Tribe (Tribe).

Over 170,000 acres of Fort Benning have completed Planning Level Surveys that exclude only Dud areas and some acreage that are, for CRM purposes, permanent Safety Danger Zones. These surveys have identified 3,978 archaeological sites that range in age from approximately 8,000 or more years through the last 50 years. Similarly, the number of historic structures on Fort Benning—as of this writing numbering about 650—will probably increase as time and events add meaning to newer buildings that today are taken for granted. No sacred sites or traditional cultural properties are currently recognized on Fort Benning.

C.4.2 NATURAL RESOURCES MANAGEMENT IMPLICATIONS

Natural resources management activities may involve ground disturbance and, consequently, can present the potential for adverse impacts to cultural resources. The use of best management practices, such as avoiding ground disturbance on archeological sites, is a prerequisite for the protection of cultural resources. The following guidelines focus on three areas—cultural resources compliance requirements generated as a result of ecosystem

management activities; contributions that cultural resources studies can make to ecosystem management decisions; and human activities (including practices by American Indians) that should be supported and sustained in development and implementation of an ecosystem management plan.

Natural resources personnel have lent invaluable assistance in the discovery and protection of cultural resources on Fort Benning. Natural resources personnel are in the field with a high level of awareness of their surroundings. Changes in the condition of the natural environment on or near cultural properties often signal the need for greater site protection or perhaps other steps such as excavation. Such awareness and observations by natural resources personnel and others continues to be encouraged.

C.4.2.1 Compliance

Cultural resources compliance requirements associated with ecosystem management activities may be generated under various statutes. Relevant historic preservation statutes include, but are not limited to, the National Historic Preservation Act (NHPA), the Archeological Resources Protection Act (ARPA), the Native American Grave Protection and Repatriation Act (NAGPRA), the American Indian Religious Freedom Act (AIRFA), EO 13007 (Indian Sacred Sites), and EO 13175 (Consultation and Coordination with Indian Tribal Governments). The compliance requirements of the preceding statutes, their associated implementing regulations, guidelines, and EOs should be considered in the conduct of natural resource management activities on Fort Benning.

All ground disturbing activities associated with natural resources management may trigger cultural resources compliance requirements. Such activities include, but are not limited to, forest management (harvesting, plowing, and planting for regeneration); habitat management (physical soil preparation for food plots, cover plantings, pond and wetland construction); cantonment area management (historically appropriate landscaping may be an issue where the cantonment area is in Fort Benning's historic district); soil surveys; land rehabilitation and maintenance (terrain modification for erosion control and restoration); and agricultural outleasing (plowing).

National Environmental Policy Act and National Historic Preservation Act

Tracking projects, training, or other actions that may affect the environment begins with the completion of a Request for Environmental analysis (Form FB 144-R) by the proponent of the project. Proponents may include Conservation Branch and Land Management Branch, military unit, or other activity on Fort Benning. The Cultural Resource Manager receives a copy of the completed Form FB 144-R for review from the NEPA Coordinator. The project or "undertaking" is examined to determine if there will be an effect on a cultural resource that is subject to one or more of the above Federal laws, regulations, or guidelines.

NEPA and NHPA, particularly Section 106 of NHPA, have similar, but separate steps in the process of consideration of project effects including the requirement for public notice and

comment. NHPA is specifically structured to handle cultural resources and its requirements are more detailed. Both processes must be satisfied to assure legal compliance. Figure C.4.1 illustrates the general process followed in complying with NHPA Section 106 compliance. In most cases, the steps taken to comply with NEPA and NHPA, and to varying degrees with other historic preservation legislation, are concurrent, though the regulatory agencies concerned will differ. In particular, the State Historic Preservation Offices (SHPO) for Alabama, Georgia, and Florida, and the Advisory Council on Historic Preservation (ACHP) are the primary clearing agencies for undertakings that might affect cultural resources. Consultation with the Tribes is required when sacred sites, known or suspected traditional cultural properties, or American Indian burials are involved; however, Fort Benning's CRM program has selected to implement Army Alternate Procedures (AAP) in lieu of 36 CFR Part 800 for Section 106 compliance of the NHPA. Figure C.4.2 compares the coordination steps of NEPA and NHPA under the Army Alternate Procedures for Section 106 compliance.

Section 110 of NHPA has mandated the identification of all cultural properties on federally owned land and the nomination of significant cultural properties to the NRHP. The conduct of the CRM program as related to NHPA includes Phase 1—survey to discover cultural properties, Phase II—testing of archeological sites or historic structure assessment to determine their eligibility for the Register, and, when necessary, Phase III—data recovery or varying levels of Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation when these respective historic properties must make way for a given undertaking. It also has mandated that all cultural properties that are of unknown eligibility or that are known to be eligible for the NRHP be treated as if they are on the NRHP.

NHPA established the NRHP as the repository of information for significant historical (cultural) properties in the United States. Significance may be measured at the national, regional, or local level. Each State may also have its own register, usually reflecting specific emphasis on state and local significance. To be determined eligible for the NRHP, a cultural property must meet one of four, broadly defined, criteria (A-D). The criteria of eligibility for inclusion on the Register include:

> …districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and: (A) that are associated with events that have made a significant contribution to the broad patters of our history; or (B) that are associated with the lives of persons significant in our past; or (C) that embody the distinctive characteristics, of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (D) that have yielded, or may be likely to yield, information important in prehistory or history. (36 CFR 60.4)

Consultation with relevant Tribes on a government-to-government basis and public notice and comment as defined within the Historic Property Component of the Installation Cultural Resources Management Plan (ICRMP), in lieu of 36 CRR 800 procedures, as well as completing coordination with the SHPOs and ACHP as mandated by NHPA, Section 106,

usually will fulfill NEPA requirements to take into account project effects on cultural resources (see Army Regulation 200–1, DoDI 4710.02 *DoD Interactions with Federally-Recognized Tribes,* and DoDI 4715.16 *Cultural Resources Management* for consultation procedures). It should be noted that neither the Tribes, the SHPOs, nor the ACHP has approval authority over projects. The purpose of the consultation is to allow the relevant Tribes, the SHPOs, and the ACHP to review the internal review process that is afforded by the AAP.

In particular, SHPOs assist in determinations of eligibility for the NRHP and render advice on the avoidance or mitigation of project adverse effects on eligible resources through technical assistance and not necessarily through formal consultation. To accomplish their tasks, a formalized set of consultation steps is followed. While Fort Benning can disagree on resource eligibility and recommendations on avoidance or mitigation of adverse effects and proceed with a given undertaking as planned (with HQTRADOC and DA concurrence), it must follow the process of consultation. Failure to consult formally with the Tribes (as needed), the SHPO, and ACHP can lead to legal action alleging Fort Benning is in violation of NHPA by foreclosing on SHPO and ACHP's opportunity to comment. Court action may halt and possibly kill the planned undertaking and delay Fort Benning in accomplishing its mission.

As with NEPA, NHPA does not provide for fines or other penalties. NHPA does mandate, however, that the process of decision making be adhered to by Federal agencies or those using Federal funds or otherwise permitted by the Federal government. Failure to consult with the relevant Tribes, SHPO and sometimes the ACHP on an undertaking, can lead to civil law suites brought by private individuals. "Foreclosure" of the prescribed period for the Tribes, SHPO, or ACHP comment and any subsequent legal challenge can result in a project or undertaking being enjoined by a Federal court.

Figure C.4.1 General NHPA Section 106 Process

Note: Federally recognized Tribes are consulted as appropriate at various stages of the process.

Advisory Council on Historic Preservation

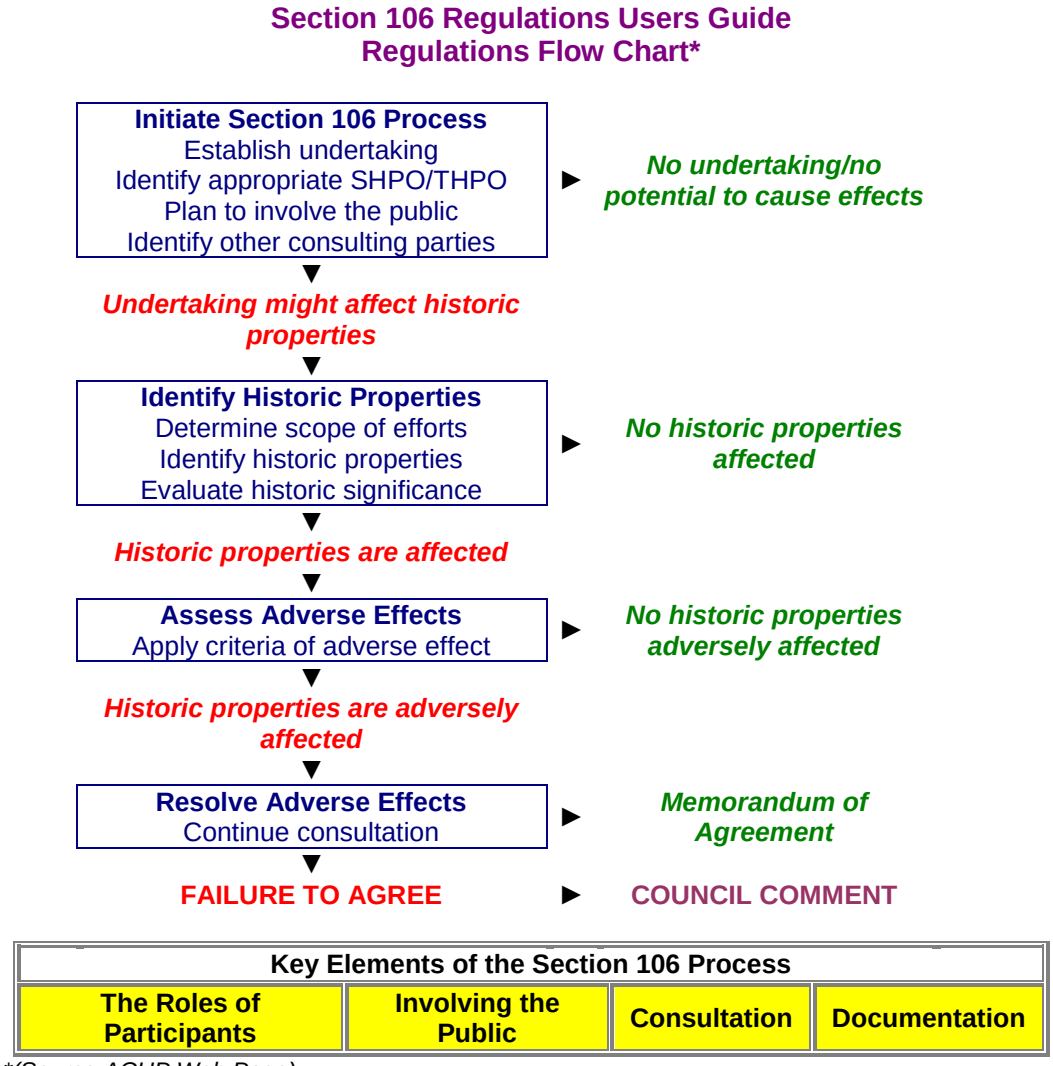

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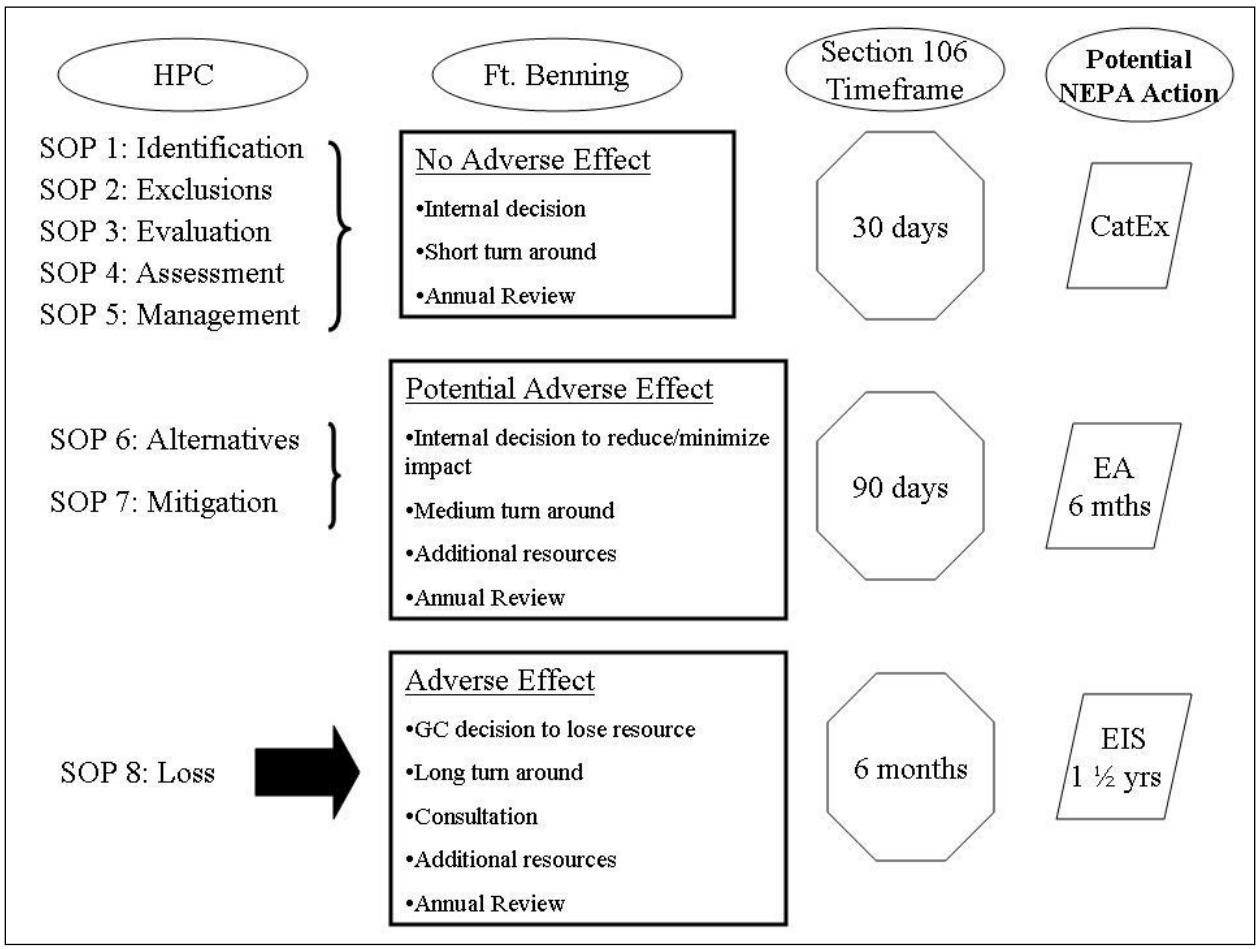
Figure C.4.2 Comparison of the Standard Operating Procedures under Army Alternate Procedures, with appropriate NEPA action.



Archeological Resources Protection Act

ARPA is one of two main historic preservation laws that provide for criminal and civil penalties for causing harm to archeological sites (NAGPRA being the other). It is designed to provide the Federal land manager a tool to combat the wanton destruction of archeological sites on Federal property. Looting and similar vandalism on an archeological site on Federal property can be prosecuted directly, without the need of a lawsuit generated by a third party.

Archeological sites on Federal property may be surveyed, tested, excavated, or otherwise disturbed only with a permit. A limited exception occurs when authorized Fort Benning personnel or its agents perform mandated CRM actions; no permit is required. Similarly, the use of a metal detector on Federal property requires a permit. Failure to acquire a permit can result in criminal penalties, fines, and confiscation of property. Picking up projectile points

("arrowheads") from surface context on Federal property is specifically exempted from criminal prosecution.

Native American Grave Protection and Repatriation Act

NAGPRA is designed to protect the historic human remains and interred cultural items of American Indians, Hawaiians, and Inuit (Eskimo) and prohibits any person from wrongfully obtaining, transporting, or selling the items. As with ARPA, criminal penalties, fines, and confiscation of property can result from the unlawful disturbance of American Indian Graves. Consultation with relevant Tribes is required whenever an American Indian grave or graves may be present or when a grave is intentionally or unintentionally disturbed. Projects or other undertakings must cease within the immediate vicinity of any American Indian grave to allow time for consultation and disposition of the human remains and any associated cultural items. At Fort Benning, the Muscogee (Creek) Nation of Oklahoma and at least 9 other Creek, Seminole, and related Tribes are part of the consultation process.

Each of the Tribes is treated on a government-to-government basis as required by EO. Time for consultation with the several Tribes must be included as part of planning any undertaking. Though consultation is the responsibility of the Installation Commander, it is typically accomplished at the Garrison Commander's level. Sufficient time for staffing of a decision paper to the Garrison Commander, and occasionally to the Commanding General, must be included. The Coordinator for Native American Affairs (who also serves as Cultural Resource Manager for Fort Benning) is the Point of Contact for consultation actions with American Indians.

American Indian Religious Freedom Act and Executive Order 13007 (Indian Sacred Sites)

AIRFA and EO 13007 reinforce the rights of American Indians to practice their traditional religions and requires Federal land managers to allow American Indians onto Federal properties for that purpose, as needed. Sacred sites and Traditional Cultural Properties are identified at the discretion of each Tribe in consultation with Fort Benning.

C.4.2.2 Contributions

Data recovered from archeological site excavations on the Installation and nearby locations pertaining to floral and faunal remains and pollen analysis can provide Installation ecosystem managers with direct and highly relevant information. Cultural resources management data with regard to native plant and animal species, native plant and animal communities, changes in native plant and animal communities through time, and past human relationships with and modifications to biotic communities, climate change, and the landscape and ecosystems, may contribute to ecosystem management. Archeological data that directly pertain to native biodiversity should be used, if available, in order to ensure that there is a historical basis for determining what is "native" and what should be sustained.

C.4.2.3 Human Activities

In general, activities associated with sacred sites and traditional cultural properties should be considered in the conduct of natural resources management activities. While the following specifically apply to American Indian access to sacred sites and traditional cultural properties, access to historic cemeteries and similar activities by other American groups may require consideration during natural resources management activities. Under the American Indian Religious Freedom Act, Federal agencies are required to allow American Indians reasonable access to lands that contain sacred sites. EO 13007 reaffirms this statute and adds the additional requirement that the Army avoid adverse effects to the "physical integrity" of sacred sites. EO 13007 requires Fort Benning to provide reasonable notice to the Tribes when land management policies may restrict future access or adversely affect sacred sites or traditional cultural properties.

Traditional cultural properties may include Indian sacred sites; topographical features of the natural environment; past occupation sites (archeological sites); burial areas; building ruins; plant, animal and mineral gathering areas; and spirit sites such as caves or other geological structures that may be indistinguishable from the surrounding natural environment. Fort Benning does not contain any known American Indian sacred site or formally recognized traditional cultural property, though this status may change with further consultation with the Tribes. It is probable that sites associated with the last phase of American Indian settlement during the eighteenth and early nineteenth centuries, such as Kasita and Yuchi Town, may become designated as traditional cultural properties, if not sacred sites. It must be reiterated that Fort Benning is required to consult with the relevant Tribes on a Government-to-Government basis, meaning Commanding General and Garrison Commander involvement.

Modification to terrain and changes to plant species composition in sacred site areas could significantly impact the site and, therefore, could adversely affect Indian religious practices and require actions to comply with EO 13007 and NHPA. Additionally, for installations that have known American Indian sacred sites and plant, animal and mineral gathering localities, the INRMP and ecosystem management program should recognize these areas and support and sustain the human activities associated with them. Management of plant and animal communities and other natural areas that are associated with traditional beliefs or utilized in traditional American Indian practices should focus on how the area and resources can be integrated into the overall ecosystem management plan in a manner that sustains and enhances this human activity.

The Federally-recognized Indian Tribes that have association with Fort Benning are contacted for the purposes of the NHPA, NAGPRA, and other required consultation on a government-to-government basis. In most cases, the Garrison Commander acts for the Commanding General as Federal land manager. The coordinator for Native American Affairs, appointed by the Garrison Commander, maintains routine communications between the Tribes and Fort Benning.

The Federally recognized American Indian Tribes that have a historical association with Fort Benning and participate in consultation are:

- Muscogee Creek Nation of Oklahoma
- Chickasaw Nation
- Seminole Nation of Oklahoma
- Poarch Band of Creek Indians
- Kialegee Tribal Town
- Mississippi Band of Choctaw Indians
- Thlopthlocco Tribal Town
- Alabama-Coushatta Tribe of Texas
- Alabama-Quassarte Tribe of Oklahoma
- Seminole Tribe of Florida

APPENDIX C5 WATERSHED MANAGEMENT

A watershed delineates a land area where all surface water drains to a specified point. Activities that affect the quality and quantity of water moving from the watershed into surface waters impact the biology and usefulness of the streams. Natural resource management of water-related environmental concerns; such as erosion, sedimentation, and pollution, must be assessed on a watershed basis. Watershed boundaries typically encompass numerous Stakeholders, representing diverse interests and responsibilities. The quality and quantity of the water leaving the watershed includes downstream interests as Stakeholders.

Watershed Management is a framework for Stakeholder collaboration and cooperation in order to prevent stream degradation and improve the aquatic biological communities. A Watershed Management Plan is a document that describes the watershed, the Stakeholders, land use and management, and all factors impacting the stream. This plan is developed in collaboration with all Stakeholders to identify best management practices, effective monitoring and to leverage resources. A Watershed Management Plan is a living document, regularly revised, that is recognized by federal and state government as the basis for Stakeholder agreements.

C.5.1 AUTHORIZATION

AR 200-1 4-2(d) describes the basis, policy and requirements for the Watershed Management Program. The primary legal drivers for the Watershed Management Program are the Federal CWA and the Safe Drinking Water Act (SDWA) and their associated Federal and state regulations.

The “Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management” (65 FR62565-62572, 18 Oct 2000) established the watershed approach as the means to prevent and reduce pollution of surface and ground waters resulting from Federal land and resources management activities.

C.5.2 HISTORY OF THE PROGRAM

In order to implement Federal policy, Army regulation and to assure compliance with the CWA and SDWA, Fort Benning EMD established the Watershed Program within the Environmental Programs Management Branch in 2008. Fort Benning funded the "Watershed Protection Master Plan" (USACHPPM 2008) to provide a description of the Installation watersheds and a conceptual plan for a Watershed Program that would meet regulatory, sustainability and stewardship requirements. A second document, the "Watershed Protection Quality Assurance Program Plan" (USACHPPM 2010) provided a technical description of the Watershed Program and an independent estimate of the costs and resources required to implement an effective program.

The Program initiated a "Fort Benning Stream Assessment Project" in 2009. This project conducts annual stream assessments using a subset of the EPA Rapid Bioassessment Protocols and produces an annual update of stream conditions. In response to the conversion of forested land to create the Good Hope Maneuver Training Area (GHMTA), the Program developed a GHMTA Watershed Monitoring Plan and initiated monitoring and the production of a GHMTA Watershed Assessment.

C.5.3 CURRENT PROGRAM

The Fort Benning Watershed Program is a knowledge-based approach to minimizing the impacts of Installation activities on water resources. The interrelated components of this approach are to conduct monitoring in order to identify problems, produce documentation to support management decisions, and interaction with Stakeholders to disseminate knowledge and promote collaboration.

The Program has directly integrated all Water Resources compliance program areas: recreational waters, water resources protection and management, wastewater, stormwater and drinking water (AR200-1). The Program provides documentation and expertise to all EPMB compliance programs and other Installation managers, such as ITAM. The Program supports public outreach and education, advises and coordinates water-related research projects, and represents the Installation as a Stakeholder to exterior watershed programs.

C.5.4 PROGRAM INITIATIVES

The Watershed Program will continue to advocate a Watershed approach for all natural resource management programs. Protection of water resources will be achieved through continued monitoring, documentation, and interaction with Stakeholders both on and outside of the Installation. The Program will increase interaction with research organizations, Schools and Universities in order to address knowledge gaps identified by the monitoring program.

The Program will continue to monitor and report on conditions in the GHMTA. If required, the Program will develop and document a GHMTA Watershed Management Plan to coordinate sustainability and stewardship of the area into a regulatory agreement.

The Program is conducting a Watershed Assessment of Victory Pond in response to concerns about present health risks and potential threats to sustainable training of Army swimmers. The Program is conducting an Initial Watershed Assessment of Uchee Creek in response to concerns about pollution and the survival of rare mussel species. A Watershed Assessment of Upatoi Creek will be part of the Installation's storm water permit requirements due to the listing of the on-Post stream segment as impaired due to fecal coliform bacteria.

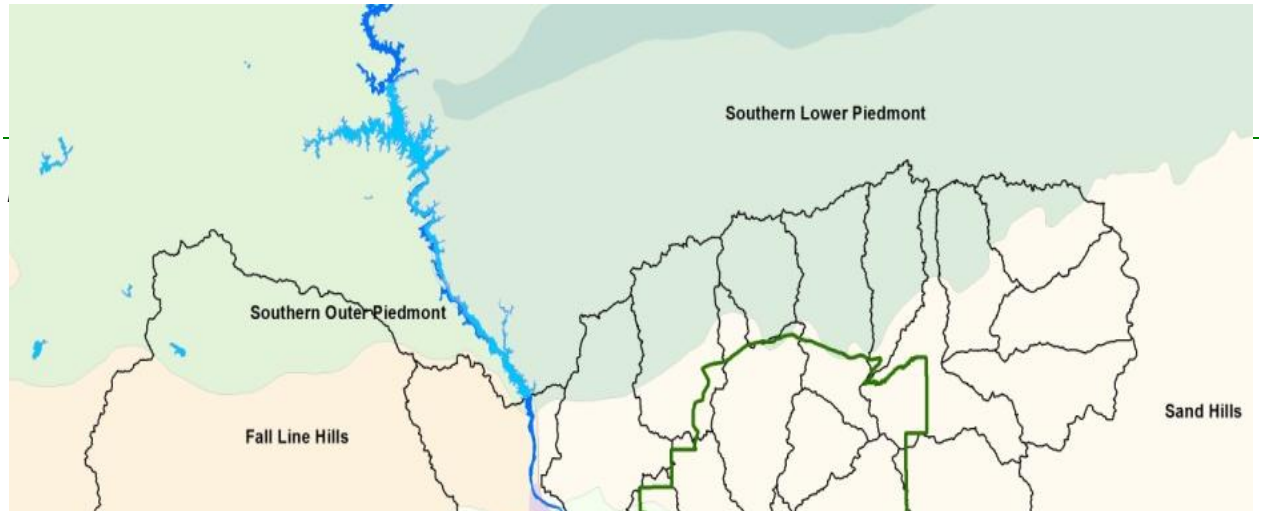
The Program will continue surveillance of Installation streams to assure compliance and stewardship. The Program continues to provide expertise and supporting documentation for Installation managers.

C.5.5 EFFECTS OF LAND USES AND MANAGEMENT PRACTICES OUTSIDE THE INSTALLATION BOUNDARY

Fort Benning is located within parts of three counties and has common boundaries with six local government jurisdictions including the city of Columbus, Georgia and the counties of Muscogee, Talbot, Marion, and Chattahoochee in Georgia and Russell in Alabama. Current land uses in the major metropolitan center of Columbus, Georgia include residential, industrial, commercial, state and federal highways, and recreation areas. Other uses in the surrounding areas include agriculture, multiple-use forestland, and undeveloped land.

Fort Benning is part of a large hydrologic unit, the Chattahoochee River Basin, which is the most heavily used water resource in Georgia and consists of an area that is 8,770 square miles. The Chattahoochee River begins as a cold-water mountain stream in the Blue Ridge Mountains of north Georgia and flows 430 miles to its confluence with the Flint River in Lake Seminole in southern Georgia. The outflow from Lake Seminole forms the Apalachicola River, in Florida, which ultimately discharges to the Gulf of Mexico at Apalachicola Bay. Within the Fort Benning boundary, there are seven Piedmont streams that enter from the north, funnel into the Upatoi Creek, and then flow into the Chattahoochee River. Typical of most Piedmont streams, these have high sustained flows during the winter months and also show responses to storm events throughout the year. For this reason, Fort Benning is greatly influenced by the surrounding community and its water quality practices. Fort Benning receives all pollutants generated off the Installation that flow through this hydrologic cataloging unit.

Figure C.5.1 Watersheds and Ecoregions Associated with Fort Benning



APPENDIX C6 OUTDOOR RECREATION

C.6.1 PURPOSE AND SCOPE

This program addresses outdoor recreational opportunities with an emphasis on hunting and fishing, but it also includes activities such as hiking, bird watching, boating, and camping. It emphasizes the human and administrative aspects of outdoor recreation, such as the hunting and fishing programs, budget, fees, regulations, and access. The biological aspects of game and sport fish populations and habitat management actions that enhance and support these outdoor recreational activities are addressed in Chapter 5.6.

Two Directorates on Fort Benning manage outdoor recreation activities—the Directorate of Family, Morale, Welfare and Recreation (Community Recreation Division) and the Directorate of Public Works (Conservation Branch). The Directorate of Family, Morale, Welfare and Recreation handles such facilities and activities as Uchee Creek Recreation Area, the River Walk, Russ Pond Children's Fishing Rodeo, hunter control, the sale of hunting/fishing supplies and permits, and boat/canoe/camping equipment rentals. The Directorate of Public Works manages the fishponds (stocking and feeding the fish for the Russ Pond Rodeo), manages wildlife and fisheries habitat (planting of wildlife openings/managing fish ponds), and publishes the hunting and fishing regulations.

Although ecosystem management is a method for maintaining or restoring natural systems, it must also support sustainable economies and communities. It must consider functional biological systems, but also include human considerations. In this regard, outdoor recreation is a critical element in providing for the needs of the Fort Benning community. Outdoor recreation in the form of fishing, hunting, bird watching, hiking, and other activities is a quality-of-life issue. One of Fort Benning's goals is to provide Soldiers, civilians, Families, and retirees the best quality-of-life facilities, services, and programs in the Army. Quality of life is one of the five key processes that have been developed as part of the Army's Performance Improvement Criteria. A soldier has a hectic, fast-paced life. Time spent with Family and friends may be infrequent and short. Outdoor recreational opportunities are often the activity of choice as soldiers are outdoor-oriented and outdoor recreation is often close and inexpensive. Time spent outdoors hiking, camping, hunting, and participating in other activities promotes an understanding and appreciation for wildlife, plants, and nature in general. For soldiers, an additional benefit of outdoor recreation activities, particularly hunting, is that they enhance infantry skills. Skills such as land navigation, terrain analysis, camouflage, movement techniques, and tracking are used when hunting deer and turkey.

Quality outdoor recreational activities depend on proper stewardship of natural resources, particularly forests, waters, and wildlife. Proper management—such as timber thinning, prescribed fire, tree planting, soil erosion control, protection of species of conservation concern and Unique Ecological Areas, and pond maintenance—will increase outdoor recreational

opportunities by providing the appropriate settings for activities to occur. A clean, well-stocked lake or pond with good road access, mowed grass, picnic tables and grills, a dock, and a boat landing will be inviting to the community and provide camping, fishing, picnicking, boating, and other activities. Large trees with open vistas provide hiking, wildlife viewing, and aesthetic qualities. A variety of habitats such as wetlands and hardwood bottomlands will provide excellent hunting opportunities. A well-managed dove field will facilitate family outings, such as an adult-and-child dove hunt. All activities will occur in a safer setting due to the reduction of fuels by prescribed burns.

C.6.2 AUTHORIZATION

The Sikes Act of 1960 (16 USC 670a et seq. and its 2011 amendments) authorizes the Secretary of Defense to carry out a program "to provide for the conservation and rehabilitation of natural resources on military installations, the sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and non-consumptive uses." The Sikes Act amendments of 2011 also require an INRMP that shall provide for "fish and wildlife management, land management, forest management, and fish- and wildlife-oriented recreation." To the extent appropriate and applicable, the INRMP shall provide for "sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources and is subject to requirements necessary to ensure safety and military security."

Army Regulation 200–1 (Environmental Protection and Enhancement, 13 December 2007), states that, "management of flora and fauna be consistent with accepted scientific principles for conservation of indigenous species and provide access for hunting, fishing and trapping consistent with security requirements and safety concerns." Outdoor recreation is defined in the regulation as follows:

> Recreational program, activity, or opportunity that is dependent on the natural environment. Examples are hunting, fishing, trapping, picnicking, bird watching, off-road vehicle use, hiking and interpretive trails use, wild and scenic river use, and underdeveloped camping areas. Developed or constructed activities such as golf courses, lodging facilities, boat launching ramps, and marinas are not included.

Army Regulation 215–1 (Military, Morale, Welfare, and Recreation Programs and Nonappropriated Fund Instrumentalities, 24 September 2010), indicates that the outdoor recreation program offers diverse, healthful, vigorous, and comprehensive outdoor recreation activities while conserving and protecting wildlife, forests, wetlands, and other natural resources.

C.6.3 HISTORY OF PROGRAM

Undoubtedly, hunting and fishing occurred on Fort Benning well before any established program was developed in 1961. The first reported harvest of white-tailed deer (*Odocoileus virginianus*) was in 1965 when 189 adult antlered deer were harvested. Deer harvest reached a peak in the 1987-1988 season, which included a 42-day either-sex season, when 1,910 deer were harvested. Hunter success, measured as the percentage of hunters harvesting at least one deer, has ranged from 25 to 41 percent. Eastern wild turkey (*Meleagris gallopavo*) harvest has ranged from 45 to 160 birds with its peak in 1990. Turkey hunter success ranges from 15 to

31percent. Fishing opportunities peaked in the late 1960s and 1970s when 17 ponds (309 acres) were available for fishing with seven receiving intensive management (Kings, Stephens, Pattersons, Kirks, Headleys, Victory, and Averetts Ponds). Fishing boats were located at some of the ponds. Over the years, dams failed or ponds were closed due to impact area designation. In 1999, 10 of the original 17 ponds were still available for fishing. Additionally, several more ponds had been constructed over the years that brought the total to 13 that were available for fishing. Three ponds, Russ Pond, Russ Pool and Sand Hill Duck Pond, are designated for children only. A children's fishing rodeo is held in one or more locations during the spring. Catfish are stocked in the fall and fed to reach about a pound in size before the rodeo. In the past, rainbow trout were stocked. For example, in 1967, 6,000 rainbow trout were stocked in the pond and 100 children participated in the rodeo held in December.

The Outdoor Recreation Program began in 1984 and was administered by the Directorate of Personnel and Community Activities, which later became the Directorate of Family Morale, Welfare and Recreation. A Rod and Gun Club was established in the early 1960s and located in Harmony Church. At that time, the clubs offered skeet and trap ranges, a restaurant, an archery range, and a bait and tackle store. A monthly fishing contest was held for the largest bass, catfish, and bream, and a three-day Labor Day fishing contest also was sponsored. The Rod and Gun Club reached its peak in the late 1960s and early 1970s with about 5,000 members, but closed in the late 1970s. There were two other major recreational facilities available at that time—the King's Pond Recreational Area and the U.S. Army Infantry Center Recreation Area located near Upatoi Creek.

The Uchee Creek Recreation Area was established in 1965. Cabins and recreational vehicle pads were constructed around 1986. The grand opening of the campground occurred in 1992.

C.6.4 CURRENT PROGRAM

C.6.4.1 Hunting and Fishing

Hunting

Because of the large land base and variety of habitats—including hardwood bottomlands, open pine uplands, pine reforestation areas, upland oak-hickory areas, and wetlands—Fort Benning offers abundant hunting opportunities. About 142,000 acres potentially are available for hunting, although some areas are open only rarely (such as during the Christmas break). During intensive training periods, only several thousand acres may be available for hunting. During holiday periods, as many as 100,000 acres may be available—depending on prescribed burning, other natural resource management activities, and range maintenance requirements. Military training compartments are divided into three general categories for hunting purposes—bow only, shotgun, and rifle. Bows and shotguns may be used in a rifle compartment. Areas are designated as a bow or shotgun area based primarily on safety considerations. Hunting opportunities can range from fair to excellent depending on the species. For example, quail hunting is generally rated poor, deer hunting good, and wild turkey hunting fair.

Hunting is allowed for the following 10 species of resident game mammals: white-tailed deer, Eastern cottontail rabbit (*Sylvilagus floridanus*), swamp rabbit (*Sylvilagus aquaticus*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes fulva*), Virginia opossum (*Didelphis virginiana*), and raccoon (*Procyon lotor*). There are two species of resident game birds—northern bobwhite quail (Colinus virginianus) and eastern wild turkey. Nineteen species of migratory game birds are present, at least 16 species of which are waterfowl—mourning dove (*Zenaida macroura*), common snipe (*Gallinago gallinago*), American woodcock (*Scolopax minor*), Canada goose (*Branta canadensis*), mallard duck (*Anas platyrhynchos*), wood duck (*Aix sponsa*), ring-necked duck (*Aythya collaris*), gadwall (*Anas strepaera*), wigeon (*Anas americana*), Northern pintail (*Anas acuta*), American black duck (*Anas rubripes*), green-winged teal (*Anas crecca*), blue-winged teal (*Anas discors*), canvasback (*Aythya valisineria*), redhead (*Aythya americana*), bufflehead (*Bucephala albeola*), hooded merganser (*Lophodytes cucullatus*), Northern shoveler (*Anas clypeata*), lesser scaup (*Aythya affinins*) and crows (*Corvus* spp). Hunting also is allowed for two nongame animals—coyote (*Canis latrans*) and feral swine (*Sus scrofa*), Feral swine are considered a nuisance species and liberal hunting regulations are in effect. Deer and wild turkey are the most sought after species by hunters.

Fishing

Fishing occurs throughout the Installation within the Chattahoochee River and several major streams (including Upatoi, Ochillee, Oswichee, Randall, Big Pine Knot, and Uchee); numerous oxbows off the Chattahoochee, Upatoi, and Uchee Creeks; beaver ponds; and 14 man-made ponds. The fish ponds are in fair to poor condition due to infrastructure problems and a lack of resources to conduct management in the past. Management efforts have picked up substantially since 2006 and focus on intensively managing 7 of the 14 fishing ponds. Nearly all of the ponds remain in a bass crowded condition but the bream fisheries are recovering quite nicely. Fishing by boat is feasible in Upatoi and Uchee Creeks, in the Chattahoochee River and its backwaters, and in the fish ponds and larger oxbows. The most popular fish species sought by fishermen include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear or shellcracker (*Lepomis microlophis*), white crappie (*Pomoxis annularis*), channel catfish (*Ictalurus punctatus*), white bass (*Morone chrysops*), and hybrid white bass (*Morone chrysops* x *saxatilis).*

Hunting/Fishing Control

Before entering a military training compartment, hunters and fishermen must check the compartment schedule sheets or open areas website to identify compartments which are open for hunting and fishing. These sheets are posted at five locations on Fort Benning—Provost Marshal's Office (Building 215), Conservation Branch Kiosk (First Division @ tank trail), Malone 21 on Buena Vista Road, Uchee Creek Country Store, and the DFMWR Equipment Resource Center (Building 1707). During the gun hunting season for deer and turkey, all hunters must call

in to their training compartment via the electronic (telephone) hunter control system operated by DFMWR.

Regulations

Harvest of game and fish species follows the USFWS migratory bird hunting regulations, GADNR hunting and fishing regulations, Georgia Game and Fish Act, ADCNR hunting and fishing regulations, and Alabama Game and Fish Act. Fort Benning can be more restrictive than the state and Federal regulations, but not more liberal. For example, the deer harvest limit for Muscogee and Chattahoochee Counties in Georgia is twelve per season. The deer harvest limit in Russell County, Alabama, is two per day, only one of which can be a buck. The limit for the Installation (Georgia and Alabama combined) is set at twelve per season in an effort to distribute the resource and provide Soldiers with adequate opportunity to harvest a deer. Through the 1983 Cooperative Agreement with the state agencies, active duty personnel assigned to Fort Benning, who have either a Georgia or Alabama hunting or fishing license may hunt or fish, respectively, on either side of the Installation with that license. Military personnel residing in Georgia will obtain a resident Georgia license, which will be honored on the Alabama portion of the Installation, and vice versa. All other personnel authorized hunting privileges on the Installation must obtain an appropriate resident/nonresident license.

Fort Benning publishes U.S. Army Maneuver Center of Excellence Regulation 200-3 (Hunting, Fishing and Recreation). The regulation covers topics such as responsibilities of individuals and directorates, safety information, personnel authorized to hunt and fish, legal firearms and ammunition, specific hunting and fishing regulations, permits and fee structure, and penalties for hunting and fishing violations. The hunting and fishing regulation is updated as necessary. The Conservation Branch makes appropriate changes based on input from many sources, including the Commanding General's Advisory Council on Natural Resources, and prepares a decision paper for routing through major subordinate unit commanders and directorate chiefs. Final approval rests with the Garrison Commander. Fishing regulations within the Installation boundary (post ponds) are set by the Conservation Branch. Trapping is prohibited on Fort Benning without Directorate of Public Works approval.

Fees

Fees to hunt on Fort Benning include the purchase of a hunting permit, fishing permit, combination hunting and fishing permit, or guest hunting/fishing permit which vary in price depending on type and days valid. The hunting and fishing permit fees go to the Fish and Wildlife Account to support the game and fish program, except for 10% that goes to the Community Recreation Division to handle the cost of permit administration. All hunters and fishermen also must have appropriate state hunting and fishing licenses and any Federal license needed (e.g., a migratory bird conservation stamp).

C.6.4.2 Facilities and Other Outdoor Recreational Activities

DFMWR, Community Recreation Division has two major facilities that support outdoor recreation activities—Building 1707 and Uchee Creek Recreation Area. Hunting and fishing permits, hunting and fishing licenses, hunting and fishing maps, and hunting and fishing supplies can be purchased at Building 1707. Hunter Control also operates from this building. Permits, licenses, and supplies also can be purchased at Uchee Creek Recreation Area. Additionally, a fishing pier, boat ramp, campground, and boat and canoe rentals are available at this facility. Primitive camping is available at King's and Twilight Ponds.

A major hiking trail known as the River Walk extends onto Fort Benning from Columbus for 2.5 miles. This trail starts in downtown Columbus and enters the Installation near the main gate on Benning Boulevard and ends near the Infantry Museum. Off-road vehicles such as four-wheelers are prohibited, an exception to this policy may be granted for handicapped hunters.

Although Fort Benning is an "open" installation, all individuals entering the Installation must do so through a manned access point, it remains an area of exclusive Federal jurisdiction and public activities are regulated. Due to safety and security concerns, Fort Benning limits access for hunting and fishing inside the boundaries of the Installation, except on navigable waters of the Chattahoochee River, to authorized personnel only. While unrestricted use by the general public is prohibited, Fort Benning does allow non-affiliated civilians of the general public to purchase temporary permits, of varying duration, to hunt and fish on the Installation as a guest hunter. Guest hunters must be sponsored and supervised by an authorized participant as required in MCoE Regulation 200-3 as discussed in Chapter 5.6.3. Access to Uchee Creek Recreation Area facilities is limited to active duty military, retirees, reservists, DoD personnel, and guests. The boat ramp at Uchee Creek Recreation Area, however, is available to anyone for accessing the Chattahoochee River. Additionally, the portion of the River Walk that extends onto Fort Benning is open to the public.

APPENDIX D

SPECIES KNOWN TO OCCUR ON FORT BENNING

APPENDIX D1 MUSSELS

Scientific Name	Common Name
Anodonta heardi	Apalachicola floater
Corbicula fluminea	Asian clam
Elliptio complanata	Eastern elliptio
Elliptio icterina	Variable spike
Pyganodon grandis	Giant floater
Utterbackia imbecillis	Paper pondshell
Utterbackia peggyae	Florida floater
Villosa lienosa	Little spectaclecase
Villosa vibex	Southern rainbow

APPENDIX D2 FISH

Scientific Name	Common Name
Alosa chrysochloris[1]	Skipjack herring
Ambloplites ariommus[2]	Shadow bass
Ameiurus brunneus[2]	Snail bullhead
Ameiurus catus[1]	White catfish
Ameiurus natalis[2]	Yellow bullhead
Ameiurus nebulosus[2]	Brown bullhead
Amia calva[2]	Bowfin
Ameiurus serracanthus[3]	Spotted bullhead
Aphrododerus sayanus[2]	Pirate perch
Campostoma pauciradii[2]	Bluefin stoneroller
Carpoides carpio[1]	River carpsucker
Carpoides cyprinus[1]	Quillback
Centrarchus macropterus[1]	Flier
Cyprinella callitaenia[2]	Bluestripe shiner
Cyprinella venusta[2]	Blacktail shiner
Dorosoma cepedianum[2]	Gizzard shad
Dorosoma petenense[2]	Threadfin shad
Dorosoma spp.[2]	Gizzard or threadfin shad
Elassoma zonatum[2]	Banded pygmy sunfish
Ericymba buccata[2]	Silverjaw minnow
Erimyzon oblongus[2]	Creek chubsucker
Erimyzon sucetta[2]	Lake chubsucker
Esox americanus[2]	Redfin pickerel

Esox niger[2]	Chain pickerel
Etheostoma parvipinne[2]	Goldstripe darter
Etheostoma swaini[2]	Gulf darter
Fundulus olivaceous[2]	Blackspotted topminnow
Lepomis cyanellus[2]	Green sunfish
Gambusia affinis[2]	Mosquitofish
Hybopsis winchelli[2]	Clear chub
Hypentelium etowanum[3]	Alabama hog sucker
Ichthyomyzon gagei[2]	Southern brook lamprey
Ictalurus punctatus[2]	Channel catfish
Labidesthes sicculus[2]	Brook silverside
Lepisosteus oculatus[3]	Spotted gar
Lepisosteus osseus[2]	Longnose gar
Lepomis auritus[2]	Redbreast sunfish
L. auritus x L. macrochirus	(Hybrid) Redbreast sunfish x Bluegill
Lepomis gulosus[2]	Warmouth
Lepomis marginatus[2]	Dollar sunfish
Lepomis macrochirus[2]	Bluegill

APPENDIX D2 FISH (CONTINUED)

Scientific Name	Common Name
Lepomis megalotis[2]	Longear sunfish
Lepomis microlophis[2]	Redear sunfish
Lepomis punctatus[2]	Spotted sunfish
Lepomis spp.[2]	N/A
Lythrurus atrapiculus[1]	Blacktip shiner
Micropterus coosae[1]	Redeye bass
Micropterus punctulatus[2]	Spotted bass
Micropterus salmoides[2]	Largemouth bass
Micropterus sp. cf. Poecilurum2	Shoal bass
Minytrema melanops[2]	Spotted sucker
Morone chrysops[1]	White bass
Morone chrysops x saxatilis	Hybrid bass (white bass x striped bass)
Moxostoma lachneri[2]	Greater jumprock
Moxostoma spp.[2]	Grayfin redhorse
Notemigonus chrysoleucas[2]	Golden shiner
Notropis longirostris[2]	Longnose shiner
Notropis texanus[2]	Weed shiner

Noturus leptacanthus[2]	Speckled madtom
Notropis maculatus[3]	Taillight shiner
Opsodpoeodus emiliae[2]	Pugnose minnow
Pteronotropis euryzonus[2]	Broadstripe shiner
Perca flavescens[2]	Yellow perch
Percina nigrofasciata[2]	Blackbanded darter
Pomoxis annularis[3]	White crappie
Pomoxis nigromaculatus[2]	Black crappie
Semotilus thoreauianus[2]	Dixie chub

[1]*Historic record, Dr. Bill Birkhead, Columbus State University*

[2]*Historic record, and USFWS recent survey confirmed*

[3]*USFWS new record*

APPENDIX D3 AMPHIBIANS

Scientific Name	Common Name
Frogs	
Acris gryllus	Southern cricket frog
Bufo quercicus	Oak toad
Bufo terrestris	Southern toad
Bufo woodhousii	Fowler's toad
Gastrophryne carolinensis	Eastern narrow-mouthed frog
Hyla cinera	Green treefrog
Hyla femoralis	Pine-woods treefrog
Hyla gratiosa	Barking treefrog
Pseudacris crucifer	Northern spring peeper
Pseudacris nigrita	Southern chorus frog
Pseudacris ornata	Ornate chorus frog
Pseudacris triseriata feriarum	Upland chorus frog
Rana capito	Gopher frog
Rana catesbeiana	Bullfrog
Rana clamitans	Bronze frog
Rana sphenocephala	Southern leopard frog
Scaphiopus holbrooki	Eastern spadefoot
Salamanders	
Ambystoma opacum	Marbled salamander
Ambystoma tigrinum	Eastern tiger salamander
Desmognathus apalachicolae	Apalachicola dusky salamander
Eurycea bislineata	Two-lined salamander

Eurycea longicauda guttolineata	Three-lined salamander
Gyrinphylus porphyriticus	Spring salamander
Notophthalmus viridescens	Red-spotted newt
Plethodon glutinsus comp	Slimy salamander

APPENDIX D4 REPTILES

Scientific Name	Common Name
Lizards	
Anolis carolinensis	Green anole
Cnemidophorus sexlineatus	Six-lined racerunner
Eumeces egregius similis	Northern mole skink
Eumeces fasciatus	Five-lined skink
Eumeces laticeps	Broad-headed skink
Sceloporus undulatus undulatus	Southern fence lizard
Scincella lateralis	Ground skink
Snakes	
Agkistrodon contortrix contortrix	Southern copperhead
Agkistrodon piscivorus	Cottonmouth
Caphophis amoenus	Worm snake
Cemorphora coccinea	Scarlet snake
Coluber constrictor	Southern black racer
Crotalus adamanteus	Eastern diamondback rattlesnake
Crotalus horridus	Timber rattlesnake
Diadophus punctatus	Ringneck snake
Elaphe guttata	Corn snake
Elaphe obsoleta spiloides	Gray rat snake
Farancia abacura	Mud snake
Heterodon platyrhinos	Eastern hognose snake
Heterodon simus	Southern hognose snake
Lampropelits getulus	Eastern kingsnake
Lampropeltis triangulum	Milksnake
Masticophus flagellum flagellum	Eastern coachwhip
Micrurus fulvius	Eastern coral snake
Nerodia erythrogaster	Red-bellied water snake
Nerodia taxispilota	Brown water snake
Opheodrys aestivus	Rough green snake
Pituophis melanoleucas mugitis	Florida pine snake
Sistrurus miliarius	Pigmy rattlesnake
Storeria occipitomaculata occipitomaculata	Red-bellied snake

Tantilla coronata	Southeastern crowned snake
Thamnophis sirtalis	Eastern garter snake

APPENDIX D4 REPTILES (CONTINUED)

Scientific Name	Common Name
Turtles	
Apalone spinifera	Eastern spiny softshell turtle
Chelydra serpentina	Common snapping turtle
Chrysemys picta	Painted turtle
Deirochelys reticularia	Chicken turtle
Gopherus polyphemus	Gopher tortoise
Graptemys barbouri	Barbour's map turtle
Graptemys geographica	Map turtle
Macroclemys temminckii	Alligator snapping turtle
Stenotherus minor	Loggerhead musk turtle
Stenotherus odoratus	Common musk turtle
Kinosternon subrubrum	Eastern mud turtle
Pseudomys concinna	River cooter
Pseudomys floridana	Florida cooter
Terrapene carolina	Eastern box turtle
Trachemys scripta	Yellow-bellied pond slider
Crocodilians	
Alligator mississippiensis	American alligator

APPENDIX D5 BIRDS

Scientific Name	Common Name
Accipiter cooperii	Cooper’s hawk
Accipiter striatus	Sharp-shinned hawk
Agelaius phonenicius	Red-winged blackbird
Aimophila aestivalis	Bachman's sparrow
Aix sponsa	Wood duck
Anas acuta	Northern pintail
Anas americana	American wigeon
Anas clypeata	Northern shoveler
Anas crecca	Green-winged teal

Scientific Name	Common Name
Anas discors	Blue-winged teal
Anas platyrhynchos	Mallard
Anas rubripes	American black duck
Anas strepera	Gadwall
Anhinga anhinga	Anhinga
Archilochus culubris	Ruby-throated hummingbird
Ardea herodias	Great blue heron
Aythya affinins	Lesser scaup
Aythya americana	Redhead
Aythya collaris	Ring-necked duck
Aythya valisineria	Canvasback
Bombycilla cedorum	Cedar waxwing
Branta canadensis	Canada goose
Bubo virginianaus	Great horned owl
Bucephala albeola	Bufflehead
Bulbucus ibis	Cattle egret
Buteo jamaicensis	Red-tailed hawk
Buteo lineatus	Red-shouldered hawk
Buteo platypterus	Broad-winged hawk
Butorides striatus	Green-backed heron
Caprimulgus carolinensis	Chuck-will's-widow
Caprimulgus vociferus	Whip-poor-will
Cardinalis cardinalis	Northern cardinal
Carduelis tristis	American goldfinch
Carpodacus mexicanus	House finch
Carpodacus purpureus	Purple finch
Casmerodius albus	Great egret
Cathartes aura	Turkey vulture
Catharus guttatus	Hermit thrush
Certhia americana	Brown creeper
Ceryle alcyon	Belted kingfisher

APPENDIX D5 BIRDS (CONTINUED)

Scientific Name	Common Name
Chaetura pelagica	Chimney swift
Charadrius vociferus	Killdeer
Chen canagica	Snow goose
Chordeiles minor	Common nighthawk
Circus cyaneus	Northern harrier

Scientific Name	Common Name
Coccothraustes vespertinus	Evening grosbeak
Coccyzus americanus	Yellow-billed cuckoo
Colaptes auratus	Northern flicker
Colinus virginianus	Northern bobwhite quail
Columba livia	Rock dove
Columbina passerina	Common ground-dove
Contopus virens	Eastern wood-pewee
Coragyps atratus	Black vulture
Corvus brachyrhynchos	American crow
Corvus ossifragus	Fish crow
Cyanocitta cristata	Blue jay
Dendrocygna bicolor	Fulvous whistling duck
Dendroica coronata	Yellow-rumped warbler
Dendroica discolor	Prairie warbler
Dendroica dominica	Yellow-throated warbler
Dendroica palmarum	Palm warbler
Dendroica pinus	Pine warbler
Dryocopus pileatus	Pileated woodpecker
Dumetella carolinensis	Gray catbird
Egretta caerulea	Little blue heron
Egretta tricolor	Tri-color heron
Egretta thula	Snowy egret
Elanoides forficatus	American swallow-tailed kite
Empidonax virescens	Acadian flycatcher
Eudocimus albus	White ibis
Euphagus carolinus	Rusty blackbird
Falco sparverius paulus	SE American kestrel
Gallinago gallinago	Common snipe
Fulica americana	American coot
Gallinula chloropus	Common moorhen
Geothlypis trichas	Common yellowthroat
Grus canadensis	Sandhill crane
Guiraca caerulea	Blue grosbeak
Haliaeetus leucocephalus	Bald eagle
Helmitheros vermivorus	Worm-eating warbler
Hirundo rustica	Barn swallow

APPENDIX D5 BIRDS (CONTINUED)

Scientific Name	Common Name
Hylocichla mustelina	Wood thrush
Icteria virens	Yellow-breasted chat
Icterus spurius	Orchard oriole
Ictinia mississippiensis	Mississippi kite
Junco hyemalis	Dark-eyed junco
Lanius ludovicianus	Loggerhead shrike
Larus delawarensis	Ring-billed gull
Lophodytes cucullatus	Hooded merganser
Melanerpes carolinus	Red-bellied woodpecker
Melanerpes erythrocephalus	Red-headed woodpecker
Meleagris gallapavo	Wild turkey
Melospiza melodia	Song sparrow
Mimus polyglottos	Northern mockingbird
Mniotilta varia	Black-and-white warbler
Molothrus ater	Brown-headed cowbird
Mycteria americana	Wood stork
Myiarchus crinitus	Great crested flycatcher
Nycticorax nycticorax	Black-crowned night-heron
Nycticorax violacea	Yellow-crowned night-heron
Oporornis formosus	Kentucky warbler
Otus asio	Eastern screech owl
Oxyura jamaicensis	Ruddy duck
Pandion haliaetus	Osprey
Parula americana	Northern warbler
Parus bicolor	Tufted titmouse
Parus carolinensis	Carolina chickadee
Passer domesticus	House sparrow
Passerculus sandwichensis	Savannah sparrow
Passerella iliaca	Fox sparrow
Passerina cyanea	Indigo bunting
Phalacrocorax auritus	Double-crested cormorant
Picoides borealis	Red-cockaded woodpecker
Picoides pubescens	Downy woodpecker
Picoides villosus	Hairy woodpecker
Pipilo erythrophthalmus	Rufous-sided towhee
Piraanga olivacea	Scarlet tanager
Piranga rubra	Summer tanager
Podilymbus podiceps	Pied-billed grebe
Polioptila caerulea	Blue-gray gnatcatcher

Progne subis	Purple martin
Protonotaria citrea	Prothonotary warbler

APPENDIX D5 BIRDS (CONTINUED)

Scientific Name	Common Name
Quiscalus quiscala	Common grackle
Rallus elegans	King rail
Regulus calendula	Ruby-crowned kinglet
Regulus satrapa	Golden-crowned kinglet
Sayornis phoepe	Eastern phoebe
Scolopax minor	American woodcock
Seiurus aurocapillus	Ovenbird
Seiurus motacilla	Louisiana waterthrush
Setophaga ruticilla	American redstart
Sialia sialis	Eastern bluebird
Sitta canadensis	Redbreasted nuthatch
Sitta carolinensis	White-breasted nuthatch
Sitta pusilla	Brown-headed nuthatch
Sphyrapicus varius	Yellow-bellied sapsucker
Spizella passerina	Chipping sparrow
Spizella pusilla	Field sparrow
Stelgidopteryx serripennis	Northern rough-winged swallow
Strix varia	Barred owl
Sturnella magna	Eastern meadowlark
Sturnus vulgaris	European starling
Thryothorus ludovicianus	Carolina wren
Toxostoma rufum	Brown thrasher
Troglodytes aedon	House wren
Turdus migratorius	American robin
Tyrannus tyrannus	Eastern kingbird
Vireo flavifrons	Yellow-throated vireo
Vireo griseus	White-eyed vireo
Vireo olivaceus	Red-eyed vireo
Vireo solitarius	Solitary vireo
Wilsonia citrina	Hooded warbler
Zenaida macroura	Mourning dove
Zonotrichia albicollis	White-throated sparrow

APPENDIX D6 MAMMALS

Scientific Name	Common Name
Blarina carolinensis	Southern short-tailed shrew
Canis latrans	Coyote
Castor canadensis	Beaver
Cryptotis parva	Least shrew
Dasypus novemcinctus	Nine-banded armadillo
Didelphis virginiana	Virginia opossum
Eptesicus fuscus	Big brown bat
Geomys pinetis	Southeastern pocket gopher
Glaucomys volans	Flying squirrel
Lasiurus borealis	Red bat
Lasiurus seminolus	Seminole bat
Lutra canadensis	River otter
Lynx rufus	Bobcat
Mephitis mephitis	Striped skunk
Microtus pinetorum	Pine vole
Mus musculus	House mouse
Mustela frenata	Longtail weasel
Myotis austroriparius	Southeastern myotis
Myotis lucifugus	Little brown myotis
Neotoma floridana	Eastern woodrat
Nycteceius humeralis	Evening bat
Ochrotomys nuttalli	Golden mouse
Odocoileus virginianus	White-tailed deer
Ondatra zibethica	Muskrat
Oryzomys palustris	Marsh rice rat
Peromyscus gossypinus	Cotton mouse
Peromyscus leucopus	White-footed mouse
Peromyscus maniculatus	Deer mouse
Peromyscus polionotus	Oldfield mouse
Pipestrellus subflavus	Eastern pipestrel
Procyon lotor	Raccoon
Rattus norvegicus	Norway rat
Rattus rattus	Black rat
Reithrodontomys humulis	Eastern harvest mouse
Scalopus aquaticus	Eastern mole
Sciurus carolinensis	Gray squirrel
Sciurus niger	Fox squirrel
Sigmodon hispidus	Hispid cotton rat
Sorex longirostris	Southeastern shrew

Spilogale putorius	Spotted skunk

APPENDIX D6 MAMMALS (CONTINUED)

Scientific Name	Common Name
Sus scrofa	Feral swine
Sylvilagus aquaticus	Swamp rabbit
Sylvilagus floridanus	Eastern cottontail
Tadarida brasiliensis	Mexican freetail bat
Tamias striatus	Eastern chipmunk
Urocyon cinereoargenteus	Gray fox
Vulpes fulva	Red fox

APPENDIX D7 PLANT SPECIES

Family	Scientific Name	Common Name
SPHAGNACEAE	*Sphagnum cyclophyllum*	Sphagnum
ASPLENIACEAE	*Asplenium platyneuron*	Ebony spleenwort
BLECHNACEAE	*Woodwardia areolata*	Netted chainfern
	Woodwardia virginica	Virginia chainfern
DENNSTAEDTIACEAE	*Pteridium aquilinum*	Western brackenfern
DRYOPTERIDACEAE	*Athyrium filix-femina ssp. Asplenioides*	Asplenium ladyfern
	Onoclea sensibilis	Sensitive fern
	Polystichum acrostichoides	Christmas fern
	Woodsia obtusa ssp. obtusa	Bluntlobe cliff fern
ISOETACEAE	*Isoetes engelmannii*	Engelmann's quillwort
	Isoetes melanopoda	Black-footed quillwort
LYCOPODIACEAE	*Lycopodiella alopecuroides*	Foxtail bog-clubmoss
	Lycopodiella caroliniana	Carolina bog-clubmoss
	Lycopodiella ×copelandii	Copeland's bog clubmoss
	Lycopodiella prostrata	Prostrate foxtail clubmoss
	Lycopodium digitatum	Fan clubmoss
OPHIOGLOSSACEAE	*Botrychium biternatum*	Sparselobe grapefern
	Botrychium virginianum	Rattlesnake fern
	Ophioglossum vulgatum	Adders-tongue fern
OSMUNDACEAE	*Osmunda cinnamomea*	Cinnamon fern
	Osmunda regalis var. spectabilis	Royal fern
POLYPODIACEAE	*Pleopeltis polypodioides ssp. Michauxiana*	Resurrection fern
PTERIDACEAE	*Cheilanthes lanosa*	Hairy lipfern
	Pteris multifida	Spider brake
SCHIZAEACEAE	*Lygodium japonicum*	Japanese climbing fern

Family	Scientific Name	Common Name
{*LYGODIACEAE}		
SELAGINELLACEAE	*Selaginella acanthonota*	
	Selaginella apoda	Meadow spikemoss
THELYPTERIDACEAE	*Macrothelypteris torresiana*	Mariana maidenfern
	Phegopteris hexagonoptera	Broad beechfern
	Thelypteris hispidula var. versicolor	Variable-veined maidenfern
	Thelypteris kunthii	Widespread maidenfern
	Thelypteris noveboracensis	New York fern
GYMNOSPERMA		
CUPRESSACEAE	*Chamaecyparis lawsoniana*	Port Orford cedar
	Juniperus virginiana	Eastern redcedar
PINACEAE	*Pinus echinata*	Shortleaf pine
	Pinus glabra	Spruce pine
	Pinus palustris	Longleaf pine
	Pinus taeda	Loblolly pine
ANGIOSPERMAE MONOCOTYLEDONEAE		
AGAVACEAE	*Yucca filamentosa*	Adam's needle
ALISMATACEAE	*Echinodorus cordifolius*	Creeping bur-head
	Echinodorus parvulus	Mud babies, dwarf burhead
	Sagittaria latifolia	Broadleaf arrowhead
	Sagittaria lancifolia	

Family	Scientific Name	Common Name
ARACEAE	*Arisaema dracontium*	Greendragon
	Arisaema triphyllum	Jack in the pulpit
	Arisaema triphyllum ssp. Quinatum	Jack in the pulpit
	Colocasia esculenta	Coco yam
	Orontium aquaticum	Goldenclub
	Peltandra virginica	Green arrow arum
ARECACEAE	*Rhapidophyllum hystrix*	Needle palm
	Sabal minor	Dwarf palmetto
BROMELIACEAE	*Tillandsia usneoides*	Spanish moss
CANNACEAE	*Canna X generalis*	General canna
COMMELINACEAE	*Callisia rosea*	Piedmont roseling
	Commelina communis	Asiatic dayflower
	Commelina diffusa	Small-flowered dayflower
	Commelina erecta var. angustifolia	Whitemouth dayflower
	Commelina virginica	Virginia dayflower
	Murdannia keisak	Wartremoving herb
	Tradescantia ohiensis	Bluejacket
CYPERACEAE	*Bulbostylis barbata*	Watergrass
	Bulbostylis capillaris	Threadleaf beakseed
	Bulbostylis ciliatifolia var. ciliatifolia	Capillary hairsedge

	Bulbostylis ciliatifolia var. coarctata	Capillary hairsedge
	Carex abscondita	Thicket sedge
	Carex alata	Winged sedge
	Carex albolutescens	Greenwhite sedge
	Carex atlantica	Prickly bog sedge
	Carex atlantica ssp. Capillacea	Prickly bog sedge
	Carex basiantha	Low-flowering sedge
	Carex bromoides	Bromelike sedge
	Carex caroliniana	Carolina sedge
	Carex cephalophora	Ovalleaf sedge
	Carex cf. styloflexa	Bent sedge
	Carex cherokeensis	Cherokee sedge
	Carex comosa	Longhair sedge
	Carex complanata	Blue sedge
	Carex crinita	Fringed sedge
	Carex crus-corvi	Crow-spur sedge
	Carex debilis var. debilis	White edge sedge
	Carex digitalis	Slender woodland sedge
	Carex festucacea	Fescue sedge
	Carex flaccosperma	Thinfruit sedge
	Carex folliculata	Northern long sedge
	Carex gigantea	Giant sedge
	Carex glaucescens	Clustered sedge
	Carex gracilescens	Slender looseflower sedge
	Carex granularis	Limestone meadow sedge
	Carex intumescens	Greater bladder sedge
	Carex joorii	Cypress swamp sedge
	Carex leavenworthii	Leavenworth's sedge

Family	Scientific Name	Common Name
CYPERACEAE (continued)	*Carex leptalea*	Bristlystalked sedge
	Carex lonchocarpa	Southern folliculate sedge
	Carex lupulina	Hop sedge
	Carex lurida	Shallow sedge
	Carex muehlenbergii	Muhlenberg's sedge
	Carex oxylepis	Sharpscale sedge
	Carex radiata	Eastern star sedge
	Carex retroflexa	Reflexed sedge
	Carex rosea	Rosy sedge
	Carex seorsa	Smooth-beaked stellate sedge
	Carex squarrosa	
	Carex stipata	Owlfruit sedge

	Carex striatula	Lined sedge
	Carex stricta	Tussock sedge
	Carex tenax	Wire sedge
	Carex tribuloides	Caltrop sedge
	Carex venusta	Darkgreen sedge
	Carex vulpinoidea	Fox sedge
	Cyperus compressus	Compressed flatsedge
	Cyperus echinatus	Globose flatsedge
	Cyperus erythrorhizos	Redroot flatsedge
	Cyperus esculentus	Chufa flatsedge
	Cyperus filiculmis	
	Cyperus flavicomus	Whiteedge flatsedge
	Cyperus haspan	Haspan flatsedge
	Cyperus iria	Ricefield flatsedge
	Cyperus odoratus	Fragrant flatsedge
	Cyperus plukenetii	Plukenet's flatsedge
	Cyperus polystachyos var. texensis	Texan flatsedge
	Cyperus pseudovegetus	Marsh flatsedge
	Cyperus refractus	Reflexed flatsedge
	Cyperus retrofractus	Rough flatsedge
	Cyperus retrorsus	Pine barren flatsedge
	Cyperus rotundus	Nut grass
	Cyperus strigosus	Common flatsedge
	Cyperus virens	Green flatsedge
	Dulichium arundinaceum	Threeway sedge
	Eleocharis baldwinii	Baldwin’s spikerush
	Eleocharis equisetoides	Scouring-rush spikerush
	Eleocharis flavescens	Yellow spikerush
	Eleocharis melanocarpa	Black fruited spikerush
	Eleocharis microcarpa	Small-fruited spikerush
	Eleocharis obtusa	Blunt spikesedge
	Eleocharis robbinsii	Robbins spikerush
	Eleocharis tortilis	Twisted spikerush
	Eleocharis tricostata	Three-angled spikerush
	Eleocharis tuberculosa	Cone-cup spikerush

Family	Scientific Name	Common Name
CYPERACEAE (continued)	*Fimbristylis annua*	Annual fimbry
	Fimbristylis autumnalis	Slender fimbry
	Fimbristylis dichotoma	Forked fimbry
	Fimbristylis miliacea	Grasslike fimbry
	Fimbristylis tomentosa	Rimseed fimbry
	Fimbristylis vahlii	Vahl's fimbry

	Fuirena breviseta	Short bristle umberella sedge
	Fuirena squarrosa	Hairy umbrellasedge
	Isolepis carinata	Keeled lateral-bulrush
	Kyllinga odorata	Fragrant spikesedge
	Kyllinga pumila	Low spikesedge
	Rhynchospora caduca	Whisker-cap beakrush
	Rhynchospora chalarocephala	Loosehead beaksedge
	Rhynchospora corniculata	Shortbristle horned beaksedge
	Rhynchospora filifolia	Threadleaf beaksedge
	Rhynchospora glomerata	Clustered beaksedge
	Rhynchospora gracilenta	Gracile beakrush
	Rhynchospora grayi	Gray's beaksedge
	Rhynchospora harveyi	Harvey's beakrush
	Rhynchospora inexpansa	Nodding beaksedge
	Rhynchospora megalocarpa	Big-fruited beakrush
	Rhynchospora miliacea	Millet beakrush
	Rhynchospora pusilla	Dwarf beaksedge
	Rhynchospora rariflora	Few-flowered beakrush
	Rhynchospora recognita	Long-bracted globose beakrush
	Rhynchospora scirpoides	Bullrush baldrush
	Rhynchospora stenophylla	Narrow-leaved beakrush
	Scirpus cyperinus	Woolgrass
	Scirpus georgianus	Georgia bulrush
	Scirpus polyphyllus	Leafy bullrush
	Scleria ciliata	Fringed nutrush
	Scleria georgiana	Georgia nutrush
	Scleria oligantha	Littlehead nutrush
	Scleria reticularis	Honeycomb nutrush
	Scleria triglomerata	Whip nutrush
DIOSCOREACEAE	*Dioscorea quaternata*	Whorled wild yam
	Dioscorea villosa	Wild yam
ERIOCAULACEAE	*Eriocaulon decangulare*	Pipewort
	Lachnocaulon anceps	Whitehead bogbutton
HAEMODORACEAE	*Lachnanthes caroliniana*	Redroot
IRIDACEAE	*Gladiolus X gandavensis*	Gladiolus
	Iris brevicaulis	Lamance iris
	Iris verna var. smalliana	Dwarf violet iris
	Iris virginica	Virginia iris
	Sisyrinchium angustifolium	Narrowleaf blueeyed grass
	Sisyrinchium atlanticum	Eastern blueeyed grass

Family	Scientific Name	Common Name
IRIDACEAE (continued)	*Sisyrinchium fuscatum*	Coastalplain blueeyed grass
	Sisyrinchium mucronatum	Needletip blueeyed grass
	Sisyrinchium rosulatum	Annual blueeyed grass
JUNCACEAE	*Juncus acuminatus*	Tapertip rush
	Juncus biflorus	Bog rush
	Juncus brachycephalus	Squat-headed rush
	Juncus bufonius	Toad rush
	Juncus coriaceus	Leathery rush
	Juncus debilis	Weak rush
	Juncus dichotomus	Forked rush
	Juncus diffusissimus	Airy rush
	Juncus effusus	Common rush
	Juncus elliottii	Elliott's rush
	Juncus marginatus	Shore rush
	Juncus repens	Carpet rush
	Juncus scirpoides	Needlepod rush
	Juncus tenuis	Poverty rush
	Juncus trigonocarpus	Redpod rush
	Luzula acuminata var. carolinae	Carolina woodrush
	Luzula bulbosa	Bulbous woodrush
	Luzula echinata	Hedgehog woodrush
LILIACEAE	*Aletris aurea*	Golden colicroot
	Aletris farinosa	White colicroot
	Allium canadense var. canadense	Meadow garlic
	Allium canadense var. mobilense	Fertile wild onion
	Amianthium muscitoxicum	Fly-poison
	Camassia scilloides	Atlantic camas
	Chamaelirium luteum	Fairy wand
	Hymenocallis caroliniana	Spider lily
	Hypoxis hirsuta	Common goldstar
	Hypoxis juncea	Fringed yellow stargrass
	Hypoxis wrightii	Bristleseed yellow stargrass
	Hypoxis sessilis	Glossyseed yellow stargrass
	Lilium catesbaei	Pine lily
	Lilium michauxii	Carolina lily
	Lilium superbum	Turk’s cap lily
	Liriope spicatum	Monkey grass
	Maianthemum racemosum ssp. racemosum	Feather Solomon's seal
	Medeola virginiana	Indian cucumber
	Melanthium latifolium	Slender bunchflower
	Melanthium virginicum	Virginia bunchflower
	Nothoscordum bivalve	Crowpoison
	Polygonatum biflorum	King Solomon's seal
	Stenanthium gramineum	Featherbells

	Tofieldia racemosa	False asphodel
	Trillium catesbaei	Catesby's wakerobin
	Trillium cuneatum	Little sweet Betsy

Family	Scientific Name	Common Name
LILIACEAE (continued)	*Trillium decipiens*	Little sweet Betsy
	Trillium reliquum	Confederate wakerobin
	Trillium underwoodii	Longbract wakerobin
	Uvularia perfoliata	Perfoliate bellwort
	Uvularia sessilifolia	Sessileleaf bellwort
	Zephyranthes atamasca	Atamasco lily
	Zigadenus glaberrimus	Sandbog deathcamas
MAYACACEAE	*Mayaca fluviatilis*	Stream bogmoss
ORCHIDACEAE	*Calopogon tuberosa*	Common grass-pink
	Habenaria repens	Water-spider orchid
	Malaxis unifolia	Green addersmouth orchid
	Platanthera ciliaris	Yellow fringed orchid
	Platanthera clavellata	Little green wood-orchid
	Platanthera cristata	Crested yellow orchid
	Platanthera flava var. flava	Palegreen orchid
	Platanthera lacera	Green fringed orchid
	Pogonia ophioglossoides	Rose pogonia
	Spiranthes cernua	Nodding lady's-tresses
	Spiranthes ovalis	October ladiestresses
	Spiranthes praecox	Greenvein ladiestresses
	Spiranthes tuberosa	Little ladies'-tresses
	Spiranthes vernalis	Spring lady's-tresses
	Tipularia discolor	Crippled cranefly
POACEAE	*Axonopus fissifolius*	Common carpetgrass
	Agrostis elliottiana	Elliott's bentgrass
	Agrostis hyemalis	Winter bentgrass
	Agrostis perennans	Upland bentgrass
	Aira caryophyllea	Silver hairgrass
	Aira elegans	Aira
	Alopecurus carolinianus	Carolina foxtail
	Amphicarpum muhlenbergianum	Florida peanut-grass
	Andropogon gerardii	Big bluestem
	Andropogon glomeratus var. pumilus	Bushytop broomsedge
	Andropogon gyrans var. gyrans	Elliott's bluestem
	Andropogon ternarius	Splitbeard bluestem
	Andropogon virginicus	Broomsedge bluestem
	Anthaenantia villosa	Green silkyscale
	Aristida dichotoma var. dichotoma	Churchmouse threeawn

	Aristida dichotoma var. curtissii	Curtiss' three-awn grass
	Aristida gyrans	Corkscrew three-awn grass
	Aristida lanosa	Woollysheath threeawn
	Aristida longispica var. geniculata	Red threeawn
	Aristida longispica var. longispica	Red threeawn
	Aristida oligantha	Prairie threeawn
	Aristida purpurascens var. virgata	Arrowfeather threeawn
	Aristida purpurascens var. purpurascens	Arrow-feather
	Aristida tuberculosa	Seaside threeawn

Family	Scientific Name	Common Name
POACEAE (continued)	*Arthraxon hispidus*	Carp grass
	Arundinaria gigantea ssp. gigantea	Giant cane
	Arundinaria gigantea ssp. Tecta	Switchcane
	Arundo donax	Giantreed
	Bothriochloa saccharoides	Silver beardgrass
	Brachyelytrum erectum	Ravine grass
	Briza minor	Little quakinggrass
	Bromus catharticus	Rescuegrass
	Bromus commutatus	Meadow brome
	Bromus japonicus	Japanese brome
	Bromus pubescens	Hairy woodland brome
	Calamagrostis coarctata	Reedgrass
	Cenchrus echinatus	Southern sandbur
	Cenchrus longispinus	Innocent-weed
	Cenchrus spinifex	Coastal sandbur
	Chasmanthium latifolium	Indian woodoats
	Chasmanthium laxum	Slender woodoats
	Chasmanthium sessiliflorum	Slender woodoats
	Cinna arundinacea	Sweet woodreed
	Coelorachis cylindrica	Carolina jointtail grass
	Ctenium aromaticum	Toothache grass
	Cynodon dactylon	Bermudagrass
	Dactyloctenium aegyptium	Durban crow's-foot grass
	Danthonia sericea	Downy danthonia
	Dichanthelium aciculare	Needleleaf rosette grass
	Dichanthelium acuminatum var. acuminatum	Tapered rosette grass
	Dichanthelium acuminatum var. fasciculatum	Western panicgrass
	Dichanthelium acuminatum var. lindheimeri	Lindheimer panicgrass

	Dichanthelium boscii	Bosc's panicgrass
	Dichanthelium clandestinum	Hidden panic-grass
	Dichanthelium commutatum	Variable panicgrass
	Dichanthelium depauperatum	Starved panicgrass
	Dichanthelium dichotomum var. dichotomum	Cypress panicgrass
	Dichanthelium dichotomum var. ensifolium	Cypress panicgrass
	Dichanthelium dichotomum var. tenue	Cypress panicgrass
	Dichanthelium ensifolium var. ensifolium	Small leaved witch grass
	Dichanthelium laxiflorum	Openflower rosette grass
	Dichanthelium linearifolium	Slimleaf panicum
	Dichanthelium meridionale	Matting witch grass
	Dichanthelium oligosanthes var. oligosanthes	Heller's rosette grass
	Dichanthelium ovale	Oval panic-grass

Family	Scientific Name	Common Name
POACEAE (continued)	*Dichanthelium ovale var. addisonii*	Addison's rosette grass
	Dichanthelium ravenelii	Ravenel's rosette grass
	Dichanthelium sabulorum var. thinium	Hemlock rosette grass
	Dichanthelium scabriusculum	Woolly rosette grass
	Dichanthelium scoparium	Velvet panicum
	Dichanthelium sphaerocarpon var. isophyllum	Roundseed panicum
	Dichanthelium sphaerocarpon var. sphaerocarpon	Roundseed panicum
	Dichanthelium strigosum var. strigosum	Roughhair rosette grass
	Dichanthelium villosissimum var. villosissimum	Whitehair rosette grass
	Dichanlilium wrightianum	Wright's witch grass
	Digitaria ciliaris	Southern crabgrass
	Digitaria cognata var. cognata	Fall witchgrass
	Digitaria ischaemum	Smooth crabgrass
	Digitaria sanguinalis	Hairy crabgrass
	Digitaria villosa	Shaggy crabgrass
	Echinochloa colona	Jungle rice
	Echinochloa crus-galli	Barnyardgrass
	Echinochloa muricata var. microstachya	Rough barnyardgrass
	Eleusine indica	Indian goosegrass
	Elymus virginicus	Virginia wildrye

	Eragrostis cilianensis	Stink grass
	Eragrostis curvula	Weeping lovegrass
	Eragrostis elliottii	Elliot's lovegrass
	Eragrostis hirsuta	Bigtop lovegrass
	Eragrostis hypnoides	Teal lovegrass
	Eragrostis japonica	Pond lovegrass
	Eragrostis lugens	Mourning lovegrass
	Eragrostis minor	Little lovegrass
	Eragrostis pectinacea	Tufted lovegrass
	Eragrostis pilosa	Indian lovegrass
	Eragrostis refracta	Coastal lovegrass
	Eragrostis secundiflora ssp. oxylepis	Red lovegrass
	Eragrostis spectabilis	Purple lovegrass
	Eremochloa ophiuroides	Centipede grass
	Festuca paradoxa	Clustered fescue
	Festuca subverticillata	Nodding fescue
	Glyceria striata	Fowl mannagrass
	Gymnopogon ambiguus	Bearded skeletongrass
	Gymnopogon brevifolius	Short-leaved skeleton grass
	Hordeum pusillum	Little barley
	Leersia lenticularis	Big-flowered cutgrass
	Leersia oryzoides	Rice cutgrass
	Leersia virginica	Whitegrass

Family	Scientific Name	Common Name
POACEAE (continued)	*Leptochloa panicea ssp. Mucronata*	Red sprangletop
	Leptochloa panicoides	Amazon sprangletop
	Lolium arundinaceum	
	Lolium perenne ssp. Multiflorum	Italian ryegrass
	Lolium pratense	Meadow rye grass
	Luziola fluitans	Southern water grass
	Melica mutica	Twoflower melicgrass
	Microstegium vimineum	Nepal grass
	Muhlenbergia capillaris	Pink muhly
	Muhlenbergia capillaris var. trichopodes	Open muhly
	Muhlenbergia schreberi	Sprawling muhly
	Oplismenus hirtellus ssp. Setarius	Basketgrass
	Panicum amarum	Bitter panic-grass
	Panicum anceps	Beaked panicum
	Panicum ashei	
	Panicum brachyanthum	Short-flowered panic-grass

	Panicum dichotomiflorum	Fall panicgrass
	Panicum hemitomon	Maidencane
	Panicum rigidulum var. rigidulum	Redtop panicum
	Panicum verrucosum	Warty panicgrass
	Panicum virgatum	Switchgrass
	Paspalum boscianum	Bull crowngrass
	Paspalum dilatatum	Dallis grass
	Paspalum distichum	Knot grass
	Paspalum floridanum	Florida paspalum
	Paspalum fluitans	Horsetail paspalum
	Paspalum laeve	Field paspalum
	Paspalum notatum var. notatum	Bahiagrass
	Paspalum notatum var. saurae	Bahiagrass
	Paspalum plicatulum	Brownseed paspalum
	Paspalum praecox	Early paspalum
	Paspalum setaceum	Thin paspalum
	Paspalum urvillei	Vasey's grass
	Phalaris caroliniana	Carolina canarygrass
	Phanopyrum gymnocarpon	Savannah panicum
	Phyllostachys aurea	Golden bamboo
	Piptochaetium avenaceum	Blackseed needlegrass
	Poa annua	Annual bluegrass
	Poa autumnalis	Autumn bluegrass
	Poa chapmaniana	Chapman's bluegrass
	Saccharum alopecuroidum	Silver plumegrass
	Saccharum baldwinii	Narrow plumegrass
	Saccharum brevibarbe var. contortum	Short-beard plume grass
	Saccharum giganteum	Sugarcane plumegrass
	Sacciolepis striata	American cupscale
	Schizachyrium scoparium var. scoparium	Little bluestem

Family	Scientific Name	Common Name
POACEAE (continued)	*Schizachyrium tenerum*	Slender bluestem
	Secale cereale	Cultivated rye
	Setaria glauca	
	Setaria parviflora	Yellow bristlegrass
	Sorghastrum elliottii	Slender Indiangrass
	Sorghastrum nutans	Yellow Indiangrass
	Sorghastrum secundum	Lopsided Indiangrass
	Sorghum bicolor ssp. bicolor	Broomcorn
	Sorghum halepense	Johnsongrass
	Sphenopholis filiformis	Longleaf wedgescale

	Sphenopholis nitida	Shiny wedgescale
	Sphenopholis obtusata	Prairie wedgescale
	Sporobolus clandestinus	Tall dropseed
	Sporobolus indicus	Smut grass
	Sporobolus junceus	Pineywoods dropseed
	Sporobolus vaginiflorus	Poverty grass
	Steinchisma hians	Spreadflower panic grass
	Tridens carolinianus	Carolina fluff grass
	Tridens flavus var. chapmanii	Chapman's tridens
	Tridens flavus var. flavus	Purpletop tridens
	Tridens strictus	Dense-flowered trident grass
	Triplasis americana	Perennial sandgrass
	Triplasis purpurea	Purple sandgrass
	Tripsacum dactyloides	Eastern gramagrass
	Urochloa ramosa	Dixie signalgrass
	Urochloa texana	Texas liverseed grass
	Vulpia elliotea	Squirreltail fescue
	Vulpia octoflora	Sixweeks fescue
	Zizaniopsis miliacea	Giant cutgrass
POTAMOGETONACEAE	*Potamogeton diversifolius*	Waterthread pondweed
SMILACACEAE	*Smilax bona-nox*	Saw greenbrier
	Smilax ecirrata	Upright carrionflower
	Smilax glauca	Cat greenbrier
	Smilax hugeri	Huger's carrionflower
	Smilax laurifolia	Climbing bamboo
	Smilax pulverulenta	Downy carrionflower
	Smilax pumila	Sarsparilla vine
	Smilax rotundifolia	Roundleaf greenbrier
	Smilax smallii	Lanceleaf greenbrier
	Smilax tamnoides	Rough-edged greenbriar
	Smilax walteri	Red-berry greenbriar
SPARGANIACEAE	*Sparganium americanum*	American burreed
STEMONACEAE	*Croomia pauciflora*	Croomia
TYPHACEAE	*Typha latifolia*	Broadleaf cattail
XYRIDACEAE	*Xyris ambigua*	Ciliate-sepal yellow-eyed grass
	Xyris caroliniana	Slim-head yellow-eyed grass
	Xyris difformis var. difformis	Bog yelloweyed grass

Family	Scientific Name	Common Name
XYRIDACEAE (continued)	*Xyris fimbriata*	Fringed yelloweyed grass
	Xyris jupicai	Richard's yelloweyed grass
	Xyris laxifolia var. iridifolia	Iris-leaved yellow-eyed grass

ANGIOSPERMAE DICOTYLEDONEAE		
ACANTHACEAE	*Justicia americana*	Water-willow
	Justicia ovata var. lanceolata	Looseflower waterwillow
	Ruellia caroliniensis	Carolina wild petunia
	Ruellia humilis	Fringeleaf wild petunia
	Yeatsia viridiflora	Yellow bractspike
ACERACEAE	*Acer leucoderme*	Chalk maple
	Acer negundo	Box-elder
	Acer rubrum	Red maple
	Acer saccharinum	Silver maple
AMARANTHACEAE	*Alternanthera philoxeroides*	Alligatorweed
	Amaranthus palmeri	Carelessweed
	Amaranthus spinosus	Thorny amaranth
	Froelichia floridana	Plains snakecotton
	Froelichia gracilis	Slender snakecotton
	Gomphrena serrata	Arrasa con todo
ANACARDIACEAE	*Rhus aromatica*	Fragrant sumac
	Rhus copallinum	Dwarf sumac
	Rhus glabra	Smooth sumac
	Toxicodendron pubescens	Atlantic poison oak
	Toxicodendron radicans ssp. radicans	Eastern poison ivy
	Toxicodendron vernix	Poison sumac
ANNONACEAE	*Asimina parviflora*	Smallflower pawpaw
	Asimina triloba	Northern pawpaw
APIACEAE	*Angelica venenosa*	Hairy angelica
	Chaerophyllum tainturieri	Hairyfruit chervil
	Cyclospermum leptophyllum	
	Cicuta maculata	Spotted water hemlock
	Cryptotaenia canadensis	Canadian honewort
	Daucus pusillus	Little queen anne's lace
	Eryngium integrifolium	Bog eryngo
	Eryngium prostratum	Creeping eryngo
	Eryngium yuccifolium	Button eryngo
	Hydrocotyle verticillata var. verticillata	Whorled marshpennywort
	Oxypolis rigidior	Cowbane
	Ptilimnium capillaceum	Herbwilliam
	Sanicula canadensis	Canadian blacksnakeroot
	Sanicula odorata	Clustered blacksnakeroot
	Sanicula smallii	Leather-leaved black snakeroot
	Spermolepis divaricata	Southern spermolepis
	Thaspium barbinode	Hairyjoint meadowparsnip
	Thaspium trifoliatum	Purple meadowparsnip
	Thaspium trifoliatum var. aureum	Purple meadowparsnip
	Trepocarpus aethusae	Whitenymph
	Zizia trifoliata	Golden Alexander

Family	Scientific Name	Common Name
APOCYNACEAE	*Amsonia ciliata*	Fringed bluestar
	Amsonia tabernaemontana	Blue star
	Apocynum cannabinum	Indianhemp
	Trachelospermum difforme	Climbing dogbane
	Vinca major	Bigleaf periwinkle
AQUIFOLIACEAE	*Ilex ambigua*	Carolina holly
	Ilex coriacea	Large gallberry
	Ilex decidua	Possumhaw
	Ilex glabra	Inkberry
	Ilex opaca var. opaca	American holly
	Ilex vomitoria	Yaupon
ARALIACEAE	*Aralia spinosa*	Devil's walkingstick
	Panax quinquefolius	Ginseng
ARISTOLOCHIACEAE	*Aristolochia serpentaria*	Virginia snakeroot
	Aristolochia tomentosa	Wooly dutchman's-pipe
	Hexastylis arifolia	Littlebrownjug
	Hexastylis shuttleworthii	Largeflower heartleaf
ASCLEPIADACEAE	*Asclepias amplexicaulis*	Clasping milkweed
	Asclepias humistrata	Sandhill milkweed
	Asclepias longifolia	Long-leaved milkweed
	Asclepias tuberosa	Butterfly milkweed
	Asclepias variegata	Redring milkweed
	Asclepias verticillata	Whorled milkweed
	Asclepias viridiflora	Green-flowered milkweed
	Matelea carolinensis	Carolina milkvine
	Matelea decipiens	Deceptive milkvine
	Matelea gonocarpos	Anglepod
ASTERACEAE	*Acanthospermum australe*	Paraguayan starburr
	Ageratina altissima var. altissima	White snakeroot
	Ageratina aromatica var. aromatica	Lesser snakeroot
	Ambrosia artemisiifolia	Annual ragweed
	Ambrosia trifida	Giant ragweed
	Antennaria plantaginifolia	Woman's tobacco
	Arnoglossum atriplicifolium	Armoglossum
	Arnoglossum ovatum	Ovateleaf cacalia
	Baccharis halimifolia	Eastern baccharis
	Bidens aristosa	Tickseed sunflower
	Bidens bipinnata	Spanish needles
	Bidens discoidea	Small beggarticks
	Bidens frondosa	Devil's beggartick
	Bidens laevis	Wild goldenglow
	Bidens tripartita	Threelobe beggarticks

	Boltonia diffusa	Smallhead doll's daisy
	Brickellia cordifolia	Heartleaf brickellia
	Brickellia eupatorioides var. eupatorioides	False boneset
	Chrysogonum virginianum var. australe	Green and gold
	Chrysoma pauciflosculosa	Woody goldenrod

Family	Scientific Name	Common Name
ASTERACEAE (continued)	*Chrysopsis gossypina ssp. gossypina*	Cottony goldenaster
	Chrysopsis mariana	Maryland goldenaster
	Cirsium altissimum	Tall thistle
	Cirsium horridulum	Yellow thistle
	Cirsium virginianum	Virginia thistle
	Conoclinium coelestinum	Blue mistflower
	Conyza bonariensis	Hairy horseweed
	Conyza canadensis var. canadensis	Canadian horseweed
	Conyza canadensis var. pusilla	Canadian horseweed
	Coreopsis auriculata	Lobed tickseed
	Coreopsis gladiata	Alternate-leaved tickseed
	Coreopsis grandiflora	Largeflower tickseed
	Coreopsis lanceolata	Lanceleaf tickseed
	Coreopsis major	Greater tickseed
	Coreopsis tinctoria	Calliopsis
	Croptilon divaricatum	Slender scratchdaisy
	Doellingeria sericocarpoides	Parasol aster
	Echinacea pallida	Pale purple coneflower
	Eclipta prostrata	False daisy
	Elephantopus carolinianus	Carolina elephantsfoot
	Elephantopus nudatus	Smooth elephantsfoot
	Elephantopus tomentosus	Devil's grandmother
	Erechtites hieraciifolia var. hieraciifolia	American burnweed
	Erigeron annuus	Daisy fleabane
	Erigeron philadelphicus	Philadelphia fleabane
	Erigeron strigosus	Prairie fleabane
	Erigeron strigosus var. beyrichii	Beyrich's fleabane
	Eupatorium album var. album	White thoroughwort
	Eupatorium capillifolium	Dog-fennel
	Eupatorium cf. compositifolium	Yankeeweed
	Eupatorium fistulosum	Joe-pye weed
	Eupatorium glaucescens	Wedge-leaved thoroughwort
	Eupatorium hyssopifolium var. hyssopifolium	Hyssopleaf thoroughwort
	Eupatorium leucolepis	Bog narrow-leaved

		thoroughwort
	Eupatorium mohrii	
	Eupatorium perfoliatum	Boneset
	Eupatorium pilosum	Ovate thoroughwort
	Eupatorium rotundifolium var. rotundifolium	Roundleaf thoroughwort
	Eupatorium semiserratum	Half-toothed thoroughwort
	Eupatorium serotinum	Weedy thoroughwort
	Eurybia surculosa	Colonizing aster
	Euthamia caroliniana	Slender goldentop
	Facelis retusa	Trampweed
	Gaillardia aestivalis	Lanceleaf blanketflower
	Gamochaeta purpurea	Spoonleaf purple everlasting
	Helenium amarum	Yellowdicks

Family	Scientific Name	Common Name
ASTERACEAE (continued)	*Helenium autumnale var. autumnale*	Common sneezeweed
	Helenium brevifolium	Shortleaf sneezeweed
	Helenium flexuosum	Purplehead sneezeweed
	Helianthus ×glaucus	A hybrid sunflower
	Helianthus angustifolius	Swamp sunflower
	Helianthus atrorubens	Purpledisk sunflower
	Helianthus decapetalus	Ten-rayed sunflower
	Helianthus divaricatus	Sessile-leaved sunflower
	Helianthus giganteus	Giant sunflower
	Helianthus hirsutus	Hairy sunflower
	Helianthus longifolius	Longleaf sunflower
	Helianthus microcephalus	Small woodland sunflower
	Helianthus pauciflorus ssp. pauciflorus	Stiff sunflower
	Helianthus resinosus	Resindot sunflower
	Helianthus smithii	Smith's sunflower
	Heliopsis helianthoides	Sunflower heliopsis
	Heterotheca subaxillaris	Camphorweed
	Hieracium gronovii	Queendevil
	Hieracium venosum	Rattlesnakeweed
	Hymenopappus scabiosaeus var. scabiosaeus	Carolina woollywhite
	Hypochaeris glabra	Smooth catsear
	Hypochaeris radicata	Hairy catsear
	Ionactis linariifolius	Toadflax aster
	Iva annua	Marsh-elder
	Krigia caespitosa	Weedy dwarfdandelion
	Krigia dandelion	Potato dwarfdandelion
	Krigia virginica	Virginia dwarfdandelion

	Lactuca canadensis	Canada lettuce
	Lactuca floridana	Woodland lettuce
	Lactuca graminifolia	Grassleaf lettuce
	Liatris aspera	Rough blazing-star
	Liatris elegans	Pinkscale gayfeather
	Liatris pilosa var. pilosa	
	Liatris regimontis	
	Liatris spicata var. spicata	Spicate blazing-star
	Liatris squarrosa var. squarrosa	Scaly gayfeather
	Liatris squarrulosa	Earle's blazing-star
	Liatris tenuifolia var. tenuifolia	Shortleaf gayfeather
	Marshallia obovata var. obovata	Spoonshape Barbara's buttons
	Mikania scandens	Climbing hempvine
	Packera anonyma	Small's ragwort
	Packera glabella	Butterweed
	Packera tomentosa	Woolly ragwort
	Pityopsis aspera var. adenolepis	Sticky grass-leaved golden-aster
	Pityopsis aspera var. aspera	Pineland silkgrass

Family	Scientific Name	Common Name
ASTERACEAE (continued)	*Pityopsis graminifolia var. latifolia*	Grass-leaved golden-aster
	Pluchea camphorata	Camphor pluchea
	Pluchea odorata var. odorata	Sweetscent
	Prenanthes serpentaria	Cankerweed
	Pseudognaphalium helleri ssp. helleri	Sticky rabbit-tobacco
	Pseudognaphalium obtusifolium ssp. obtusifolium	Blunt-leaf rabbit-tobacco
	Pyrrhopappus carolinianus	Carolina desertchicory
	Rudbeckia fulgida var. fulgida	Orange coneflower
	Rudbeckia hirta	Blackeyed Susan
	Rudbeckia hirta var. pulcherrima	Blackeyed Susan
	Rudbeckia laciniata var. laciniata	Cutleaf coneflower
	Sericocarpus asteroides	
	Sericocarpus linifolius	
	Sclerolepis uniflora	One-flowered sclerolepis; pink bogbutton
	Silphium asteriscus var. angustatum	Starry rosinweed
	Silphium asteriscus var. laevicaule	Starry rosinweed
	Silphium compositum var. compositum	Kidneyleaf rosinweed
	Smallanthus uvedalius	Hairy leafcup
	Solidago altissima	Canada goldenrod

	Solidago arguta var. caroliniana	Carolina goldenrod
	Solidago auriculata	Eared goldenrod
	Solidago caesia	Bluestem goldenrod
	Solidago discoidea	
	Solidago erecta	Showy goldenrod
	Solidago gigantea	Giant goldenrod
	Solidago juncea	Early goldenrod
	Solidago nemoralis var. nemoralis	Gray goldenrod
	Solidago odora var. odora	Anisescented goldenrod
	Solidago patula var. strictula	Swamp goldenrod
	Solidago petiolaris	Big-flowered goldenrod
	Solidago puberula var. pulverulenta	Downy goldenrod
	Solidago rugosa ssp. rugosa	Rough-leaved goldenrod
	Solidago rugosa ssp. aspera	Wrinkleleaf goldenrod
	Solidago speciosa var. speciosa	Showy goldenrod
	Solidago stricta	Wand goldenrod
	Solidago tortifolia	Twistleaf goldenrod
	Soliva sessilis	Burweed
	Sonchus asper	Spiny sowthistle
	Symphyotrichum adnatum	Scale-leaved aster
	Symphyotrichum concolor	Eastern silver aster
	Symphyotrichum cordifolium	Arrow-leaved aster
	Symphyotrichum dumosum	Rice button aster
	Symphyotrichum lateriflorum var. lateriflorum	Farewell summer
	Symphyotrichum patens var. gracile	Southern clasping-leaved aster
	Symphyotrichum patens var. patens	Late purple aster

Family	Scientific Name	Common Name
ASTERACEAE (continued)	*Symphyotrichum pilosum var. pilosum*	White oldfield aster
	Symphyotrichum undulatum	Waxyleaf aster
	Tetragonotheca helianthoides	Pineland nerveray
	Verbesina alternifolia	Alternate-leaved crownbeard
	Verbesina aristata	Serrate crownbeard
	Verbesina occidentalis	Yellow crownbeard
	Verbesina virginica	White crownbeard
	Vernonia ×concinna	A hybrid ironweed
	Vernonia angustifolia ssp. Mohrii	Mohr's ironweed
	Vernonia gigantea ssp. gigantea	Giant ironweed
	Vernonia gigantea ssp. ovalifolia	Giant ironweed
	Xanthium strumarium var. glabratum	Rough cockleburr
BALSAMINACEAE	*Impatiens capensis*	Jewelweed
BERBERIDACEAE	*Podophyllum peltatum*	Mayapple

BETULACEAE	*Alnus serrulata*	Hazel alder
	Betula nigra	River birch
	Carpinus caroliniana	American hornbeam
	Ostrya virginiana	Eastern hophornbeam
BIGNONIACEAE	*Bignonia capreolata*	Crossvine
	Campsis radicans	Trumpet creeper
	Catalpa bignonioides	Southern catalpa
BORAGINACEAE	*Cynoglossum virginianum*	Wild comfrey
	Heliotropium amplexicaule	Clasping heliotrope
	Heliotropium indicum	Indian heliotrope
	Lithospermum caroliniense	Hairy puccoon
	Myosotis macrosperma	Largeseed forget me not
	Onosmodium virginianum	Virginia marbleseed
BRASSICACEAE	*Arabis canadensis*	Sicklepod
	Arabis georgiana	Georgia rockcress
	Cardamine bulbosa	Bulbous bittercress
	Cardamine concatenata	Cut-leaved toothwort
	Cardamine hirsuta	Hairy bittercress
	Draba brachycarpa	Whitlow-grass.
	Lepidium virginicum var. virginicum	Virginia pepperweed
	Teesdalia nudicaulis	Teesdalia
	Warea cuneifolia	Carolina pinelandcress
BUDDLEJACEAE	*Buddleja lindleyana*	Lindley's butterfly-bush
	Polypremum procumbens	Juniper leaf
CABOMBACEAE	*Brasenia schreberi*	Watershield
	Cabomba caroliniana	Fanwort
CACTACEAE	*Opuntia humifusa*	Tuna cactus
	Opuntia humifusa X pusilla	A hybrid prickly-pear
	Opuntia pusilla	Brittle prickly-pear
CALLITRICHACEAE	*Callitriche heterophylla*	Water starwort
CALYCANTHACEAE	*Calycanthus floridus*	Sweetshrub
CAMPANULACEAE	*Campanula divaricata*	Harebells
	Campanulastrum americanum	American bellflower
	Lobelia amoena var. amoena	Southern lobelia
	Lobelia amoena var. glandulifera	Southern lobelia

Family	Scientific Name	Common Name
CAMPANULACEAE (continued)	*Lobelia boykinii*	
	Lobelia cardinalis	Cardinalflower
	Lobelia elongata	Longleaf lobelia
	Lobelia flaccidifolia	Foldear lobelia
	Lobelia puberula	Downy lobelia
	Triodanis biflora	Clasping Venus' lookingglass
	Triodanis perfoliata	Clasping Venus' lookingglass

	Wahlenbergia marginata	Southern rockbell
CAPRIFOLIACEAE	*Abelia X grandiflora*	Largeflower abelia
	Lonicera japonica	Japanese honeysuckle
	Lonicera sempervirens	Trumpet honeysuckle
	Sambucus canadensis	Elderberry
	Viburnum acerifolium	Maple-leaved viburnum
	Viburnum nudum	Possumhaw
	Viburnum rufidulum	Rusty blackhaw
CARYOPHYLLACEAE	*Arenaria lanuginosa*	Spreading sandwort
	Arenaria serpyllifolia	Thymeleaf sandwort
	Cerastium brachypodum	Shortstalk chickweed
	Cerastium glomeratum	Sticky chickweed
	Minuartia caroliniana	Pinebarren stitchwort
	Paronychia americana	American nailwort
	Paronychia baldwinii ssp. riparia	Baldwin's nailwort
	Paronychia americana ssp. pauciflora	Few-flowered nailwort
	Paronychia baldwinii ssp. baldwinii	Baldwin’s nailwort
	Paronychia herniarioides	Coastalplain nailwort
	Sagina decumbens	Beach pearlwort
	Saponaria officinalis	Bouncing bet
	Silene antirrhina	Sleepy silene
	Silene stellata	Widowsfrill
	Stellaria media	Common chickweed
	Stipulicida setacea	Pineland scalypink
CELASTRACEAE	*Euonymus americana*	American strawberrybush
CHENOPODIACEAE	*Chenopodium album var. album*	Lamb’s quarters
	Chenopodium ambrosioides	Mexican tea
CISTACEAE	*Helianthemum canadense*	Longbranch frostweed
	Helianthemum carolinianum	Carolina frostweed
	Helianthemum georgianum	Georgia frostweed
	Helianthemum rosmarinifolium	Rosemary frostweed
	Lechea minor	Thymeleaf pinweed
	Lechea mucronata	Hairy pinweed
	Lechea racemulosa	Illinois pinweed
	Lechea sessiliflora	Pineland pinweed
	Lechea tenuifolia	Narrowleaf pinweed
CLETHRACEAE	*Clethra alnifolia*	Coastal sweetpepperbush
CLUSIACEAE	*Hypericum adpressum*	Creeping St. John's-wort
	Hypericum canadense	Canada St. John’s-wort
	Hypericum crux-andreae	St. Peterswort
	Hypericum densiflorum	Bushy St. Johnswort
	Hypericum drummondii	Nits and lice

Family	Scientific Name	Common Name

CLUSIACEAE (continued)	*Hypericum gentianoides*	Orangegrass
	Hypericum gymnanthum	Claspingleaf St. Johnswort
	Hypericum hypericoides	St. Andrews cross
	Hypericum mutilum	Dwarf St. Johnswort
	Hypericum myrtifolium	Myrtle-leaved St. John's-wort
	Hypericum nudiflorum	Bractless St. John's-wort
	Hypericum prolificum	Shrubby St. Johnswort
	Hypericum punctatum	Spotted St. Johnswort
	Hypericum setosum	Hairy St. John's-wort
	Hypericum virgatum	Pointy-leaved St. John's-wort
	Triadenum tubulosum	Lesser marsh St. Johnswort
	Triadenum virginicum	Virginia marsh St. Johnswort
	Triadenum walteri	Walter's marsh St. John's-wort
CONVOLVULACEAE	*Calystegia sepium*	Hedge false bindweed
	Calystegia spithamaea	Low false bindweed
	Dichondra carolinensis	Pony foot
	Ipomoea coccinea	Redstar
	Ipomoea cordatotriloba var. cordatotriloba	Tievine
	Ipomoea lacunosa	Whitestar
	Ipomoea pandurata	Man of the earth
	Ipomoea purpurea	Tall morningglory
	Jacquemontia tamnifolia	Hairy clustervine
	Stylisma aquatica	Water dawnflower
	Stylisma humistrata	Southern dawnflower
	Stylisma patens ssp. angustifolia	Coastalplain dawnflower
	Stylisma patens ssp. patens	Coastalplain dawnflower
	Stylisma pickeringii var. pickeringii	Pickering's dawnflower
CORNACEAE	*Cornus amomum*	Silky dogwood
	Cornus florida	Flowering dogwood
	Cornus foemina	Stiff dogwood
CRASSULACEAE	*Penthorum sedoides*	Ditch stonecrop
CUCURBITACEAE	*Melothria pendula*	Guadeloupe cucumber
CUSCUTACEAE	*Cuscuta compacta*	Compact dodder
	Cuscuta gronovii	Scaldweed
	Cuscuta pentagona var. pentagona	Fiveangled dodder
CYRILLACEAE	*Cyrilla racemiflora*	Swamp titi
DIAPENSIACEAE	*Galax urceolata*	Galax
DROSERACEAE	*Drosera capillaris*	Pink sundew
	Drosera rotundifolia	Roundleaf sundew
EBENACEAE	*Diospyros virginiana*	Common persimmon
ELAEAGNACEAE	*Elaeagnus pungens*	Thorny elaeagnus
ERICACEAE	*Epigaea repens*	Trailing arbutus
	Gaylussacia dumosa	Dwarf huckleberry
	Gaylussacia tomentosa	Blue huckleberry

	Kalmia latifolia	Mountain laurel
	Leucothoe axillaris	Coastal doghobble
	Leucothoe racemosa	Swamp doghobble

Family	Scientific Name	Common Name
ERICACEAE (continued)	*Lyonia ligustrina*	Maleberry
	Lyonia lucida	Fetterbush lyonia
	Oxydendrum arboreum	Sourwood
	Rhododendron alabamense	Alabama azalea
	Rhododendron alabamense X canescens	A hybrid azalea
	Rhododendron arborescens	Sweet azalea
	Rhododendron atlanticum	Dwarf azalea
	Rhododendron canescens	Mountain azalea
	Rhododendron minus	Carolina rosebay
	Rhododendron viscosum	Swamp azalea
	Vaccinium arboreum	Farkleberry
	Vaccinium corymbosum	Highbush blueberry
	Vaccinium elliottii	Elliott's blueberry
	Vaccinium myrsinites	Shiny blueberry
	Vaccinium stamineum	Deerberry
	Vaccinium tenellum	Small black blueberry
	Vaccinium virgatum	Swamp blueberry
EUPHORBIACEAE	*Acalypha gracilens*	Slender threeseed mercury
	Acalypha rhomboidea	Common three-seeded mercury
	Acalypha virginica	Virginia three-seeded mercury
	Chamaesyce cordifolia	Heartleaf sandmat
	Chamaesyce maculata	Spotted sandmat
	Chamaesyce nutans	Eyebane
	Cnidoscolus stimulosus	Finger rot
	Croton capitatus	Hogwort
	Croton glandulosus var. septentrionalis	Vente conmigo
	Croton michauxii	Michaux's croton
	Croton willdenowii	Willdenow's croton
	Euphorbia corollata	Flowering spurge
	Euphorbia dentata	Toothed spurge
	Euphorbia pubentissima	False flowering spurge
	Phyllanthus caroliniensis	Carolina leafflower
	Sebastiania fruticosa	Gulf sebastiana
	Stillingia sylvatica	Queensdelight
	Tragia cordata	Nettlevine

	Tragia urens	Wavyleaf noseburn
	Tragia urticifolia	Nettleleaf noseburn
	Triadica sebifera	Chinese tallow-tree
FABACEAE	*Albizia julibrissin*	Silktree
	Alysicarpus vaginalis	Alyce clover
	Amorpha fruticosa	Desert indigobush
	Amphicarpaea bracteata	American hogpeanut
	Apios americana	Groundnut
	Astragalus villosus	Bearded milkvetch
	Baptisia alba var. alba	White wild indigo

Family	Scientific Name	Common Name
FABACEAE (continued)	*Baptisia albescens*	Slimpod white indigo
	Baptisia bracteata	Creamy wild indigo
	Baptisia lanceolata var. lanceolata	Gopherweed
	Centrosema virginianum	Spurred butterfly pea
	Cercis canadensis	Eastern redbud
	Chamaecrista fasciculata	Sleepingplant
	Chamaecrista nictitans ssp. nictitans var. nictitans	Partridge pea
	Clitoria mariana	Atlantic pigeonwings
	Crotalaria purshii	Narrow-leaved rattlebox
	Crotalaria rotundifolia	Rabbitbells
	Crotalaria spectabilis	Showy crotalaria
	Dalea candida	Slender white prairieclover
	Dalea carnea var. albida	Whitetassels
	Dalea pinnata var. trifoliata	Summer farewell
	Desmodium cf. viridiflorum	Velvetleaf ticktrefoil
	Desmodium ciliare	Hairy smallleaf ticktrefoil
	Desmodium fernaldii	Fernald's ticktrefoil
	Desmodium glabellum	Dillenius' ticktrefoil
	Desmodium laevigatum	Smooth ticktrefoil
	Desmodium lineatum	Sand ticktrefoil
	Desmodium marilandicum	Smooth ticktrefoil
	Desmodium nudiflorum	Nakedflower ticktrefoil
	Desmodium nuttallii	Nuttall's ticktrefoil
	Desmodium paniculatum	Panicledleaf ticktrefoil
	Desmodium pauciflorum	Fewflower ticktrefoil
	Desmodium rotundifolium	Dollar-leaf beggar-lice
	Desmodium sessilifolium	Sessile-leaved tick-trefoil
	Desmodium strictum	Pinebarren ticktrefoil
	Desmodium tenuifolium	Slimleaf ticktrefoil

	Desmodium tortuosum	Florida beggarweed
	Erythrina herbacea	Redcardinal
	Galactia microphylla	Littleleaf milkpea
	Galactia regularis	Eastern milkpea
	Galactia volubilis	Downy milkpea
	Gleditsia triacanthos	Honey locust
	Glottidium vesicarium	Bagpod
	Indigofera caroliniana	Carolina indigo
	Kummerowia striata	Japanese clover
	Lespedeza bicolor	Shrubby lespedeza
	Lespedeza capitata	Roundhead bush-clover
	Lespedeza cuneata	Chinese lespedeza
	Lespedeza hirta ssp. Curtissii	Curtiss' lespedeza
	Lespedeza hirta ssp. hirta	Hairy lespedeza
	Lespedeza procumbens	Trailing lespedeza
	Lespedeza repens	Creeping lespedeza
	Lespedeza stuevei	Tall lespedeza
	Lespedeza violacea	Violet lespedeza
	Lespedeza virginica	Slender lespedeza

Family	Scientific Name	Common Name
FABACEAE (continued)	*Lupinus perennis*	Sundial lupine
	Melilotus officinalis	White sweetclover
	Mimosa microphylla	
	Orbexilum pedunculatum var. pedunculatum	Sampson's snakeroot
	Orbexilum simplex	Singlestem leatherroot
	Pediomelum canescens	Prairie-turnip
	Phaseolus polystachios var. sinuatus	Wavy wild bean
	Pueraria montana var. lobata	Kudzu
	Rhynchosia difformis	Twining rhynchosia
	Rhynchosia reniformis	Dollarleaf
	Rhynchosia tomentosa	Twining snoutbean
	Rhynchosia tomentosa var. tomentosa	Twining snoutbean
	Robinia hispida	Bristly locust
	Robinia pseudoacacia	Black locust
	Senna marilandica	Maryland wild sensitive plant
	Senna obtusifolia	Coffeeweed
	Senna occidentalis	Coffee senna
	Sesbania herbacea	
	Sesbania punicea	Rattlebox
	Strophostyles helvula	Trailing fuzzybean
	Strophostyles umbellata	Pink fuzzybean
	Stylosanthes biflora	Sidebeak pencilflower

	Tephrosia florida	Florida hoarypea
	Tephrosia spicata	Spiked hoarypea
	Tephrosia virginiana	Virginia tephrosia
	Trifolium campestre	Field clover
	Trifolium carolinianum	Carolina clover
	Trifolium incarnatum	Crimson clover
	Trifolium pratense	Red clover
	Trifolium reflexum	Buffalo clover
	Trifolium repens	White clover
	Vicia caroliniana	Carolina vetch
	Vicia grandiflora	Big-flowered vetch
	Vicia sativa ssp. nigra	Common vetch
	Vicia tetrasperma	Lentil vetch
	Wisteria frutescens	American wisteria
	Wisteria sinensis	Chinese wisteria
	Zornia bracteata	Viperina
FAGACEAE	*Castanea dentata*	American chestnut
	Castanea pumila var. pumila	Allegheny chinkapin
	Fagus grandifolia	American beech
	Quercus alba	White oak
	Quercus arkansana	Arkansas oak
	Quercus coccinea	Scarlet oak
	Quercus falcata	Southern red oak
	Quercus falcata X hemisphaerica	A hybrid oak
	Quercus georgiana	Georgia oak
	Quercus hemisphaerica	Darlington oak

Family	Scientific Name	Common Name
FAGACEAE (continued)	*Quercus incana*	Bluejack oak
	Quercus ×cravenensis	A hybrid oak
	Quercus laevis	Turkey oak
	Quercus laurifolia	Laurel oak
	Quercus lyrata	Overcup oak
	Quercus margarettiae	Runner oak
	Quercus marilandica	Blackjack oak
	Quercus michauxii	Swamp chestnut oak
	Quercus prinus	Rock chestnut oak
	Quercus nigra	Water oak
	Quercus pagoda	Cherrybark oak
	Quercus phellos	Willow oak
	Quercus prinoides	Dwarf chinkapin oak
	Quercus shumardii	Shumard's oak
	Quercus stellata	Post oak
	Quercus velutina	Black oak

	Quercus virginiana	Live oak
GENTIANACEAE	*Bartonia virginica*	Virginia screwstem
	Gentiana catesbaei	Catesby's gentian
	Gentiana villosa	Striped gentian
	Sabatia angularis	Rosepink
	Sabatia campanulata	Perennial rose-gentian
GERANIACEAE	*Geranium carolinianum*	Carolina geranium
	Geranium maculatum	Spotted geranium
GROSSULARIACEAE	*Itea virginica*	Virginia sweetspire
HALORAGACEAE	*Myriophyllum aquaticum*	Parrot feather watermilfoil
	Myriophyllum heterophyllum	Wide water-milfoil
	Myriophyllum laxum	Slender water-milfoil
	Proserpinaca palustris	Mermaid-weed
HAMAMELIDACEAE	*Hamamelis virginiana*	Witch-hazel
	Liquidambar styraciflua	Sweetgum
HIPPOCASTANACEAE	*Aesculus cf. flava*	Yellow buckeye
	Aesculus pavia	Red buckeye
	Aesculus parviflora	Bottlebrush buckeye
HYDRANGEACEAE	*Decumaria barbara*	Woodvamp
	Hydrangea quercifolia	Oakleaf hydrangea
	Philadelphus inodorus	Smooth mock-orange
HYDROPHYLLACEAE	*Hydrolea quadrivalvis*	Waterpod
	Nemophila aphylla	Smallflower baby blue eyes
	Phacelia dubia	Smallflower scorpionweed
JUGLANDACEAE	*Carya alba*	Mockernut hickory
	Carya aquatica	Water hickory
	Carya cordiformis	Bitternut hickory
	Carya glabra	Pignut hickory
	Carya illinoinensis	Pecan
	Carya ovata	Shagbark hickory
	Carya pallida	Sand hickory
	Juglans nigra	Black walnut

Family	Scientific Name	Common Name
LAMIACEAE	*Ajuga reptans*	Bugleweed
	Clinopodium georgianum	Georgia mint
	Collinsonia serotina	Blue Ridge horsebalm
	Hedeoma hispida	False pennyroyal
	Hyptis alata	Clustered bushmint
	Hyptis mutabilis	Tropical bushmint
	Lamium amplexicaule	Henbit deadnettle
	Lycopus rubellus	Narrow-leaved bugleweed
	Lycopus virginicus	Virginia waterhorehound

	Monarda punctata	Spotted beebalm
	Prunella vulgaris	Common selfheal
	Pycnanthemum incanum	Hoary mountainmint
	Pycnanthemum loomisii	Loomis' mountain mint
	Pycnanthemum pycnanthemoides	Long-toothed mountain mint
	Salvia azurea	Azure blue sage
	Salvia lyrata	Lyreleaf sage
	Salvia urticifolia	Nettleleaf sage
	Scutellaria elliptica	Hairy skullcap
	Scutellaria integrifolia	Helmet flower
	Scutellaria ovata	Ovate skullcap
	Scutellaria racemosa	South American skullcap
	Teucrium canadense	Candad germander
	Trichostema dichotomum	Forked bluecurls
	Trichostema setaceum	Slender blue-curls
LAURACEAE	*Persea borbonia*	Upland red-bay
	Persea palustris	Swamp bay
	Sassafras albidum	Sassafras
LENTIBULARIACEAE	*Utricularia cornuta*	Horned bladderwort
	Utricularia floridana	Foxtail bladderwort
	Utricularia gibba	Humped bladderwort
	Utricularia inflata	Swollen bladderwort
	Utricularia juncea	Little horned bladderwort
	Utricularia subulata	Dwarf bladderwort
LINACEAE	*Linum medium var. texanum*	Texas flax
	Linum striatum	Ridged yellow flax
LOGANIACEAE	*Gelsemium sempervirens*	Evening trumpetflower
	Mitreola petiolata	Petiolate miterwort
	Mitreola sessilifolia	Sessile miterwort
	Spigelia marilandica	Woodland pinkroot
LYTHRACEAE	*Ammannia coccinea*	Valley redstem
	Cuphea carthagenensis	Colombian waxweed
	Lagerstroemia indica	Crapemyrtle
	Lythrum lineare	Wand lythrum
	Rotala ramosior	Lowland rotala
MAGNOLIACEAE	*Liriodendron tulipifera*	Tuliptree
	Magnolia grandiflora	Southern magnolia
	Magnolia macrophylla	Bigleaf magnolia
	Magnolia virginiana	Sweetbay

Family	Scientific Name	Common Name
MALVACEAE	*Hibiscus aculeatus*	Comfortroot
	Hibiscus laevis	Halberdleaf rosemallow

	Hibiscus moscheutos ssp. moscheutos	Crimsoneyed rosemallow
	Modiola caroliniana	Carolina bristlemallow
	Sida elliottii	Elliott's fanpetals
	Sida rhombifolia	Cuban jute
	Sida spinosa	Prickly mallow
MELASTOMATACEAE	*Rhexia alifanus*	Savanna meadow-beauty
	Rhexia mariana	Maryland meadowbeauty
	Rhexia nashii	Maid Marian
	Rhexia petiolata	Fringed meadowbeauty
	Rhexia virginica	Handsome Harry
MELIACEAE	*Melia azedarach*	Chinaberrytree
MENISPERMACEAE	*Calycocarpum lyonii*	Cupseed
	Cocculus carolinus	Carolina coralbead
	Menispermum canadense	Moonseed
MENYANTHACEAE	*Nymphoides cordata*	Little floatingheart
MOLLUGINACEAE	*Mollugo verticillata*	Green carpetweed
MORACEAE	*Morus alba*	White mulberry
	Morus rubra	Red mulberry
MYRICACEAE	*Morella cerifera*	Wax mrytle
	Morella caroliniensis	Carolina wax-myrtle
NELUMBONACEAE	*Nelumbo lutea*	American lotus
NYCTAGINACEAE	*Mirabilis albida*	White four o'clock
NYMPHAEACEAE	*Nuphar lutea ssp. advena*	Spatterdock
	Nymphaea odorata	American white waterlily
NYSSACEAE	*Nyssa aquatica*	Water tupelo
	Nyssa biflora	Swamp tupelo
	Nyssa sylvatica	Black tupelo
OLEACEAE	*Chionanthus virginicus*	Fringetree
	Fraxinus caroliniana	Water ash
	Fraxinus pennsylvanica	Green ash
	Ligustrum sinense	Chinese privet
	Osmanthus americanus	Devilwood
ONAGRACEAE	*Gaura filipes*	Slenderstalk beeblossom
	Ludwigia alternifolia	Seedbox
	Ludwigia decurrens	Wingleaf primrosewillow
	Ludwigia glandulosa	Cylinder-fruit false loosestrife
	Ludwigia hirtella	Downy false loosestrife
	Ludwigia leptocarpa	Anglestem primrosewillow
	Ludwigia linearis	Narrowleaf primrosewillow
	Ludwigia palustris	Marsh seedbox
	Ludwigia spathulata	Southern water purslane
	Ludwigia virgata	Savannah primrosewillow
	Oenothera biennis	Common eveningprimrose
	Oenothera curtissii	Curtiss' eveningprimrose
	Oenothera fruticosa	Narrowleaf eveningprimrose

	Oenothera laciniata	Cutleaf eveningprimrose

Family	Scientific Name	Common Name
ONAGRACEAE (continued)	*Oenothera parviflora*	Northern eveningprimrose
	Oenothera speciosa	Pinkladies
OROBANCHACEAE	*Conopholis americana*	American squawroot
	Epifagus virginiana	Beechdrops
OXALIDACEAE	*Oxalis dillenii*	Dillen's oxalis
	Oxalis priceae ssp. colorea	Price's yellow wood-sorrel
	Oxalis priceae ssp. priceae	Tufted yellow woodsorrel
	Oxalis rubra	Red wood-sorrel
	Oxalis stricta	Common yellow oxalis
	Oxalis violacea	Violet woodsorrel
PAPAVERACEAE	*Argemone albiflora*	Prickly-poppy
	Sanguinaria canadensis	Bloodroot
PASSIFLORACEAE	*Passiflora incarnata*	Purple passionflower
	Passiflora lutea	Pale passionflower
PEDALIACEAE	*Sesamum orientale*	Sesame
PHYTOLACCACEAE	*Phytolacca americana*	American pokeweed
PLANTAGINACEAE	*Plantago aristata*	Largebracted plantain
	Plantago lanceolata	Narrowleaf plantain
	Plantago pusilla	Pygmy plantain
	Plantago sparsiflora	Pineland plantain
	Plantago virginica	Virginia plantain
	Plantago wrightiana	Wright's plantain
PLATANACEAE	*Platanus occidentalis*	American sycamore
POLEMONIACEAE	*Phlox carolina*	Thickleaf phlox
	Phlox carolina ssp. angusta	Narrow-leaved Carolina phlox
	Phlox divaricata	Wild blue phlox
	Phlox nivalis ssp. nivalis	Trailing phlox
	Phlox pilosa	Downy phlox
POLYGALACEAE	*Polygala curtissii*	Curtiss' milkwort
	Polygala grandiflora	Showy milkwort
	Polygala incarnata	Procession flower
	Polygala lutea	Orange milkwort
	Polygala mariana	Maryland milkwort
	Polygala nana	Candyroot
	Polygala polygama	Racemed milkwort
	Polygala verticillata	Whorled milkwort
POLYGONACEAE	*Brunnichia ovata*	American buckwheatvine
	Eriogonum tomentosum	Dogtongue buckwheat
	Polygonella fimbriata	Sandhill jointweed
	Polygonella polygama	October-flower
	Polygonum aviculare	Carpet knotweed

	Polygonum caespitosum var. longisetum	Oriental ladysthumb
	Polygonum densiflorum	Dense-flowered knotweed
	Polygonum hydropiperoides	Swamp smartweed
	Polygonum pensylvanicum	Lady's thumb
	Polygonum persicaria	Spotted ladysthumb
	Polygonum punctatum	Dotted smartweed
	Polygonum sagittatum	Tear-thumb

Family	Scientific Name	Common Name
POLYGONACEAE (continued)	*Polygonum scandens*	Climbing false buckwheat
	Polygonum setaceum	Bog smartweed
	Polygonum virginianum	Jumpseed
	Rumex cf. acetosella	Common sheep sorrel
	Rumex conglomeratus	Clustered dock
	Rumex crispus	Curly dock
	Rumex hastatulus	Heartwing sorrel
	Rumex pulcher	Fiddle dock
	Rumex verticillatus	Swamp dock
PORTULACACEAE	*Claytonia virginica*	Virginia springbeauty
	Portulaca amilis	Paraguayan purslane
	Portulaca oleracea	Little hogweed
	Portulaca pilosa	Chisme
PRIMULACEAE	*Anagallis minima*	Chaffweed
	Lysimachia ciliata	Fringed loosestrife
	Lysimachia lanceolata	Lanceleaf loosestrife
	Lysimachia quadrifolia	Whorled loosestrife
	Samolus valerandi ssp. parviflorus	Water pimpernel
PYROLACEAE	*Chimaphila maculata*	Striped prince's pine
RANUNCULACEAE	*Actaea pachypoda*	White baneberry
	Clematis crispa	Swamp leather flower
	Clematis reticulata	Netleaf leather flower
	Clematis terniflora	Three-flowered virgin's-bower
	Delphinium carolinianum	Carolina larkspur
	Hepatica nobilis var. obtusa	Round-lobed hepatica
	Ranunculus abortivus	Littleleaf buttercup
	Ranunculus fascicularis	Prairie buttercup
	Ranunculus hispidus	Bristly buttercup
	Ranunculus parviflorus	Small-flowered buttercup
	Ranunculus pusillus	Low spearwort
	Ranunculus recurvatus	Blisterwort
	Thalictrum revolutum	Waxyleaf meadowrue
	Thalictrum thalictroides	Rue anemone
	Xanthorhiza simplicissima	Yellowroot

RHAMNACEAE	*Berchemia scandens*	Alabama supplejack
	Ceanothus americanus	New Jersey tea
	Frangula caroliniana	Carolina buckthorn
ROSACEAE	*Agrimonia incisa*	Incised agrimony
	Agrimonia microcarpa	Smallfruit agrimony
	Amelanchier arborea	Common serviceberry
	Aphanes microcarpa	Pixie's mantle
	Crataegus flabellata	Fanleaf hawthorn
	Crataegus flava	Yellowleaf hawthorn
	Crataegus marshallii	Parsley haw
	Crataegus phaenopyrum	Washington haw
	Crataegus spathulata	Littlehip hawthorn
	Crataegus uniflora	Dwarf hawthorn
	Crataegus viridis	Green hawthorn
	Duchesnea indica	Indian strawberry

Family	Scientific Name	Common Name
ROSACEAE (continued)	*Fragaria virginiana*	Virginia strawberry
	Malus angustifolia	Southern crabapple
	Malus cf. coronaria	Sweet crabapple
	Photinia pyrifolia	Red chokeberry
	Porteranthus stipulatus	Indian physic
	Potentilla canadensis	Dwarf cinquefoil
	Potentilla simplex	Common cinquefoil
	Prunus alabamensis	Alabama black cherry
	Prunus americana	American plum
	Prunus angustifolia	Chickasaw plum
	Prunus caroliniana	Carolina laurelcherry
	Prunus persica	Peach
	Prunus serotina	Black cherry
	Prunus umbellata var. injuncunda	Hog plum
	Prunus umbellata var. umbellata	Hog plum
	Pyracantha cf. fortuneana	Chinese firethorn
	Rosa bracteata	Macartney rose
	Rosa carolina	Carolina rose
	Rosa gallica	French rose
	Rosa wichuraiana	Memorial rose
	Rubus argutus	Sawtooth blackberry
	Rubus cf. flagellaris	Northern dewberry
	Rubus cuneifolius	Sand blackberry
	Rubus trivialis	Dewberry
RUBIACEAE	*Cephalanthus occidentalis*	Common buttonbush
	Diodia teres	Poorjoe
	Diodia virginiana	Virginia buttonweed

	Galium aparine	Stickywilly
	Galium circaezans	
	Galium hispidulum	Coastal bedstraw
	Galium obtusum ssp. filifolium	Bluntleaf bedstraw
	Galium obtusum ssp. obtusum	Bluntleaf bedstraw
	Galium pilosum	Hairy bedstraw
	Galium pilosum var. puncticulosum	Hairy bedstraw
	Galium tinctorium	Stiff marsh bedstraw
	Galium uniflorum	Oneflower bedstraw
	Hedyotis nigricans	Diamondflowers
	Houstonia purpurea var. purpurea	Venus' pride
	Houstonia caerulea	Azure bluets
	Houstonia micrantha	Western baby bluets
	Houstonia procumbens	Roundleaf bluet
	Houstonia pusilla	Tiny bluet
	Mitchella repens	Partridgeberry
	Oldenlandia boscii	Bosc's mille graines
	Oldenlandia corymbosa	Long-stalked oldenlandia
	Oldenlandia uniflora	Clustered mille graines
	Richardia brasiliensis	Tropical Mexican clover
	Richardia scabra	Rough Mexican clover
	Sherardia arvensis	Field madder

Family	Scientific Name	Common Name
SALICACEAE	*Populus deltoides*	Eastern cottonwood
	Salix humilis	Prairie willow
	Salix nigra	Black willow
SANTALACEAE	*Nestronia umbellula*	Conjurer's nut
SAPINDACEAE	*Cardiospermum halicacabum*	Balloon vine
SAPOTACEAE	*Sideroxylon lanuginosum*	Gum bully
	Sideroxylon lycioides	Buckthorn bully
SARRACENIACEAE	*Sarracenia rubra*	Sweet pitcherplant
SAURURACEAE	*Saururus cernuus*	Lizards tail
SAXIFRAGACEAE	*Heuchera americana*	Alumroot
SCROPHULARIACEAE	*Agalinis fasciculata*	Beach false foxglove
	Agalinis obtusifolia	Tenlobe false foxglove
	Agalinis purpurea	Purple false foxglove
	Agalinis tenuifolia	Slenderleaf false foxglove
	Aureolaria flava	Smooth yellow false foxglove
	Aureolaria pectinata	Combleaf yellow false foxglove
	Aureolaria virginica	Downy yellow false foxglove
	Bacopa caroliniana	Lemon water-hyssop
	Buchnera americana	American bluehearts

	Chelone glabra	White turtlehead
	Gratiola floridana	Florida hedgehyssop
	Gratiola neglecta	Neglected hedge-hyssop
	Gratiola pilosa	Hairy hedge-hyssop
	Gratiola virginiana	Roundfruit hedgehyssop
	Lindernia dubia var. anagallidea	Yellowseed false pimpernel
	Lindernia dubia var. dubia	Yellowseed false pimpernel
	Mazus pumilus	Japanese mazus
	Mecardonia acuminata	Axilflower
	Micranthemum umbrosum	Shade mudflower
	Mimulus alatus	Sharpwing monkeyflower
	Nuttallanthus canadensis	Canada toadflax
	Pedicularis canadensis	Lousewort
	Penstemon australis	Eustis Lake beardtongue
	Penstemon laevigatus	Eastern smooth beardtongue
	Seymeria cassioides	Yaupon blacksenna
	Seymeria pectinata	Piedmont blacksenna
	Verbascum thapsus	Common mullein
	Veronica arvensis	Corn speedwell
SOLANACEAE	*Datura stramonium*	Jimson weed
	Petunia ×atkinsiana	Garden petunia
	Physalis angulata	Cutleaf groundcherry
	Physalis pubescens	Husk tomato
	Physalis virginiana	Virginia groundcherry
	Solanum americanum	American black nightshade
	Solanum carolinense	Carolina horsenettle
	Solanum dimidiatum	Western horsenettle
	Solanum sisymbriifolium	Sticky nightshade

Family	Scientific Name	Common Name
SPHENOCLEACEAE {SYN = CAMPANULACEAE}	*Sphenoclea zeylanica*	Sphenoclea
STAPHYLEACEAE	*Staphylea trifolia*	Bladdernut
STYRACACEAE	*Halesia carolina*	Carolina silverbell
	Halesia diptera	Twowing silverbell
	Halesia tetraptera	Four-wing silverbell
	Styrax americanus	American snowbell
	Styrax grandifolius	Big-leaved snowbell
SYMPLOCACEAE	*Symplocos tinctoria*	Horse sugar
TILIACEAE	*Tilia americana var. heterophylla*	American basswood
ULMACEAE	*Celtis laevigata*	Sugarberry
	Celtis tenuifolia	Dwarf hackberry

	Ulmus alata	Winged elm
	Ulmus americana	American elm
	Ulmus rubra	Slippery elm
URTICACEAE	*Boehmeria cylindrica*	Smallspike false nettle
	Pilea pumila	Clearweed
VALERIANACEAE	*Valerianella radiata*	Beaked cornsalad
VERBENACEAE	*Callicarpa americana*	American beautyberry
	Glandularia pulchella	South American mock vervain
	Phryma leptostachya	Lopseed
	Stylodon carneus	Carolina false vervain
	Verbena bonariensis	Purpletop vervain
	Verbena brasiliensis	Brazilian vervain
	Verbena halei	Texas vervain
	Verbena rigida	Tuberous vervain
	Verbena urticifolia	White vervain
VIOLACEAE	*Viola X primulifolia*	Violet
	Viola affinis	Sand violet
	Viola bicolor	Field pansy
	Viola lanceolata	Bog white violet
	Viola missouriensis	Missouri violet
	Viola palmata	Early blue violet
	Viola pedata	Birdfoot violet
	Viola septemloba	Southern coastal violet
	Viola tripartita	Yellow violet
	Viola walteri	Prostrate blue violet
VISCACEAE	*Phoradendron leucarpum*	Oak mistletoe
VITACEAE	*Ampelopsis arborea*	Peppervine
	Parthenocissus quinquefolia	Virginia creeper
	Vitis aestivalis var. aestivalis	Summer grape
	Vitis baileyana	Possum grape
		Muscadine

APPENDIX E

ENDANGERED SPECIES MANAGEMENT COMPONENTS AND GOPHER TORTOISE MANAGEMENT PLAN

RED-COCKADED WOODPECKER (*PICOIDES BOREALIS*) ENDANGERED SPECIES MANAGEMENT COMPONENT

Fort Benning, Georgia

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ACRONYMS AND ABBREVIATIONS

ACUB	Army Compatible Use Buffer
AR	Army Regulation
BA^2	Basal Area squared
BA	Biological Assessment
BE	Biological Evaluation
BMP	Best Management Practices
BO	Biological Opinion
BRAC	Base Realignment and Closure
CB	Conservation Branch (Fort Benning)
DA	Department of Army
DAC	Department of Army Civilian
DBH	Diameter at Breast Height
DCA	Demographic Conservation Area
DMPRC	Digital Multi-Purpose Range Complex
DoD	Department of Defense
DPW	Directorate of Public Works
DPTMS	Directorate of Plans, Training, Mobilization and Security
DUD	Live impact area
ESA	Endangered Species Act of 1973, as amended
EMD	Environmental Management Division (Fort Benning)
EOD	Explosive Ordnance Detachment
ESMC	Endangered Species Management Component
ESMG	Endangered Species Management Guidelines
ESMP	Endangered Species Management Plan
FB	Fort Benning
FBSMS	Fort Benning Standard for Managed Stability
FR	Federal Register
GIS	Geographic Information System
GPS	Global Positioning System
HMU	Habitat Management Unit
IAW	In Accordance With
IMCOM	Installation Management Command
INRMP	Integrated Natural Resources Management Plan

LMB	Land Management Branch (Fort Benning)
MCoE	Maneuver Center of Excellence
MPTR	Multi-Purpose Training Range
NEPA	National Environmental Policy Act
NMA	Northern Maneuver Area
PBG	Potential Breeding Group
PC	Protected Cluster
POI	Program of Instruction
RS	Recovery Standard
RCW	Red-cockaded Woodpecker
REC	Record of Environmental Consideration (FB 144-R)
SDZ	Surface Danger Zone
SMS	Standard for Managed Stability
SMA	Southern Maneuver Area
SRC	Supplemental Recruitment Cluster
TAITC	Total Army Instructor Training Course
TES	Threatened and Endangered Species
TNC	The Nature Conservancy
USFWS	Fish and Wildlife Service (U.S. Department of the Interior)
UXO	Unexploded Ordnance
UC	Unprotected Cluster

EXECUTIVE SUMMARY

Background

This Endangered Species Management Component (ESMC) fulfills Fort Benning's requirements under the Endangered Species Act of 1973, as amended (ESA). The Red-cockaded woodpecker (RCW) (*Picoides borealis*) ESMC was prepared in accordance with Chapter 4 of Army Regulation (AR) 200-1, the 2007 Management Guidelines for the Red-cockaded Woodpecker on Army Installations (RCW Guidelines) and the Sikes Act (16 U.S.C.670a). The RCW was Federally listed as endangered by the U.S. Fish and Wildlife Service (USFWS) on 13 October 1970 and is protected under the ESA. Failure to implement this ESMC can lead to violation of the ESA and result in the costly disruption of military operations.

The Red-cockaded Woodpecker (*Picoides borealis*) Recovery Plan: *Second Revision* (USFWS 2003; Recovery Plan) outlines criteria for defining good quality RCW habitat that supersedes guidance (USFWS 1985) used to develop previous RCW conservation strategies.

Habitat Requirements and Limiting Factors

Red-cockaded woodpeckers need open, park-like pine forests and savannahs with little or no hardwood midstory, well developed groundcovers, and mature pine trees for foraging, nesting and roosting habitat. The aggregate of cavity trees used for nesting and roosting by each RCW group is called a cluster. Large, mature (60-80+ years), living pine trees are selected for cavity excavation due to the presence of decaying and softened heartwood, caused by red heart fungus. Cavity trees must be in open stands with little or no hardwood midstory and few or no overstory hardwoods. Hardwood encroachment resulting from fire suppression is a well-known cause of habitat degradation and cluster abandonment. Red-cockaded woodpeckers also require abundant foraging habitat. Suitable foraging habitat consists of pines that are at least 30 years old with an open canopy, low densities of small pines, little or no hardwood or pine midstory, few or no overstory hardwoods, and abundant native bunchgrass and forb groundcovers (USFWS 2003). On Fort Benning, suitable RCW habitat historically is believed to have been characterized by an overstory dominated by longleaf pine with a bluestem bunchgrass understory on upland sites.

Because of their cooperative breeding system, red-cockaded woodpecker populations are unusually resistant to environmental and demographic variation, but highly sensitive to the spatial arrangement of habitat. The buffering effect of helpers against annual variation operates only when helpers can readily occupy breeding vacancies as they arise. Helpers do not disperse very far and typically occupy vacancies on their natal territory or a neighboring one. If groups are isolated in space, dispersal of helpers to neighboring territories is disrupted and the buffering effect of the helper class is lost. When this happens, populations become much less likely to

persist through time. Also, the cooperative breeding system does not allow rapid natural growth of populations. Pioneering of unoccupied habitat is an exceedingly slow process under natural conditions because cavities take long periods of time to excavate and birds do not occupy habitat without cavities. As forests age and old pines become abundant, rates of natural cavity excavation and colonization may increase (USFWS 2003).
One of the primary limiting factors for the RCW throughout its range is the availability of suitable trees for excavating cavities. This is due to historic land use and management practices which eliminated most of the virgin and old growth forests that were present pre-European settlement. Encroachment of hardwoods into historically pine dominated forests due to the exclusion of fire has also played a significant role towards the degradation of RCW habitat. Management tools to offset these limitations and ensure the continued existence of the RCW include:

1. Installation of artificial cavities
2. Prescribed burning
3. Strategic silvicultural prescriptions designed to manipulate stand development and regeneration to restore historic forest composition and structure
4. Mechanical and chemical control of undesirable, off-site hardwood midstory species
5. Restoration of native herbaceous ground covers
6. Exotic species control
7. Implementation of National Pollutant Discharge Elimination System (NPDES) Best Management Practices to control erosion of construction/ground disturbing activities.

Management and Conservation Goals

The management goal is to protect and enhance the existing RCW population on Fort Benning (and off-post as appropriate via, Army Compatible Use Buffer (ACUB) and Demographic Conservation Area (DCA) programs) while simultaneously expanding the population into unoccupied suitable and potentially suitable habitat. Red-cockaded woodpecker management will be consistent with MCoE mission requirements and requirements of the ESA.

Fort Benning's ACUB program, which is implemented by The Nature Conservancy (TNC) and its partners via Army-funded acquisition of both conservation easements and fee title purchases, emphasizes RCW Conservation. An Off-Post RCW Plan (Appendix 1) is being implemented and aims to secure property interests, assure long-term management, and restore and conserve habitat for the RCW in the region around Fort Benning. This plan is intended to comply with USFWS guidelines for including off-Post properties as part of Fort Benning's recovery baseline landscape. Analysis of landscape conditions suggests there are over 20,000 acres of land east and north of Fort Benning already protected under ACUB and over 10,000 acres potentially available for future protection. Restored RCW habitat on suitable ACUB acreage would have a

good to excellent chance of adding to the stability of Fort Benning's Primary Core Recovery Population.

The overall RCW conservation goal is to recover the Fort Benning RCW population, thereby eliminating the need for most training restrictions and therefore reducing conflicts with the training mission.

Currently, there are 367 manageable RCW clusters at Fort Benning, 357 are active and 10 are inactive. This includes 62 active clusters in the A20 dudded impact area. There are an additional 7 known clusters in the A20 dudded impact area, but they are currently inaccessible due to unsafe conditions. Access to these 7 clusters may change if the areas are deemed safe. There are also 4 clusters located in the K15 dudded impact area but they are also not accessible due to the hazardous conditions of this impact area. To date, no RCW populations are known to occur outside of the immediate installation boundary although one cluster is located on the Columbus city property. This cluster was previously on Fort Benning property. Due to a land exchange between Fort Benning and Columbus, it is now on Columbus city property. The nearest active RCW population on public lands is the Piedmont National Wildlife Refuge/Oconee National Forest population located approximately 90 miles ENE of Columbus and is considered a secondary core population according to the Recovery Plan. The closest known RCW population on private lands is Enon/Sehoy Plantation which is located approximately 30 miles west of Fort Benning. This population is considered disjunct from the Installation's population and does not contribute to recovery of the species on Fort Benning; however, there has been one documented natural dispersal from Fort Benning to Enon/Sehoy.

The Installation's recovery goal is 351 potential breeding groups (PBG). This is the number of groups that will be required to have a recovered population according to the Recovery Plan. In order for Fort Benning to reach this goal, it will be necessary to have at least 382 managed clusters on the Installation. This number of managed clusters was determined based on breeding season and cluster inspection data collected over the past 5 years.

Although the population goal is 382 managed clusters, the habitat at Fort Benning can potentially support at least 410 clusters based on an ArcGIS analysis of placing potential recruitment clusters on the landscape (Figure 2). New cluster formation can occur in several ways. New territories are created naturally via RCWs budding (splitting of an existing cluster into two) or pioneering (e.g., helper or juvenile male disperses from its natal territory to a new area and excavates cavities). Fort Benning can also create new clusters (called recruitment clusters) through strategic placement and installation of artificial cavities (boxes or drilled) in suitable habitat. Newly formed clusters, whether by natural or artificial recruitment, will be designated as either Protected Clusters (PC) (marked with boundary signs and 2 white bands on cavity trees) or Unprotected Clusters (UC) (no boundary signs, no white bands). Unprotected Clusters will not be subject to training restrictions, and therefore should not adversely affect the training

mission. Unprotected Clusters will be located in areas where mission-related impacts would normally prevent the installation of a PC with restrictions. Fort Benning will continue to create additional artificial clusters on the landscape in order to take advantage of all available suitable habitat.

The rate of recruitment cluster establishment will vary depending upon available habitat and the distances to nearest active clusters. Over the short-term, these factors will slow Fort Benning's population growth rate for two reasons. First, historic fire suppression and silvicultural land use practices have allowed loblolly and shortleaf pines and hardwoods to encroach and become established in many upland sites on the Installation. These species are considered to be "off-site" when established in these upland areas. Loblolly and shortleaf pine species are more susceptible to disease and insects, tend to be shorter-lived, and are less resistant to damage from frequent prescribed fire, which is the primary driver for restoring and maintaining longleaf pine ecosystems (good quality RCW habitat). Secondly, the Installation has restored, and continues to aggressively do so, off-site pine and hardwood species with longleaf pine on upland areas. According to the Recovery Plan, it takes 30 years for pine seedlings to mature to a point that they are considered suitable foraging habitat for RCWs; 60+ years before they are considered suitable nesting habitat. As the Fort Benning RCW population approaches the carrying capacity of currently available good quality habitat, natural and artificial recruitment is limited by the rate at which existing natural pine stands and newly established longleaf pine stands mature to an age of suitable foraging and nesting habitat. Good quality habitat will therefore take time to develop and mature to a stage where it will be available for RCW population expansion.

Actions Needed

The primary actions needed to accomplish recovery goals are: (1) application of frequent prescribed fire to both clusters and foraging habitat, (2) protection and development of large, mature longleaf pines throughout the landscape, (3) protection of existing cavities and judicious provisioning of artificial cavities, (4) provision of sufficient recruitment clusters in locations chosen to enhance the spatial arrangement of groups, and (5) restoration and maintenance of sufficient habitat quality and quantity to support the population necessary for recovery on Fort Benning.

This focus on sustainable forest management and RCW habitat by incorporating uneven aged management strategies that diversify the age and size class structure of the forest will promote the perpetual replacement of large, mature longleaf pines with a continual supply of younger longleaf pines. This sustainable forest management strategy should provide and promote perpetual RCW habitat in lieu of unforeseen natural disasters (e.g., tornadoes, hurricanes, ice storms, etc. (3) continued protection of existing cavities, with provisioning of artificial cavities only when necessary. Emphasis should be placed on allowing the RCW population to naturally excavate cavities in forested habitat they find suitable (4) decreasing the provisioning of artificial

recruitment clusters over the long-term and allowing the RCW population to naturally select spatial arrangement as they find suitable, and (5) continued restoration and increased sustainable maintenance of sufficient habitat quality and quantity to support the population necessary for recovery on Fort Benning.

To achieve these goals, Fort Benning will (1) manage forest ecosystems to improve RCW habitat using commercial timber harvest (i.e. thinning), hardwood control, conservation and regeneration of longleaf pine, and other ecosystem management practices that will benefit the RCW, (2) conduct prescribed burns on all suitable, potentially suitable, and future recovery habitat every 1 to 3 years, with burns predominantly conducted during the growing season, (3) use management techniques such as translocation and augmentation to increase the RCW populations on- and off-post, (4) enhance existing RCW clusters by provisioning artificial cavities in cavity-limited sites, (5) protect PCs from damage or disturbance by education and proactive planning via Fort Benning's National Environmental Policy Act (NEPA) process, boundary marking, and periodic cluster inspections, (6) maintain and improve environmental awareness of all personnel at Fort Benning with respect to protection of the RCW, (7) monitor RCW population status/trends and make necessary adjustments as required, (8) identify recruitment cluster locations to achieve an RCW population density of approximately one cluster per 150 acres of suitable habitat. The foraging habitat for each cluster should contain at least 3000 ft^2 Basal Area (BA^2) of pines $\geq$ 10 inches diameter at breast height (DBH) and meet the Fort Benning Standard for Managed Stability (FBSMS) with the goal of managing for the Recovery Standard (RS), and (9) conduct habitat improvements to provide suitable future recruitment clusters.

1.0 INTRODUCTION

The purposes of this ESMC are to: (1) present information on the RCW, (2) discuss challenges the species faces on the Installation, 3) define conservation goals, (4) outline a management plan that will enable achievement of conservation goals, and (5) implement existing Biological Opinion (BO) monitoring requirements.

These purposes are consistent with the following laws, regulations, and policy guidance:

The Endangered Species Act (ESA) of 1973, as Amended through the 108th Congress

The ESA imposes 5 primary requirements upon the Army related to RCW conservation at Fort Benning:

1. Sections 2(c) (1) and 7(a) (1) require that the Army carry out programs for the "conservation" of listed species. "Conservation" as defined by the ESA, means the "use of all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the measures provided pursuant to this act are no longer necessary" (ESA).

FINDINGS, PURPOSES, AND POLICY

SEC. 2 (c) Policy (1) "… all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."

INTERAGENCY COOPERATION

ESA Section 7 (a) (2) requires the Army not to "jeopardize" listed species. Simply stated, this requires the Army to ensure that no actions or projects (including military training) will affect the "continued existence of any listed species or result in the destruction or adverse modification of critical habitat" (ESA). The Army is ultimately responsible for ensuring its actions do not jeopardize listed species.

ESA Section 7 (a) (3) requires that the Army conduct formal consultation on any action that may affect the continued existence of a listed species or critical habitat. Formal consultation is not required if the Army determines, with concurrence by the USFWS, that the project is not likely to adversely affect the listed species. Coordination with Office of the Director of Environmental Programs (ODEP) through Installation Management Command (IMCOM) is required for formal consultations per AR 200-1.

EAS Section 7 (c) requires the Army to conduct biological assessments for major actions that directly or indirectly affect a listed species.

ESA Section 9 requires the Army not to "take" listed species without prior authorization.

The ESA defines take as: "To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct; may include significant habitat modification or degradation if it kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering."

Army Regulation 200-1, *Environmental Protection and Enhancement* *(13 December 2007)*

Army Regulation 200-1 (AR200-1) addresses environmental responsibilities of all Army organizations and agencies and implements Federal, state, and local environmental laws and DoD policies for preserving, protecting, conserving, and restoring the environment. This regulation should be used in conjunction with the Army National Environmental Policy Act

(NEPA) Regulation at 32 Code of Regulation (CFR) Part 651 (32 CFR 651), which provides Army policy on compliance with NEPA, 42 USC 4321-4347.

Management Guidelines for the Red-cockaded Woodpecker on Army Installations (1 May 2007) (RCW Guidelines).

The purpose of the RCW Guidelines is to provide standard RCW management guidance to Army installations for developing ESMCs for the RCW as part of an installation's Integrated Natural Resource Management Plan (INRMP). Terminology has been revised from endangered species management "plans" to "components" to reflect that endangered species management on installations is an integral component of natural resource management activities on Army installations. Installation RCW ESMCs will be prepared according to these guidelines and AR200-1, Environmental Protection and Enhancement and subsequent policies and guidance published by the Army. These guidelines establish the baseline standards for Army installations in managing the RCW and its habitat. Installation RCW ESMCs will supplement these guidelines with detailed measures to meet installation-specific RCW conservation needs and unique military mission needs. The requirements in RCW ESMCs will apply to all activities on the installation.

The 2007 RCW Guidelines replace the 1996 Management Guidelines for the Red-cockaded Woodpecker on Army Installations, 30 October 1996. Restrictions established in the 2007 RCW Guidelines are generally the same as those described in the 1996 RCW Guidelines for populations with <250 RCW PBGs; however, the 2007 RCW Guidelines allow the incremental removal of training restrictions on clusters as installations exceed 250 PBGs. While the 2007 revisions to the 1996 Guidelines may relax training restrictions as populations exceed established PBG thresholds, habitat management practices must continue to be implemented for all RCW clusters (RCW Guidelines 2007). Many of the training restrictions in the 1996 RCW Guidelines remain the same in the 2007 RCW Guidelines. Fort Benning intends to utilize the 2007 RCW Guidelines through this updated RCW ESMC.

The Army's goal is to implement management guidelines that will allow the Army to accomplish military mission readiness while concurrently developing and implementing methods to assist in the conservation, down-listing, and recovery of the RCW. To the extent practicable RCW ESMCs should be drafted to incorporate the requirements of existing BOs, as modified to conform to these management guidelines through consultation with the USFWS.

Maneuver Center of Excellence (MCoE) Regulation 350-19 (2013)

MCoE Regulation 350-19 is a complete revision of the Range and Terrain Regulation and supersedes United States Army Infantry Center (USAIC) Regulation 210-4, 11 May 2005. It was renumbered in the 350-series to comply with guidance found in AR 350-19, Army

Sustainable Range Program. This regulation provides procedures for the management of ranges, training land, and air space and applies to all units and activities conducting training and testing on Fort Benning. Section 5-17.c. gives specific guidance for military training in and around RCW clusters.

This regulation assigns responsibilities for integrating program functions to ensure the capability, accessibility, and availability of ranges and training lands, defines responsibilities and prescribes policies for implementing the Sustainable Range Program (SRP) on Army controlled training ranges and training lands.

This regulation assigns responsibilities and provides policy and guidance for managing and operating U.S. Army ranges and training lands to support their long-term viability and utility to meet the National defense mission; planning, programming, funding, and executing the core programs comprising the Army's Sustainable Range Program, the Range and Training Land Program, and the Integrated Training Area Management Program; integrating program functions to support sustainable ranges; assessing range sustainability; and managing the automated and manual systems that support sustainable ranges. This regulation also details the procedures that must be followed in order to request a check-fire from ranges that are firing in order to access RCW clusters that may be in danger due to wildfires.

The Red-cockaded Woodpecker (*Picoides borealis*) Recovery Plan: *Second Revision* (2003) (Recovery Plan)

The USFWS Recovery Plan provides updated guidelines, protocols and policies for the management, monitoring and recovery of the RCW and establishes a recovery goal, including designating Fort Benning as one of 13 Primary Core Recovery Populations. In addition, the Recovery Plan outlines new criteria for defining good-quality RCW habitat. Since approval of the Recovery Plan, the USFWS has issued additional guidance on the determination of Incidental Take and the information required in Biological Assessments, which includes up to 5 levels of analysis for projects impacting RCWs: foraging partition (or "cluster"), group, neighborhood, population and recovery unit analyses (USFWS 2005).

Additional guidance and clarifications distributed by the USFWS since approval of the Recovery Plan addresses the use of the USFWS RCW Foraging Habitat Matrix software (Matrix) for foraging habitat analyses (FHAs) (USFWS 2006a) and protocols for monitoring the effect of traffic on nesting RCWs (USFWS 2006b).

This ESMC will be updated as necessary to reflect any changes in the Recovery Plan, RCW Guidelines, or the listing status of the RCW.

CHRONOLOGY OF BIOLOGICAL OPINIONS

In this ESMC, clusters with incidental take authorization are not counted towards Fort Benning's RCW recovery goal (except those for SRCs/UCs). Many of the clusters categorized as taken actually persist on the landscape and are managed. After 5 years, Fort Benning re-evaluates the cluster to determine if the taken designation is still required. If a change in take status is proposed by Fort Benning, consultation with USFWS will be conducted.

Past Biological Opinions

1. Biological Opinion on the Effects of Military Training and Associated Activities at Fort Benning on Federally Listed Endangered and Threatened Species (1994) (USFWS 1994)

Fort Benning analyzed the potential effects of military training and related activities on Federally listed species at Fort Benning, Georgia in a Biological Assessment (BA). The USFWS prepared a Biological Opinion (BO) and concluded that ongoing activities were likely to adversely affect the RCW and its continued existence would likely be jeopardized. No incidental take authorizations for RCWs were issued.

Key non-discretionary BO compliance measures taken by Fort Benning included:

a. Implemented a mandatory environmental awareness training program for military personnel.
b. Ensured training in RCW clusters complied with the 1994 and 1996 Management Guidelines for the Red-cockaded Woodpecker on Army Installations.
c. Restricted use of 2-chlorobenzalmalononitrile (CS) gas and large quantities of obscurant smoke in clusters.
d. Constructed berms on small arms ranges to minimize damage to clusters and habitat.
e. Developed an Endangered Species Management Plan (ESMP) for the RCW and incorporated it into the Integrated Natural Resource Management Plan (INRMP).
f. Aggressively implemented compliance driven RCW management strategies.
g. Established a kudzu eradication program.
h. Substantially increased staff for monitoring and management of the RCW.

2. Biological Opinion on the Review of the Endangered Species Management Plan for Fort Benning, Georgia (USFWS 2002)

This BO superseded the JBO issued to Fort Benning on September 22, 1994.

The USFWS reviewed effects of the Fort Benning ESMP and on the RCW. The Service anticipated that 41 RCW groups in A20 and K15 dudded impact areas and 15 groups associated with Supplemental Recruitment Clusters (SRCs) could be incidentally taken as a result of military training and access limitations at Fort Benning. Additionally, no more than five active

cavity trees per year could be destroyed or injured and die, as a result of military training and training related wildfires. The Service determined that this level of anticipated take was not likely to result in jeopardy to the RCW.

Key non-discretionary BO compliance measures taken by Fort Benning included:

a. Personnel were hired to implement mandatory RCW conservation measures.
b. Repaired existing, and prevented future, soil erosion in clusters that threatened individual cavity trees and the integrity of the cluster.
c. Reduced fuel loads in clusters to minimize damage to cavity trees during prescribed burns or wildfires.
d. Improved training area inspection process to protect RCWs on ranges and training areas.
e. Burned 90,000 acres of current and potential RCW habitat on a three year return interval primarily during early to mid-growing season.

No clusters have been taken under this BO. There are currently 15 SRCs on the Fort Benning landscape, all of which are active. These clusters are still persisting on the landscape even thought they are not marked with boundary signs and the trees are not painted with two white bands. Training has been allowed to go on in these clusters without any of the restrictions as indicated by the 1996 RCW Guidelines. Breeding status and cluster activity has been tracked since the clusters were created and each has been activated. These clusters will continue to persist on the landscape as unprotected clusters.

3. Biological Opinion on the Proposed Base Realignment and Closure (BRAC) 2005 and Transformation Actions at Fort Benning, Georgia (USFWS 2007)

The Army prepared a BA to analyze the potential of the construction, operation and maintenance of proposed Transformation actions, which include BRAC, Global Defense Posture and Realignment, Army Modular Force and other stationing actions, on the RCW. The USFWS issued a BO and anticipated the incidental take in the form of forage loss, cavity tree removal, harassment, group level impacts and/ or neighborhood level impacts of 32 active RCW clusters. The USFWS determined that the estimated level of anticipated take was not likely to result in jeopardy to the species, or destruction or adverse modification of habitat.

Key non-discretionary BO compliance measures taken by Fort Benning include:

a. Constructing berms for three Transformation/BRAC Oscar Complex ranges, and monitor to assess effectiveness of berms protecting downrange RCW clusters/groups and habitat.

b. Sub-dividing training compartments and creating protocols to facilitate co-locations with training units so RCW management activities impacted by Transformation/BRAC can be conducted.
c. Developing an Installations Land Management Plan that focuses on Soil Conservation and Sustainable Ranges.
d. Developing a Transformation/BRAC Access Plan and protocols for RCW, timber and fire management.
e. Providing timber operation reports prepared by either the U.S. Army Corps of Engineers resident forester, or by a Fort Benning Land Management Branch (LMB) Forester; and habitat monitoring reports that track the amount of RCW habitat lost as a result of Transformation actions.
f. Completing an RCW Demographic Plan for monitoring Transformation/BRAC impacts.
g. Completing a RCW Translocation Monitoring and Implementation Plan for RCW clusters impacted by Transformation/BRAC.
h. Monitoring all managed clusters within 0.5 miles of Transformation/BRAC related construction/clearing and military training exercises to detect signs of potential cluster abandonment and/or habitat degradation, and to respond accordingly.
i. Providing quarterly and annual summary reports for the duration of the BO.

Discretionary conservation recommendations by the Service include creation of longleaf pine restoration and upland hardwood conversion plans, implementation of a heavy vehicle maneuver monitoring project using global positioning system (GPS) tracking devices, improving the environmental training program for troops, and implementing measures to protect all planted longleaf pine plantations <30 years old.

Due to additional requirements and changes in various actions, a new BA was conducted which resulted in the Biological Opinion on the U.S. Army Maneuver Center of Excellence (MCoE) at Fort Benning, Georgia (USFWS 2009) (see 2 under Current Biological Opinions below). Many of the clusters covered under the BRAC/Transformation BA/BO were reanalyzed in the MCoE BA. However, 8 clusters that were given incidental takes for the BRAC/Transformation BO were not reanalyzed and are still in effect. Two takes were realized as the cavity trees and associated habitat were removed for the construction of new ranges (O09-04, O09-05); one active cluster that received take due to habitat loss is currently inactive (U04-01 – renamed SHC-B); the remaining 5 clusters are still active and persisting on the Fort Benning landscape.

Current Biological Opinions

1. Biological Opinion on the Digital Multi-purpose Range Complex (DMPRC) at Fort Benning, Georgia (USFWS 2004)

Fort Benning prepared a BA to analyze the reviewed effects of the construction, operation and maintenance of a DMPRC on the RCW and other listed species. The USFWS provided a BO with incidental take of seven clusters and associated RCW groups within 0.5 miles of the range footprint and concluded that the DMPRC, as proposed, in addition to the estimated level of take was not likely to jeopardize the continued existence of the RCW. One additional incidental take for a cluster near the DMPRC was subsequently authorized by the USFWS.

Key non-discretionary BO compliance measures taken by Fort Benning include:

a. Managing eight RCW clusters/groups and associated habitat located within 0.5 miles of the DMPRC footprint and monitoring for impacts resulting from training.
b. Monitoring specifically for signs of degradation from live fire in five of the eight clusters located within the largest Surface Danger Zone (SDZ) and within 0.5 miles of the DMPRC footprint.
c. Monitoring reproduction of all groups, and dispersals to and from clusters located within 3 miles of DMPRC.
d. Protecting cavity trees in the eight clusters within 0.5 miles of the range footprint from soil erosion impacts during range construction.
e. Clearing timber within RCW clusters outside the RCW breeding season.
f. Providing annual reports throughout duration of BO and a final report five years after initiation of training.

The USFWS also required as an additional minimization strategy that Fort Benning monitor 11 RCW clusters in the A20 dudded impact area during the RCW breeding season to compensate for the eight clusters that received incidental take.

Fort Benning is currently monitoring all clusters associated with this action. One incidental take has been realized as D14-04 has remained inactive. All other clusters continue to be active.

2. Biological Opinion on the U.S. Army Maneuver Center of Excellence (MCoE) at Fort Benning, Georgia (USFWS 2009)

The Army prepared a BA, Final Addendum and Addendum 2 to analyze the expected effects of the construction, operation and maintenance of proposed MCoE actions, which include BRAC, Army Modular Force, Global Defense Posture and Realignment, Grow the Army, Global War on Terrorism, and Army Power Projection Platform on the RCW. The USFWS prepared a BO that authorized 43 incidental takes for active RCW clusters would be taken resulting from destruction or degradation of habitat, 16 incidental takes for active RCW clusters would be taken resulting from short-term disturbance, eight incidental takes for active RCW clusters would be taken in the form of long-term disturbance and 14 clusters would be taken due to neighborhood/group

analysis. The USFWS determined that the estimated level of anticipated take would likely jeopardize the continued existence of the RCW without the implementation of Reasonable and Prudent Alternatives.

Key non-discretionary BO compliance measures taken by Fort Benning include:

a. Shifting cluster centers by provisioning artificial cavities to minimize project-related cavity tree impacts or harassment impacts, primarily related to road construction and use.
b. Developing a monitoring plan for RCWs potentially affected by heavy maneuvers.
c. Developing a MCoE Access Plan and protocols for RCW, timber and fire management.

Reasonable and Prudent Alternative (RPA) actions by Fort Benning that minimize impacts or remove jeopardy to the RCW include:

a. Removing the machine gun range in the Alpha training compartments and A20 impact areas.
b. Managing 36 additional active clusters in the A20 impact area which were not currently counted toward recovery.
c. Migrating field training aspects of the Scout Leaders Course (now called the Army Reconnaissance Course (ARC))from the Southern Maneuver Training Area to training areas located off the FY09 Fort Benning installation boundary within five years from the training start date of the Scout Leaders Course.
d. Re-scoping MCoE projects to avoid loss of 12 RCW clusters and 1,406 acres of potential habitat.

Key discretionary conservation recommendations by the Service include:

a. Convene a group of RCW and forest management experts to assist the Army in developing a plan to reforest Ft. Benning while maintaining a primary core recovery population.
b. Coordinate with the Service regarding modified burn return intervals in order to minimize the rate of pine mortality.
c. Thin entire stands upon entry to address foraging habitat deficiencies for specific partitions.
d. Dedicate Army Compatible Use Buffer (ACUB) land to RCW management including a focus on creation of a contiguous corridor of habitat between Ft. Benning and all ACUB lands.
e. Comprehensively assess future ACUB or other RCW potential conservation properties using spatially explicit individual-based RCW models, with pattern oriented modeling, to reduce model uncertainty and to assess demographic functions relative to the population on the Installation.

f. Initiate research to assess RCW fitness, actual home range, habitat quality and quantity within home ranges, and foraging behavior and selection in home ranges. Compare habitat quality and quantity in home ranges to matrix partitions, and the extent that partitions represent actual territories.
g. Delay RCW recruitment until a management team is convened to create a plan that accounts for growing a sustainable forest.

As of breeding season 2013, three of the taken clusters were inactive; all other clusters were active.

3. Biological Opinion Update on the U.S. Army Maneuver Center of Excellence (MCoE) at Fort Benning, Georgia (USFWS 2011)

Fort Benning prepared a BA to analyze the expected effects of MOoE project construction on two newly discovered and 10 adjacent RCW clusters. The USFWS prepared a BO as an update (supplement) to the 29 May 2009, BO written for the MCoE.

The USFWS authorized incidental takes for two RCW clusters in the form of group level impacts but determined that the level of anticipated take was not likely to result in jeopardy to the species or destruction or adverse modification of habitat.

Key non-discretionary BO compliance measures taken by Fort Benning include:

a. Managing and monitoring the 12 groups within the reanalyzed action area to meet requirements of the neighborhood analysis.
b. Detect early warning signs of potential cluster abandonment and/or habitat degradation and respond accordingly.

The two RCW clusters covered by this action are currently active.

4. Biological Opinion for Red-cockaded Woodpecker Ordnance Impacts from the Malone Small Arms Range Complex at Fort Benning, Georgia (USFWS 2013)

Fort Benning prepared a BA that analyzed the potential effects of bullet impacts to RCW clusters and associated habitat situated downrange within the Malone Small Arms Range Complex. The Service prepared a BO that authorized the incidental take of one active RCW cluster in the form of direct loss of an active cavity tree and/or harassment of RCWs in the cluster, however the estimated level of take authorized in the BO would not likely jeopardize the continued existence of the RCW or destruction or adverse modification of habitat.

Key non-discretionary BO compliance measures taken by Fort Benning include:

a. Increased management and monitoring of eight RCW groups within the Malone Small Arms Range Complex to meet requirements of the neighborhood analysis, to detect early warning signs of potential cluster abandonment and/or habitat degradation, and to respond accordingly.

The cluster covered by this action is currently active.

Future Biological Assessments (BA)

1. Draft Biological Assessment for Potential Red-cockaded Woodpecker Impacts From Several Dixie Road Small Arms Ranges at Fort Benning, Georgia (in preparation)

Fort Benning is currently writing a BA on the potential effects of bullet impacts in up to 10 RCW clusters and associated habitat situated downrange from several small arms ranges along the western end of Dixie Road. In coordination with the USFWS, Fort Benning has monitored the area since bullet strikes were first discovered and reported in December 2010 while performing routine maintenance and monitoring activities. Since that time the Army has constructed a new protective berm and elevated firing lines at Farnsworth Range, in addition to implementing other minimization efforts. The measures taken appear to have eliminated most downrange impacts to habitat that could result from direct, unobstructed, live-fire military training with small caliber munitions. Completion of the BA and initiation of formal consultation with the Service is anticipated in early 2014.

2. Proposed Biological Assessment for Potential Red-cockaded Woodpecker Impacts from the Oscar Range Complex at Fort Benning, Georgia

Fort Benning is currently monitoring and analyzing the potential effects of bullet impacts to downrange RCW foraging habitat within the Oscar Range Complex as part of the non-discretionary Habitat Impact Assessment Monitoring Plan, Bermed vs. non-Bermed (USFWS 2007). As a result of that intensive monitoring of which includes acoustical detection equipment, the Installation is preparing to conduct a third BA that addresses bullet impacts to up to five RCW clusters associated with the Oscar Range Complex. Although four of the five clusters are already covered by incidental take authorizations, the potential effects of bullet impacts to downrange habitat resulting from indirect fire (e.g. ricochets) were not anticipated on ranges equipped with protective berms and were therefore not analyzed or coverd in the MCoE BO (USFWS 2009). Fort Benning anticipates completion of a BA and initiation of formal consultation with the Service in late 2014.

Current Biological Evaluations (BE)

Biological Evaluations (BE) are prepared to analyze proposals for informal consultation with USFWS in instances where more information is needed than can be contained in a letter but does not rise to the level of requiring a BA.

1. Biological Evaluation of Potential Impacts from the Proposed Multi-Purpose Training Range (MPTR) at Hastings Range (FB 2010)

Fort Benning evaluated the potential impacts on the RCW by upgrading Hastings Range to a Multi-Purpose Training Range (MPTR). The Installation's analysis concluded that the proposed minor design changes to the existing Hasting Range targetry and firing positions to meet gunnery standards for an MPTR, (in conjunction with the implementation of minimization measures), may affect but are not likely to adversely affect the 19 RCW clusters (now 20 RCW clusters as a result of natural budding) and associated habitat situated downrange. Through informal consultation, the USFWS concurred with this BE.

Key minimization measures implemented by Fort Benning include:

a. Eliminating live fire shot alignments likely to directly impact RCW clusters or habitat.
b. Ensuring that sufficient earthen backstops are aligned behind targets approved for engagement with large caliber munitions.
c. Protecting RCW nesting and foraging habitat by requiring new training events or new shot alignments occurring on the MPTR to be granted approval only after the NEPA process has been completed using the 144R Record of Environmental Consideration form.
d. Improvement of all potentially suitable forest stands within the 20 RCW cluster partitions using the Fort Benning modified Standard for Manage Stability (SMS).
e. Providing data of all forest stands considered to be future potential habitat to the USFWS prior to the range becoming operational.
f. Developing and implementing an MPTR RCW monitoring plan in coordination with the USFWS and ensuring negative effects are minimized.

As of the 2013 breeding season, all clusters monitored for this action were active. There has been some evidence of munition intrusions and modifications have been made to delete some firing patterns. This has been reported to the USFWS and Fort Benning continues to monitor the situation. Monitoring is ongoing in accordance with the BE.

2. Biological Evaluation of Potential Effects from the proposed Changes to the Program of Instruction (POI) for the Army Reconnaissance Course (ARC) Training (FB 2011)

Fort Benning evaluated the potential impacts of a proposed change in the Army Reconnaissance Course (ARC) on the RCW at Fort Benning, specifically to increase the training area for field operations in the Blackjack portion of the course, but to eliminate use of tracked vehicles. The BE concluded that no new incidental takes were warranted as a result of the proposed changes to the ARC training. Fort Benning concluded that the impacts analyzed in this BE may affect but are not likely to adversely affect 43 RCW clusters located within the expanded area of operations by increasing the training area, nor will it impede Fort Benning's ability to reach its recovery goal of 421 total managed clusters. Through informal consultation, the USFWS concurred with this BE.

Key minimization measures taken by Fort Benning included:

a. Eliminated the use of tracked vehicles from the POI implementation on Fort Benning.
b. RCW demographic monitoring is conducted in clusters identified in action area.
c. Deployed GPS tracking devices on all or most tactical vehicles during ARC training exercises to concentrate demographic and habitat monitoring efforts.
d. Incorporated additional training areas available to conduct ARC training into the MCoE Heavy Maneuver Effects Study on the RCW (USFWS 2009).
e. Conducted a preliminary analysis of the effects of vehicular disturbance on RCW flush response prior to the breeding season.

All RCW clusters covered by this action were active as of the 2013 breeding season. Monitoring is ongoing as per the BE.

2.0 SPECIES INFORMATION

2-1 Species Description and Distribution

The RCW is a medium-sized woodpecker that feeds primarily on insects in mature pine stands and nests in mature, live pine trees that have decaying heartwood. It is easily distinguished from other similar woodpeckers by its white cheek patch. The males have a tiny red tuft of feathers or "cockade" on both sides of the head, from which the common name was derived. Vocalizations of the RCW are a rough, rasping *sripp* or *zhlip* and sometimes a higher *tsick* (Peterson 1980).

The RCW has been Federally and state listed as endangered due to population declines (35 *FR* 16047). Various publications provide more technical descriptions of the species (Ligon 1970, Crosby 1971 and Jackson 1971). The main reason for their historic decline is the loss and conversion of mature pine forests throughout the southeast. Logging, fire suppression, pine beetles and various diseases are the leading causes of habitat loss. Without the appropriate population and habitat management on Federal, state and private lands, the RCW would once again be declining.

The RCW occurs primarily in pine and pine-hardwood forests of the piedmont and coastal plain of 11 southeastern states. These pine-dominated forests used by the RCW are fire dependent ecosystems. Current thought, supported by various research among fire ecologists, is that periodic fires caused by lightning strikes during the growing season shaped these pine systems and that the removal of growing season fire will lead to dominance by non-fire dependent plant communities. The RCW is habitat-specific in that it requires mature pine trees that have decaying heartwood for nesting and roosting. The RCW also prefers stands that are open with little or no midstory. Its diet consists primarily of insects and small arthropods, but it also consumes some fruits and soft mast. The territory size of an RCW depends upon foraging habitat quality and population density, and typically ranges between 75 and 250 acres. In Georgia, the RCW was present in 35 counties in the Coastal Plain and Piedmont physiographic provinces in 1992. Most (72%) of the RCW clusters on private lands (excluding the Red Hills region) that were active in 1982 had become inactive by 1992. This decline appears to have resulted from the loss of cavity trees, inadequate foraging habitat, inadequate burning, habitat fragmentation, and population isolation (Baker 1995). Currently, there are no active clusters known from private lands immediately adjacent to Fort Benning, making recovery dependent on management of the Fort Benning population. However, Fort Benning is working with The Nature Conservancy and the ACUB program to include private lands adjacent to the Installation that may harbor RCWs in the future as part of the land base that may contribute to RCW recovery (see Appendix 1).

Fort Benning Conservation Branch (CB) personnel have surveyed all of the Installation, including the A20 dudded impact area. As of 2013, there are 379 known RCW clusters on Fort Benning, 69 of which are located in the A20 dudded impact area and four that are located in the K15 dudded impact area (Figure 1: 3 A20 clusters are not represented on this map because the clusters have not been GPSed). One A20 cluster (A20-47) was deemed to be too dangerous to enter due to unexploded ordnance so is not counted towards management. In addition, seven other A20 impact area clusters are inaccessible due to potentially hazardous conditions that are currently being assessed. These clusters may be accessible in the future, but are not counted now. Therefore a total of 61 A20 clusters may be counted towards recovery (69-1-7=61). This leaves a total of 371 clusters that are potentially manageable to count towards recovery (379-1-7=371). The clusters in the K15 impact area are also not accessible due to safety issues, leaving 365 potentially manageable clusters (371-4=367), with 304 clusters outside of the impact areas (367-61=306). Three of the clusters that are on the edge of the A20 impact area have been added to the manageable clusters. An additional 11 A20 clusters have been added to management as a result of the DMPRC BO (USFWS 2004) and 36 A20 clusters are counted towards management as a result of the MCoE BO (USFWS 2009). In any given year, only 50 of the A20 clusters are counted towards management and recovery goals as per the 2009 MCoE BO (USFWS 2009). Thus, 356 clusters are counted as potentially manageable (306+50=356).

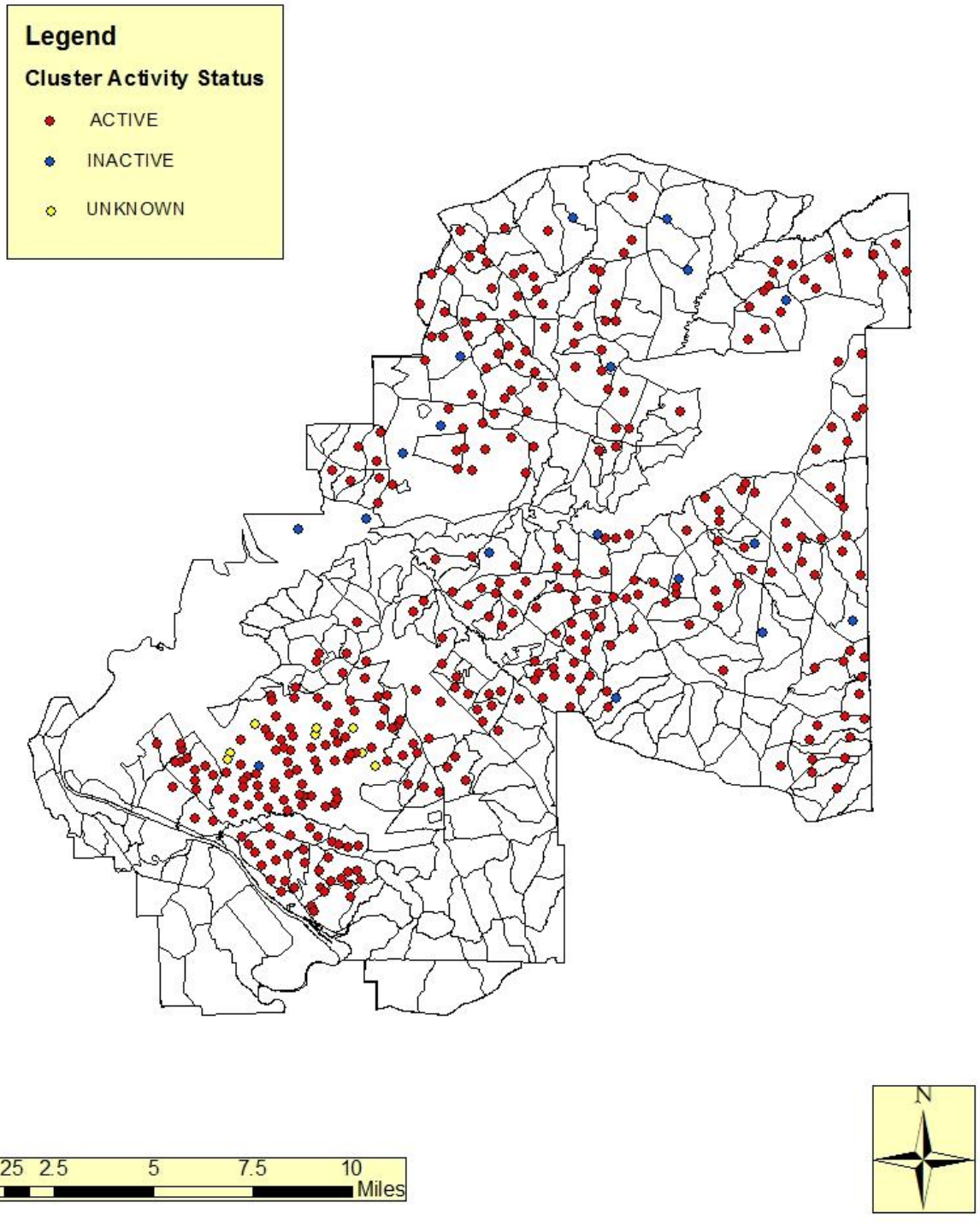
Incidental takes was issued for 101 clusters located outside of the dudded impact areas due to the DMPRC, BRAC, MCoE, and M06 BOs. Five of these clusters have been permanently deleted from management through informal consultation with USFWS. Thus, 96 existing clusters currently have incidental take (101-5= 96). Although many of them still persist on the landscape and are being managed. This leaves 260 clusters that can be counted towards management/recovery (356-96=260).

The following numbers include all clusters on Fort Benning, including all taken clusters: During the 2013 annual cluster inspections, 357 clusters were active and 10 clusters were inactive. This is broken down as follows: non-impact area clusters, manageable/recovery – 193 active, 7 inactive; duded impact area clusters, manageable/recovery - 50 active; non-impact area clusters, taken and therefore not counted for recovery - 92 active, 3 inactive; impact area clusters, not manageable and therefore not counted for recovery - 12 active.

If taken clusters are removed from the above totals, as of the 2013 breeding season, Fort Benning has 254 active clusters and 241 potential breeding groups that currently count towards recovery.

All RCW cavity trees are located and mapped using a GPS and data is maintained in ArcView and Access databases. These data are updated annually based on results of the spring cluster inspections. Data for new trees are added as the trees are discovered.

FIGURE 1. FORT BENNING RED COCKADED WOODPECKER CLUSTERS (2013)



2-2 Habitat/Ecosystem

The RCW occurs in pine or mixed pine-hardwood forests primarily in the Piedmont and Coastal Plain of the southeastern United States. Forests inhabited by the RCW historically have been shaped by fire, either intentional burns set by humans or by naturally occurring wildfires. Fire enables maintenance of the ecosystem; without fire, dense understory and midstory vegetation negatively affects establishment of young pine trees (Stoddard 1962).

The RCW is habitat-specific. For nesting and roosting, it requires living mature pine trees. Cavity trees are typically found in groups of 2-10 trees. This aggregate of trees is called a "cluster" and is home to a family group of RCWs. The RCW prefers areas with an open understory and may abandon a cavity tree if the midstory approaches cavity height (Hopkins and Lynn 1971, Van Balen and Doerr 1978, USFS 1979, Hooper et al. 1980, Locke et al. 1983, Conner and Rudolph 1989). On Fort Benning, RCWs are found predominantly in loblolly pines (*Pinus taeda).* Approximately 68% of natural cavity trees are loblolly, 27% are longleaf (*P. palustris*) and 5% are shortleaf (*P. echinata*).

The Recovery Plan defines good quality foraging habitat as having some large old pines, low densities of small and medium pines, sparse or no hardwood midstory, and a bunchgrass and forb groundcover. A study conducted in the Apalachicola National Forest suggested that understory characteristics or fire history might be more important than the number or size of pine trees as a measure of RCW foraging habitat quality (James et al. 1997). This study found that group size (number of adults), number of eggs laid, and the number of RCW groups within a 1-mile radius of sample groups all increased significantly ($\alpha = 0.05$) with respect to increasing percentage of wiregrass in the groundcover. The number of adults also increased significantly ($\alpha = 0.05$) with respect to increasing occurrence of pine regeneration in the stand, and decreased significantly ($\alpha = 0.05$) with respect to the percent gallberry in the groundcover. Number of adults, eggs, fledglings, and groups all decreased as tree density increased, but correlations were not significant. They hypothesized that frequent burning, which increases wiregrass and longleaf regeneration and reduces gallberry density, may play a role in the cycling of nutrients such as calcium. Calcium limitation has been shown to limit clutch size in songbirds (Graveland and Van Gijzen 1994).

2-3 Life History/Ecology

The RCW is a non-migratory, territorial, cooperative breeder (Walters 1990). They are long-lived, with individuals frequently living up to 10 years or longer. They form social groups, which can consist of a solitary territorial male, a mated pair, or a pair with their helpers. Helpers are usually male offspring from previous years. A cluster is defined as the area that contains all

of the cavity starts and cavities (roost, nest, and inactive) used by a group plus a 200-foot buffer zone around the aggregate of cavity trees. There are typically numerous cavities within a cluster, but there is only 1 potential breeding pair per group. The RCW differs from other woodpeckers in that it excavates in live pine trees rather than dead ones. Cavity excavation may take a year or more.

RCWs form lasting pair bonds. Eggs are laid in the male's roost cavity. Clutch size varies from 2-5 eggs. Incubation lasts approximately 10-12 days, and begins before the clutch is complete therefore hatching is asynchronous; 1-4 young fledge at 26-29 days of age. The young continue to receive food from parents for several months (Mosby 1972). Some juvenile males disperse from their natal cluster in their first year, while others remain as helpers until the breeding male dies, at which time the oldest helper (if there are more than one) will typically inherit the breeding role. A male helper may also bud off a portion of the group's territory and establish a new cluster. Juvenile females generally leave or are ejected from their natal cluster within the first year and typically do not become helpers. Natural expansion of RCW populations appears to be slow. Provisioning sites with artificial cavities is an effective method to increase the rate of population expansion.

Red-cockaded woodpeckers feed primarily on insects and small arthropods found under the bark of the upper boles and limbs of large pines, although females tend to forage lower. Ants and roaches constitute a large portion of their prey items. Fruits and mast also are consumed by the RCW, but account for only a small amount of their total diet. Individuals move from tree to tree while foraging, covering an area usually within 1/2 mile of the cluster. The Recovery Plan details a recent compilation of RCW life history, habitat descriptions and provides numerous citations and a complete bibliography of RCW research and other publications.

2-4 Relationships Between Listed Species and the MCoE Mission

2-4.1 Baseline Mission

Fort Benning is the Maneuver Center of Excellence, home of the Army Armor and Infantry, and is one of the world's premier war fighting schools and deployment centers. Fort Benning trains 144,000 plus war fighters per year, approximately 52% of all new war fighters in the Army, and all Armor Lieutenants, Captains, and Noncommissioned Officers. The Installation consists of 182,434 acres and is located adjacent to the Chattahoochee River in west-central Georgia and east-central Alabama. The majority of the training facilities and 93% of the total land area are in GA, within Muscogee and Chattahoochee Counties. The southwestern corner of the Installation, approximately 12,000 acres, is located in Russell County, AL.

Fort Benning, has 3 broad missions: (1) to provide the nation with the world's best trained Infantry and Armor Soldiers and adaptive leaders imbued with the Warrior Ethos, (2) to provide

a power projection platform capable of deploying and redeploying Soldiers, civilians and units anywhere in the world on short notice, and (3) to define required capabilities for the Infantry and Armor to meet the needs of the Future Force. Another mission of the MCoE is to maintain Infantry and Armor branch integrity within the MCoE model and ensure that it meets or exceeds the training standards for all Soldier and leader development instruction currently taught at the schools, while continuing to provide the best trained Soldiers in the world to our operating force.

The units currently stationed at Fort Benning are diverse and consist of varying combinations of mobile mechanized (tracked/ wheeled military vehicles) infantry task forces with task organized armor, mechanized infantry, field artillery and combat engineer assets utilizing both mounted (riding in mechanized vehicles) and dismounted (movement by foot) elements for offensive and defensive engagements.

Fort Benning provides ranges and maneuver training areas principally designed to support the Training and Doctrine Command (TRADOC) mission of initial entry training for Infantry Soldiers and Officers, Basic and Advanced level Noncommissioned Officer (NCO) and Officer training courses, the Army's Airborne and Ranger schools, and the continued study, testing and development of future joint and combined infantry doctrine, weapon systems, weapons tactics, techniques and procedures. TRADOC units on the Installation include the: 192nd Infantry Brigade (Bde); 197th Infantry Bde; 198th Infantry Bde; 199th Infantry Bde and NCO Academy.

The United States Army Armor School (USAARMS) trains Armor and Cavalry Soldiers, NCOs and Officers to fight in full spectrum operations in order to meet the requirements of the Army in the contemporary operational environment. The USAARMS serves as the trainer for the current mounted force and develops the tools for the future mounted force. The USAARMS also trains Marines as M1A1 Tank Crewmen and Tank Mechanics. This training includes Basic Military Occupational Specialty training as well as advanced Military Occupational Specialty training for Senior NCOs and Officers. USAARMS units on the Installation include the: 16th Cavalry Regiment, the 194th Armored Bde and the NCO Academy.

Fort Benning also provides the home station training facilities for Forces Command's 3rd Bde of the 3rd Infantry Division Mechanized, which has its Division headquarters at Fort Stewart, Georgia, Special Operations Command's 75th Ranger Regt and numerous other active deployable units. The Western Hemisphere Institute for Security Cooperation is also located at Fort Benning, which has the mission to train cadets, NCOs and Officers from various Latin American countries (US Army Corps of Engineers (USACE) 2006).

2-4.2 RCWs and Training

Beginning in the early 1980s, a 200-foot buffer around all RCW cavity and cavity start trees has been considered "Off Limits" for off-road training. The goal was to prevent habitat damage and

to minimize disturbance of the RCW, particularly during the nesting season. The unintended consequence was that these restrictions made it more difficult to conduct effective training activities, creating a disincentive for Installation commanders to apply proactive management techniques (hardwood control, artificial cavities, augmentation, etc.) to recover RCW populations.

The establishment of a buffer to prevent habitat damage was considered necessary in order to protect cavity trees. It was never intended to protect the entire habitat that a group of RCWs requires (i.e., 100-200 acres of foraging habitat). Since the 200-foot buffer was established in the 1980s, several important things have happened. The Army has initiated effective environmental awareness programs that have all but eliminated the incidence of trees being damaged during training exercises. Effective techniques for constructing artificial cavities have been developed (Copeyon 1990, Allen 1991), making it possible to mitigate most cavity tree damage that might occur.

The type of forest that the RCW requires is well suited for most types of training. This forest type is open (trees 20-25 feet apart affords room for vehicle maneuver) with a low profile midstory (provides visibility for target acquisition). Military training activities frequently cause wildfires, which have helped maintain some RCW habitat in an open condition. Areas of incompatibility include the military's requirement for openings for landing zones, drop zones, firing ranges, free dig zones, artillery position areas, maneuver lane engagement areas, etc.; and the RCWs need for some limitation in the amount of disturbance occurring during the nesting season (April-July).

Fort Benning's expansive acreage makes it possible to accommodate the military's need for openings, and provide enough high quality RCW habitat so that a few nest failures will not have a significant effect on population health. Once Fort Benning reaches 250 PBGs in clusters that are not authorized as incidental take, use of unprotected clusters following the 2007 Army Guidelines will allow natural resource personnel to proactively manage the ecosystem to encourage RCW population expansion across the entire Installation, while further reducing the adverse effects on the training mission.

If mission activities have any adverse effects on the RCW, it is expected that these will be offset by the positive effects of proactive management, so that the RCW population will continue to increase and recovery will be achieved. Fort Benning data collected over 17 years indicates that this approach is working. From 1996 to 2013 the number of RCW nests increased from 126 to 312, the number of active clusters increased from 151 to 357 and the number of PGBs increased from 143 to 332 (active clusters authorized as incidental take are included in these numbers). As of 2013 Fort Benning has 240 PBGs in clusters not covered by incidental take authorization. Population trends will continue to be monitored to determine the effectiveness of management activities.

New management techniques, new data on the effects of training activities, and increased proactive management and environmental awareness on Department of Army (DA) installations made it reasonable to reconsider the need for the restrictions that had been placed on training activities within 200 feet of a cavity tree. In 1996, DA and USFWS agreed on new guidelines for RCW management that significantly reduced training restrictions and increased DA commitment to proactive RCW management (RCW Guidelines 1996). These guidelines were revised and updated in 2007 (RCW Guidelines 2007). The newest guidelines and this ESMC are based on the premise that RCW conservation and military training are not mutually exclusive but in fact are compatible land uses. Under this ESMC, Fort Benning will recover its RCW population and fulfill its military missions. The plan will be reviewed annually and revised every 5 years to ensure that both objectives are being met.

For a detailed description of training at Fort Benning, please refer to the INRMP, Chapter 3, Military Mission and Natural Resources Implications.

2-5 Reasons for Listing

Population decline and the listing of the RCW is primarily the result of major habitat loss due to logging, agricultural clearing of mature pine forests and fire suppression.

Specifically, southern pine savannahs and open woodlands ecosystems dominated by longleaf pine, and to a lesser extent slash, loblolly and shortleaf pines, were negatively impacted by unsuitable silvicultural practices, agricultural practices, introduction of livestock, naval stores industry, and interrupted and subsequent reduction of fire frequency across the landscape.

Ultimately, extensive clearcutting (Jackson 1986, Ortego and Lay 1988, Conner and Rudolph 1989) and active fire suppression (USFWS 2003) led to removal of second-growth longleaf and restricted pine reproduction (Landers *et al.* 1995), shortage of potential cavity trees (Costa and Escano 1989, Rudolph and Conner 1991), hardwood encroachment around cavity trees (Van Balen and Doerr 1978, Locke et. al 1983, Conner and Rudolph 1989, Costa and Escano 1989, Loebb et. al 1992), changes in tree species composition and forest structure (USFWS 2003), and demographic isolation (Costa and Escano 1989). Without appropriate management of the RCW and its habitat, the species viability will be at risk and can reduce the potential for population recovery and interfere with the goal of sustaining specific population sizes.

2-6 Conservation Measures

The Recovery Plan lists eight techniques for managing RCWs: (1) population monitoring, (2) cavity management: artificial cavities and restrictor plates, (3) predator and cavity kleptoparasite control, (4) translocation, (5) silviculture, (6) prescribed burning, (7) habitat restoration, and (8)

ecosystem management (see pp. 71-119 of the Recovery Plan for details on each management technique).

Management techniques 1 through 7 are the most common techniques used to manage the RCW population on Fort Benning. The most effective of these techniques are population monitoring, cavity management (especially artificial cavity management), silviculture activities and prescribed burning. Intra-population translocations are becoming unnecessary due to population growth and natural dispersals.

Populations of RCWs occur on private, state and Federal lands. Conservation of the RCW as a species however will rely primarily on the conservation of populations on Federal lands. Federal lands contain the majority of RCW populations (Costa 1995), Federal properties contain the largest tracts of land, and Federal legislation (e.g. ESA) requires Federal agencies to conserve listed species.

Federal lands that contain RCW populations include national forests, military installations, national wildlife refuges, one national preserve and one Department of Energy property, with the national forests containing the majority of the core RCW populations required for delisting (USFWS 2003). Military installations, including Fort Benning, contain the second largest number of RCW populations of which six are designated primary core populations. An additional four secondary core and seven support populations are found on Army installations.

Management of RCWs on private and state lands plays an important role in the conservation of the species. Private landowners voluntarily take part in RCW conservation programs even though Federal law does not require them to recover the species. State lands play an important part in the conservation of the RCW because those RCW populations found on state land can also be part of a recovery population or play the role of a support population (USFWS 2003). Although private and state lands play an important role in the conservation of the RCW, Federal properties will continue to be the primary contributors to the recovery and delisting of the species. Through the ACUB program (Appendix 1), Fort Benning is striving to add acres from private lands to its baseline of acreage to be managed for RCWs. The 2007 RCW Guidelines specify that clusters on private lands that function demographically with the Installation's population and are secured by an enduring covenant may be counted toward the installation recovery goal.

3.0 CONSERVATION GOALS

The conservation goals are to increase suitable habitat and the RCW population to a recovery level consistent with the current land area available while meeting all military training requirements. This objective will be part of an integrated attempt to restore, maintain and protect

native biological diversity at Fort Benning that will also provide a sustainable training environment.

3-1 Manageable Clusters

The current population must be increased to reach a population goal of 351 PBGs on the Fort Benning landscape. This will satisfy the Recovery Plan which lists the Fort Benning population as a Primary Core Population, requiring at least 350 PBGS in order to count towards down- and de-listing of the species. One additional cluster was added to the recovery goal due to mitigation associated with a land exchange with the City of Columbus (USFWS 2002). In order to achieve 351 PBGs, biologists have calculated that Fort Benning require a minimum of 382 manageable clusters on the landscape since some clusters will be activated by single birds attempting to attract a mate and some clusters will be captured and are kept active by an adjacent RCW group. Manageable clusters are those that are accessible at least once per year, can be inspected for activity and some level of habitat management is possible. As per the A20 RCW Management Plan, aerial overflights may substitute for ground surveys in order to count the A20 impact area clusters as manageable (Appendix 8). The total number of active clusters to achieve 351 PBGs was calculated to be 370. Based on ARCGIS analysis, the available current suitable and potentially suitable pine habitat was determined using LMB forestry stand data. Any stand that was non-contiguous by 200 feet with any other stand was deleted from the baseline; as well as any other stands that were determined to be unmanageable (such as the habitat in the Good Hope Maneuver Area or habitat that was too isolated to reasonably contribute to recovery). This resulted in a baseline of 79,138 acres (Figure 2). ARCGIS was further used to determine the locations of all current-potentially manageable RCW clusters and their associated half-mile foraging partitions. Potential recruitment clusters were then added to the landscape such that each new cluster would have at least 150 acres of habitat while not reducing any existing clusters below the SMS (USFWS 2003). Based on this analysis, the Fort Benning landscape should support at least 410 clusters, surpassing the needed 382 manageable clusters that was calculated as the required number to reach recovery (Figure 2). This 382 calculation is based on the last 5 years of breeding season data collected on Fort Benning (Table 1). An additional regional analysis covering 6 large or recovered RCW populations was conducted in support of Fort Benning's proposal to change the number of managed and active clusters required to achieve 351 PBGs (Costa 2013) (Appendix 2).

Table 1. Fort Benning Population Statistics FY09 – FY13 (less taken clusters)

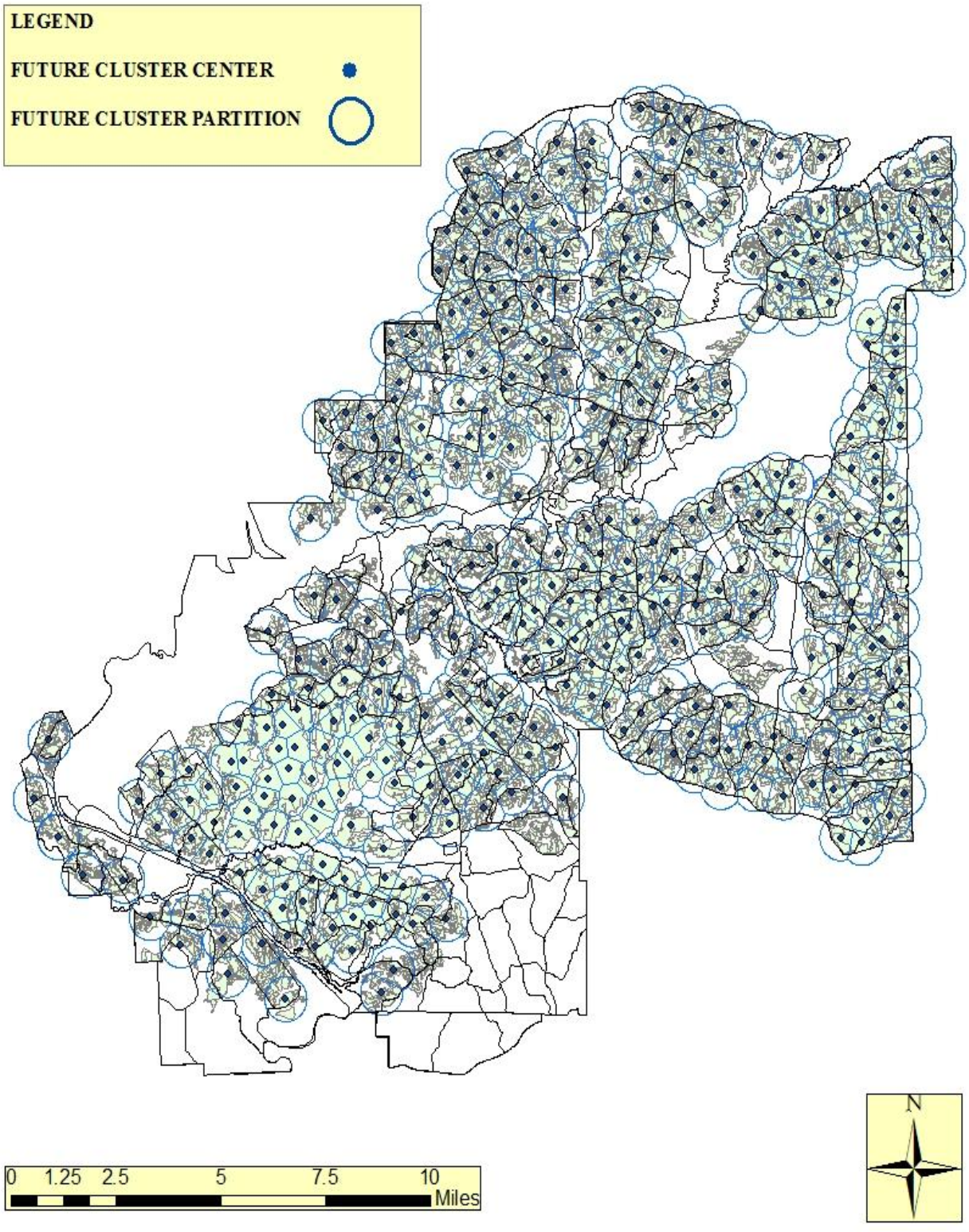
YEAR	#	#		% OF

	ACTIVE CLUSTERS	CLUSTERS WITH PBGs	# MANAGED CLUSTERS	MANAGED CLUSTERS WITH PBGs
2009	294	279	306	0.91
2010	242	234	253	0.92
2011	246	237	256	0.93
2012	250	240	261	0.92
2013	254	241	260	0.92
SUM	1286	1231	1336	
AVERAGE				0.92

MANAGED CLUSTERS NEEDED ON FORT BENNING FOR RECOVERY		% OF MANAGED CLUSTERS WITH PBGs (5 YEAR AVERAGE)		# PBGs GOAL TO MEET RECOVERY
382	x	0.92	=	351

In summary, based on the analyses of demographic monitoring data from Fort Benning and several large RCW populations, the Installation proposes to change the total number of managed RCW clusters needed on the landscape to be reduced from 421 to 382 clusters.

FIGURE 2. FORT BENNING FUTURE CLUSTER AND HABITAT CONFIGURATION



3-2 Recruitment Clusters

The RCW Guidelines (Army 2007) allow establishment of PCs and UCs that will be managed to promote RCW population expansion. All clusters currently designated as Supplemental Recruitment Clusters under the existing ESMP will be converted into UCs. The CB will coordinate with Directorate of Plans Training Mobility and Security (DPTMS) on the designation of any new recruitment clusters on whether they will be marked (PC) or unmarked (UC) clusters. No construction activities can be undertaken in UCs or PCs without consultation with the USFWS. If RCWs voluntarily move into a stand not previously designated as a recruitment site, it will be designated as either a PC or UC depending on the military use of the area. Decisions as to whether budded or pioneered clusters (naturally formed clusters) will be designated as PCs or UCs will be made jointly between the CB and DPTMS.

The RCW Guidelines provide a process for removing training restrictions from selected clusters based on the number of PBGs (e.g., once an installation exceeds 250 PBGs). However, due to BRAC and MCoE actions (USFWS 2007, USFWS 2009), all clusters with incidental take authorization are removed from analysis. Therefore, this process of training restriction reductions will be implemented but not until the population surpasses 250 PBGs. Clusters that are currently covered under an incidental take statement in an existing BO will be lower priority for consideration of deprotection until the incidental take statement is removed. Currently, existing natural clusters will be designated as PCs and will have boundary signs. RCW Guideline training restrictions will apply to these clusters. However, existing natural clusters may be designated as UCs once the appropriate level of PBGs is reached as described in the 2007 RCW Guidelines and above.

It will be necessary to use artificial cavities to establish recruitment clusters and in some instances maintain natural and recruitment clusters in order to reach the Installation's population goals. Prescribed burning will be maintained on an average 3-year return interval. Since 1990 there has been a gradual shift at Fort Benning to prescribed burning during the growing season (March-June). Burning will be conducted as much as possible (dependent on staffing and weather limitations) during the growing season. Additionally, hardwood midstory control will be conducted in all clusters as needed. Red-cockaded woodpeckers will be translocated on Post as necessary to activate recruitment clusters and fill breeding vacancies.

Thirty-one percent of Fort Benning's total pine stands are dominated by longleaf pine (including longleaf plantations), which are relatively disease resistant. This low percentage of longleaf pine on the landscape represents a challenge to the long-term management of the RCW on Fort Benning. To reverse this trend, forest management and hardwood control practices will favor the restoration and regeneration of longleaf pine on appropriate upland sites.

All of these goals should be considered long term, but are subject to change through consultation with the USFWS based upon changing circumstances, changing missions, or new scientific information. Overall conservation goals will be reexamined in conjunction with the annual and 5-year review/revision of the RCW ESMC.

Once Fort Benning achieves its RCW population goal (PBGs), most training restrictions should be eliminated from all manageable clusters as all will become UCs once 351 PGBs is reached, as long as a minimum of 382 managed clusters are maintained. In order to ensure future mission needs without adverse impacts to RCWs, additional UCs may be established to achieve a population density of 1 active cluster per 150 acres across the Installation. These additional UCs will not be subject to training restrictions as defined by the 2007 RCW Guidelines. Managing to sustain a surplus of RCWs will protect the population from catastrophic events such as hurricanes, enhance the efficiency of genetic interchange, and minimize the risk of isolating clusters. Additionally, "excess" clusters will provide flexibility as needed for future proposed project or management activities that may impact RCWs.

Population trend data will continue to be analyzed during the annual plan review and five-year revisions. Adjustments to the goals will be made as appropriate based on a five-year average of Fort Benning nesting data.

The RCW population at Fort Benning is very dynamic, with the population steadily growing over the past five years. However, some clusters change status on occasion, e.g., going from active to inactive or vice versa. This dynamic will dictate from year to year where to put new recruitment clusters and where to translocate birds; therefore, these management decisions will be made annually. Conservation Branch personnel will initially decide where to propose establishment of recruitment clusters in coordination with LMB and then seek concurrence on these sites from the DPTMS. Clusters will be designated as PCs or UCs based on DPTMS recommendations.

In order to expand the RCW population on Fort Benning, recruitment clusters (PCs and UCs) will be placed on the landscape. Recruitment cluster installation will be limited over the short term due to the current limitations of available contiguous habitat and distance to nearest active cluster. This will reduce Fort Benning's ability to expand the population through artificial recruitment. Because loblolly and shortleaf pines are off-site on many upland areas of Fort Benning, they are more susceptible to fire damage, disease, and pine beetle infestations. This, along with the fact that much of the planted longleaf will take time to reach an age that will be usable by RCWs, combine to limit the growth potential of the RCW at Fort Benning. Good quality habitat will take time to develop to a stage where it will be useful to RCWs.

4.0 HABITAT MANAGEMENT ACTIONS

There are 300 training compartments on Fort Benning. Natural fire breaks (i.e. roads, creeks, streams, etc.) serve as the main fire breaks for prescribed burning. During the next 5 years, silvicultural prescriptions will be prepared for each training area that is due for its 10-year habitat condition inventory.

Management actions incorporated within this ESMC will be applied IAW the applicable RCW Guidelines and the INRMP and are considered necessary to achieve all goals for the RCW.

Management actions include but are not limited to the following:

- Protect active and potentially active RCW clusters and PCs from damage or disturbance (i.e., using signs, painted bands on cavity trees, etc.).

- Manage forest habitats to improve RCW habitat. These efforts will include midstory control, prescribed burning, commercial harvesting, provisioning with artificial cavities, and planting longleaf pine.

- Use direct population management techniques to increase the rate of RCW recruitment including translocation and augmentation.

- Maintain and improve an educational program about the requirements to protect RCWs among those who use Fort Benning, especially military personnel.

- Monitor RCW population status/trends and adjust management as necessary to maintain population growth.

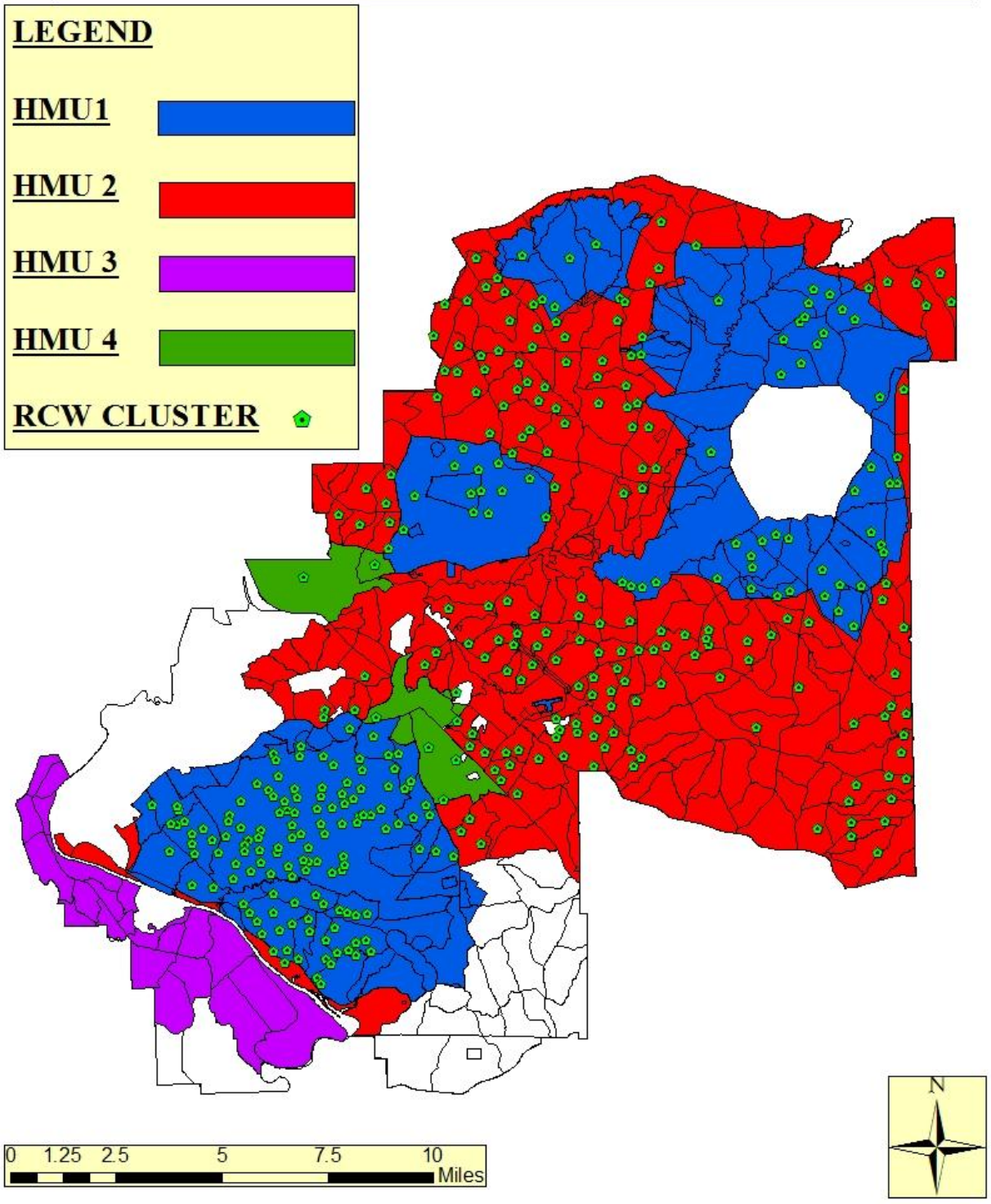
4-1 Habitat Management Units

Fort Benning has been divided into 4 HMUs (Figure 3). Each HMU will be managed using the same techniques, but with minor differences. HMUs are broken down according to land use, access issues and RCW demographics. The total acreage for RCW management is currently approximately 79,138 acres; of which 64,720 acres is current or potential habitat and 14,418 acres is future habitat.

HMU-1: This HMU encompasses some or all of the following training compartments: A01, A02, A03, A04, A05, A06, A07, A08, A09, A10, A11, A12, A13, A14, A15, A16, A17, A18, A19, A20, A21, A22, A23, A24, A25, A26, A27, A28, A29, A30, AA03, AA04, D02, D03, D04, D05, D06, D07, D08, K01, K02, K03, K04, K05, K06, K07, K09, K10, K11, K12, K13, K14, K16, K17, K19, K20, K21, K24, K25, K26, K27, K28, K29, K31, K34, K35, K36, K37, L09,

L10, M01, M02, M06, M07, O08, O09, O17, O18, O19, O20, O21, O22, O23, O24, O27, O28, O29, O30, O31, O32, O33, O34 and forested portions of Brooks, Cactus, Caramouche, DMPRC, Griswold, Ruth, Ware Ranges. It currently contains 185 clusters: 184 active, 1 inactive and contains approximately 30,084 acres. The defining characteristic of this HMU is that it encompasses all the ranges, their associated range fans and duded impact areas (except K15). The groups in these areas are demographically stable and dispersal between them has been noted on a regular basis. The main objective for HMU-1 is to maintain and manage existing clusters to the maximum degree that available access allows. Management will primarily consist of maintaining 1 to 3 year burn rotations, artificial cavity management and other techniques that may include aerial herbicide in the more difficult to access areas. All BO monitoring will be maintained in selected clusters. Clusters outside of A20 will be considered for full monitoring (banding, fledging) but those within A20 will be limited and monitored according to the A20

FIGURE 3. FORT BENNING HABITAT MANAGEMENT UNITS AND RCW CLUSTER LOCATIONS



Red-cockaded Woodpecker Management Plan (Appendix 8). There is minimal non-range training in these areas as the majority of the area is the A20 impact area and the adjacent compartments are often covered by SDZs. There is minimal activity that consists mostly of reconnaissance and dismounted training/foot traffic. The main issues with this area are due to access challenges. See Appendix 9 for details about the plan for access to these areas. The establishment of recruitment clusters within this HMU will be necessary in order to reach Fort Benning's population goal. However, clusters that naturally bud or pioneer in this HMU will be treated as described in Section 6.0.

HMU-2: This HMU encompasses all or portions of the following training compartments: A01, AA01, AA02, AA03, AA04, AA05, all BB compartments, all C compartments, D01, D02, D03, D06, D07, D08, D09, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, all E compartments, all F compartments, all G compartments, all H compartments, all I compartments, all J compartments, K02, K04, K07, K08, K09, K16, K17, K18, K19, K20, K21, K22, K23, K24, K25, K26, K29, K30, K31, K32, K33, K34, K35, L01, L02, L03, L04, L05, L06, L07, L08, L09, M01, M02, M03, M04, M05, M07, all N compartments, all O compartments, all P compartments, all Q compartments, all R compartments, all S compartments, all T compartments, and all U compartments. It contains 183 clusters: 176 active, 7 inactive and contains approximately 44,315 acres. The groups occupying these clusters are demographically stable and dispersal between these clusters has been noted on a regular basis. The main objective for HMU-2 will be to expand the population to further increase the opportunities for birds to disperse between and among territories/clusters, creating better connectivity. Recruitment clusters will be added to this area with the UCs being placed in areas that are more important or critical to the training mission. Each year, new recruitment clusters will be designated as PCs or UCs based on mission use of the area. Training varies throughout this HMU as it encompasses most of the Installation with most training activities that occur on Fort Benning being represented, but the RCW has proven to co-exist with the military in this area.

HMU-3: Fort Benning is located in both Alabama and Georgia with the Chattahoochee River separating the two states. The Alabama compartments will make up HMU-3. There is currently one historically inactive cluster that is no longer managed and no active clusters in this HMU. This HMU contains approximately 3,202 acres. The plan for this HMU will be to create new recruitment clusters and eventually translocate RCWs into the area once there is enough suitable habitat to support several recruitment clusters. These birds will be somewhat isolated from the main body of the population due to the Chattahoochee River. Dismounted/Mounted training and several landing strips and drop zones are in this HMU. This HMU is essential to any possible connections to off-post RCWs to the south and west.

HMU-4: This HMU includes the Sand Hill and Harmony Church Cantonment areas. Currently, there are 4 active clusters and 2 inactive clusters in this HMU and it contains approximately 1,537 acres. Management objectives for this HMU will emphasize creating recruitment clusters

to improve connectivity to the rest of the population. Parts of these cantonment areas need extensive habitat management, including pine thinning, hardwood removal and burning. The primary focus will be to install new recruitment clusters when habitat is suitable. These recruitment clusters should be activated naturally as they are in close proximity to existing RCW groups. Portions of this HMU may require more extensive mechanical control of hardwood and understory due to its proximity to smoke sensitive areas that inhibit the ability to consistently maintain the habitat with prescribed fire.

The K15 dudded impact area is not placed into an HMU as the area is not manageable. It is generally inaccessible due to live surface danger zones from ranges and unexploded ordnance. However, there is suitable habitat in this area and RCW clusters have been documented. Although this area may provide some local demographic stability, it unfortunately cannot be actively managed for RCWs. Incidental Take will be required for clusters in this impact area; as of 2009, 4 active clusters were documented in K15 via an aerial survey.

As the Fort Benning staff continues to manage and restore the forest, additional areas will become more suitable for RCW occupation. Portions of Fort Benning will take 30 or more years of management before they will become foraging habitat, and at least another 30 years before the trees will be suitable for cavities. Each of the HMUs contains areas that are being managed but will take long periods of time before they will be old enough to support the creation of cavities. It will not be feasible to introduce RCWs into these areas until there is sufficient habitat available.

4-2 Foraging Habitat

Research has expanded our understanding of the foraging ecology of RCWs considerably. We know that the structure of foraging habitat is important to fitness of RCWs as well as influencing habitat selection. Fitness increases if foraging habitat is burned regularly, has an open character and herbaceous groundcovers, and contains large old trees. Selection of habitat increases with these same characteristics. This structure constitutes good quality foraging habitat for the species. Quality of foraging habitat also affects home range size: as quality increases, the amount of foraging habitat used decreases. The guidelines for the management of foraging habitat for RCWs are based on what is known about both habitat quality and quantity (USFWS 2003).

Creating and maintaining good quality foraging habitat is a critical aspect of RCW recovery, especially over the long term, as immediate threats from cavity and cluster limitation are reduced. Our understanding of what constitutes good quality foraging habitat comes from a synthesis of research into selection of foraging habitat and effects of habitat characteristics on group fitness.

Both habitat selection and group fitness are influenced by the structure of the foraging habitat. Important structural characteristics include (1) healthy groundcovers of bunchgrasses and forbs, (2) minimal hardwood midstory, (3) minimal pine midstory, (4) minimal or absent hardwood overstory, (5) a low to intermediate density of small and medium sized pines, and (6) a substantial presence of mature and old pines. Thus, the quality of foraging habitat is defined by habitat structure. Although geographic variation in habitat types exist, these structural characteristics of good quality habitat remain true for all geographic regions and habitat types. Previous guidelines stressed quantity of foraging habitat, as defined by number of medium and large trees (USFWS 2003).

The current emphasis for habitat management is to include habitat quality, as defined by habitat structure, and use area metrics to address quantity. Red-cockaded woodpeckers require foraging habitat that is suitable in both quantity and quality.

4-2.1 FORAGING HABITAT GUIDELINES

4-2.1.1 Background:

As described in the Recovery Plan, foraging habitat is assessed using both the Standard for Managed Stability (SMS) and the Recovery Standard (RS). SMS is typically the threshold used for Incidental Take; therefore, all projects impacting RCWs must be measured against the SMS criteria (USFWS 2006). Additionally, the USFWS has determined that any timber harvest action that occurs within a RCW partition, whether for silvicultural or construction purposes, now will be classified as a project and must be measured against the SMS criteria (W. McDearman, USFWS, pers. comm..). Since Fort Benning is a Primary Core Recovery Population, foraging partitions must also be analyzed using the RS in order to show that each cluster has the potential to meet RS in the future.

The SMS requires a minimum of 3,000 square ft. (ft^2) of pine BA^2 in stems $\geq$10 in. dbh on at least 75 acres of good quality foraging habitat contiguous to the cluster as defined below (USFWS 2003):

a. Pine stands must be at least 30 years of age or older.
b. Average BA^2 of pines $\geq$ 10 in. dbh must be between 40 and 70 ft^2/acre.
c. Average BA^2 of pines < 10 in. dbh must be less than 20 ft^2/acre.
d. If a hardwood midstory is present, it must be sparse and less than 7 ft. in height.
e. Total stand BA^2, including overstory hardwoods, must be less than 80 ft^2/acre.

Additionally, USFWS guidance since the 2003 Recovery Plan has established the following clarification of the total stand BA^2 requirement:

•Overstory hardwood BA^2 must be $\leq$10 ft^2/ acre (W. McDearman, USFWS, pers. comm.).

• Total stand BA^2 can exceed 80 ft^2/ acre if the maximum limits for overstory hardwood and pines <10 in. dbh are not exceeded, and the BA^2 in pines 10-14 in. dbh is 40-70 ft^2/acre (in other words, the excess in BA^2 is comprised of pines ≥14 in. dbh.) (USFWS Tutorial: RCW Matrix Tool for ArcGIS 9.3 Document Version: 3.0).

• In addition to low and sparse hardwood midstory being suitable (criteria d. above), sparse-medium and sparse-tall midstory is also considered to be suitable. This modification is acceptable as long as there is data to support stability and breeding success of the resident RCW groups (R. Costa, USFWS, pers. comm.).

4-2.2 Modification of Minimum BA/acre Requirement for the SMS

The USFWS recognizes that individual RCW populations can become adapted to local environmental conditions that differ substantially from those defined as the SMS. The Recovery Plan provides an allowance for individual populations to develop population-specific guidelines that better reflect these local adaptations (USFWS 2003). Additionally, further guidance (USFWS 2005) recognizes that some sites may not currently, or ever, meet the SMS because of catastrophic events, past land use history or ecological reasons. In cases where birds have adapted to conditions that do not meet the SMS, making a "take" determination "based solely on the SMS may not always reflect the use of the best scientific information available". There may be cases where a cluster does not meet the SMS as defined in the Recovery Plan, yet no Incidental Take Statement is issued (USFWS 2005). Installations with a "take" that is questionable or who wish to develop population-specific guidelines must demonstrate, through sound science, that multiple generations of RCWs have been stable under the current site conditions. Demographic data must also show that RCW group fitness is not diminished as a result of insufficient habitat, and preferably establish a threshold where habitat quantity and/ or quality does begin to affect group fitness (R. Costa, USFWS, pers. comm.).

4-2.2.1 Current Conditions and Analyses

Other than age, the only minimum criteria for stand suitability (listed above) in the SMS is the BA^2 in pines ≥10 in. DBH; all other criteria are maximum values that could be improved with management. Therefore, in most cases, if a stand meets the BA^2 in pines ≥10 in. DBH criteria, it should be classified as either "suitable" or "potentially suitable" habitat.

4-2.2.2 Fort Benning Revised SMS

During consultation with USFWS for BRAC and MCoE actions, a revised SMS for Fort Benning was authorized. The revised SMS was based on 10 years of demographic data provided by the

Installation. Fort Benning proposes to establish this revised standard for the term of this ESMC to facilitate the transition to a longleaf pine dominated forest. The revised SMS will be referred to as the Fort Benning Standard for Managed Stability (FBSMS) throughout this document and proposes modification from 40ft^2 BA^2/acre to 30ft^2 BA^2/acre. Using this revised standard, all SMS criteria as listed in the Recovery Plan and above must be met, except that the acceptable BA^2 range for pines ≥10 in. dbh is modified to include stands with an average BA^2 of ≥ 30 ft^2/acre versus 40ft^2/acre. The minimum acreage required is directly correlated to the average BA^2 of stands within the partition. Partitions containing stands with BA^2 of 40 ft^2/ acre would still require a minimum of 75 acres, however, partitions with stands averaging 30 ft^2/ acre BA^2 would require 100 acres to meet the minimum of 3,000 ft^2 total BA^2.

4-2.2.3 Silvicultural Challenges

In deficient RCW partitions, i.e. those partitions having less than 3,000 square ft. (ft^2) of pine BA^2 in stems ≥10 in. dbh on at least 75 acres of good quality foraging habitat contiguous to the cluster as defined above, forest management is limited within ½ mile of the RCW cluster center (up to 502 acres per cluster). Within a deficient RCW partition, pine trees ≥10 in. dbh cannot be harvested regardless of tree health, pine species, or tree density. If a ≥10 in. dbh pine tree is harvested, the action could result in Incidental Take by increasing the deficit of ≥10 in. dbh pine stems. Forest management actions within deficient RCW partitions are thus limited to silvicultural actions that improve foraging habitat by reducing pine density for <10 dbh and/or removal of hardwood stems, even if forest stands are overstocked with 10 to 14 in. dbh pine trees or overall tree health is diminishing. Historically, these silviculture actions have removed younger, healthy trees while leaving older trees with declining or poor health. However, other forest management actions that are still permissible in deficient foraging partitions include hardwood removal, hardwood midstory control, underplanting the existing stand with longleaf pine seedlings, and prescribed burning.

If diminishing tree health of ≥10 in. dbh pine stems is a concern within a deficient RCW partition, passive forest management is currently the only alternative for these diameter classes of pine trees. Natural senescence of the pine overstory will set the timing and be a determining factor for other forest restoration actions such as mechanical vegetation removal, hand felling, and/or chemical site preparation and longleaf pine under-planting feasibility that would facilitate successful establishment. Passive forest management of the mature pine overstory allows natural senescence to reduce the overstory pine BA^2 to a feasible under-planting density where longleaf pine under-planting efforts can be successful. Fort Benning will modify current habitat/forest monitoring requirements to more closely track deficient clusters. Monitoring will identify clusters that will need to be underplanted or planting of naturally created gaps with longleaf to ensure sustainability of the cluster. Longleaf plantings in deficient partitions will be monitored

during the vulnerable grass and bolting stages. Management actions will be adjusted as necessary to restore these areas within the SMS criteria requirements.

A passive approach to forest management of ≥10 in. dbh pines and longleaf re-introduction within loblolly, slash, and shortleaf dominated stands does allow nature, over the course of several years, to select the healthiest overstory pine trees to remain in a stand, however, this approach is not without potential drawbacks. As pine trees reach the end of their life cycle, they put all of their reserves into producing abundant cone crops. As a result, natural pine regeneration and an over abundance of loblolly, shortleaf, and slash pine seedlings can occur within a stand which could hinder longleaf establishment in the absence of required burn intervals.

When the overstory pine BA^2 decreases, the amount of available fuel (pine straw) decreases within a stand. As a result, fire frequency and occurrence could decrease within a stand and hardwood competition begins to dominate the understory and midstory. As hardwood species begin to dominate the understory and midstory, the herbaceous component diminishes within a stand and compounds the inability for fires to carry through a stand.

Futhermore, as natural senescence of the pine overstory occurs, prescribed burning within these stands becomes an increasing challenge due to woody material (10,000 hr fuels). As trees die and an overabundance of snags and downed woody debris remain within a stand, an increase in residual smoke from prescribed burning can occur and smoke management and air quality issues could arise until those fuels are eventually consumed. In order to alleviate smoke management and air quality issues, the size of burn areas per day, cumulative acreage burned per day, and consecutive burn days in these areas may be reduced. As a result, the available days for conducting prescribed burning on these sites are potentially reduced and management goals can become compromised. When these stands are located in close proximity to smoke sensitive areas, prescribed burning is challenged even further.

Lastly, silviculture actions that can occur within deficient RCW partitions, such as harvesting pine stems <10 dbh and/or removing hardwood stems, are typically accomplished with non-conventional methods for specialty markets due to low volume of harvest material, logging feasibility, and/or market availability. These silviculture actions are often accomplished with pre-commercial thinning (hand crews) and/or herbicide application and can become very expensive. Depending on the method(s) chosen and the fire weather conditions, fire intensity may increase initially and can be stressful or detrimental to the overstory pines.

Conversely, in RCW partitions that meet the FBSMS (partitions having more than 3,000 square ft. (ft^2) of pine BA^2 in stems ≥10 in. dbh on at least 75 acres of good quality foraging habitat contiguous to the cluster) forest management is allowed more flexibility; however, flexibility is still contingent upon ≥10 in. dbh pine BA^2 and acres above the FBSMS minimum requirements.

As Fort Benning continues habitat restoration to transition off-site pine to a longleaf pine-dominated forest, forest management practices will adhere to the FBSMS.

4-2.2.4 Recovery Standard

While Incidental Take is not issued until habitat is brought below the FBSMS, recovery populations have a responsibility to manage toward the RS, and must ultimately meet the RS in order to meet one of the recovery criteria. Because Fort Benning is a Primary Core Recovery Population, foraging habitat impacts will also be assessed using the RS, both for current suitability and the ability of each cluster to reach the RS in the future. The RS is commonly referred to as the "desired future condition" of RCW habitat (USFWS 2005).

The RS requires a minimum of either 120 acres or 200-300 acres of good quality foraging habitat (as defined below) depending on the site indices of soils and dominant pine species within the foraging partition. For systems of high productivity (site index of 60 or more for the dominant pine species), the Recovery Plan requires that a minimum of 120 acres of good quality foraging habitat be provided for each RCW group. For sites with low productivity (site index below 60 for the dominant pine species), 200-300 acres of good quality foraging habitat is required for each RCW group. The majority of soils on Fort Benning have a site index $\geq$60, therefore 120 acres will be used for future RS analyses.

Good quality foraging habitat according to the RS is defined as follows (USFWS 2003a):

1. There must be a minimum of 18 pine stems $\geq$14 in. DBH per acre that are $\geq$60 years old. The minimum BA^2 for these pines is 20 ft^2/ acre.
2. The BA^2 for pines from 10-14 in. DBH must be from 0-40 ft^2/ acre.
3. The BA^2 of pines <10 in. DBH must be <10 ft^2/ acre and <20 stems/ acre.
4. The minimum combined BA^2 for categories 1 and 2 above is 40 ft^2/ acre.
5. Native herbaceous species must cover at least 40% or more of the ground.
6. No hardwood midstory exists, or if present, is sparse and less than 7 ft. in height.
7. Canopy hardwoods are absent or less than 10% of the number of canopy trees in longleaf forests and less than 30% of the number of canopy trees in loblolly, shortleaf and other pine forests.
8. All habitat must be within 0.5 mile of the center of the cluster.
9. Foraging habitat must not be separated by more than 200 ft. of non-foraging habitat, as defined above with the SMS criteria.

4-3 Fragmentation of Habitat

To minimize the fragmentation of nesting and foraging habitat, RCW foraging habitat will be provided adjacent to and contiguous with the cluster to the maximum extent possible.

4-4 Demographic and Genetic Interchange

The creation of HMUs will identify nesting and foraging areas sufficient to attain and sustain Installation RCW population goals. Within all HMUs, management efforts will focus on connecting RCW territories into a single, demographic population. The degree of isolation of an RCW group from other groups is an important factor in long term survival (Conner and Rudolph 1991, Beyer et al. 1996, Thomlinson 1996). Red-cockaded woodpecker groups with fewer than 5 other active clusters within 1.25 miles appear to be especially vulnerable to habitat conditions, while those in higher density areas are not (Hooper and Lennartz 1995). Carrying capacity for the RCW at Fort Benning is 1cluster/150 acres of suitable habitat.

Red-cockaded woodpecker populations that are separated by at least 5 miles are considered to be separate subpopulations. By this definition, the Fort Benning population is 1 contiguous population.

4-5 Deletion of Inactive Clusters

After annual inspections, each inactive cluster (including recruitment clusters) will be evaluated to determine specific management needs that may help to reactivate the cluster. If it is determined that the cluster has been inactive for 5 or more years or if the recruitment cluster was established more than 5 years ago and has never been active, the cluster may be deleted from management via consultation with USFWS. The habitat will still be managed as habitat designated for recovery, but all usable cavities will be blocked and all white painted tree bands and boundary signs will be removed.

4-6 Habitat Management

4-6.1 Management Priorities

The priority for Fort Benning natural resources management is to support the Installation's mission and maintain a sustainable training landscape, while meeting the responsibilities of all applicable laws, regulations, and guidelines. All other natural resource management, including conserving native species and providing commercial forest products and recreational opportunities, is secondary. Implementation of this ESMC will be fully incorporated into the INRMP. Timber removal for construction or military training purposes will be done in consultation with the USFWS if threatened and endangered species habitat is affected.

Priority for management activities will be given to active clusters. Clusters located in gaps between subpopulations will be given priority for augmentation and establishment of PCs and UCs.

4-6.2 Midstory Control

All RCW clusters will be kept clear of dense midstory. All dense pine, including longleaf pine regeneration and hardwood midstory within 50 feet of cavity trees, will be killed or removed. Beyond 50 feet, most pine midstory may be retained for regeneration, and a few selected hardwoods may also be retained. However, overstory hardwood stocking will not exceed 10 ft^2 BA^2 per acre, (see Fort Benning Modified Standard for Managed Stability not the Recovery Plan). Prescribed burning will be the primary method used to control the midstory. Additional control of hardwood midstory utilizing mechanical removal (mowing, chain saw, etc.) and chemical (herbicides) control will also be used in RCW clusters where needed. Commercial thinning also is currently being used to thin dense pine midstory and merchantable hardwoods, however, it may not always be a viable option due to changing markets and increasing economic challenges. The burn goal for each training compartment is once every 2 to 3 years and no greater than once every 5 years. Burns will be conducted primarily during November – June, with the majority of the burns to occur during the growing season. In some areas dormant season burns will be used to reduce fuel so that growing season fires can be conducted. Winter burns may also be used to "catch up" areas that were scheduled for growing season burning, but could not be burned due to training activity, weather, smoke management concerns, etc., and fuel accumulation is too heavy to conduct the burn in the next growing season. Winter burns may also be used in areas that are in a maintenance state (i.e. little to no midstory) or to introduce variation in the burning regime. Flexibility will be a key component of prescribed burning in order to achieve ecosystem restoration goals on a complex multiple use landscape. Prescribed burns will be conducted using drip torch ignition with the use of backing, flanking, and head fires. The Installation will be burned utilizing a "mosaic" pattern. Burn units are approximately 250 acres and the timing of the burns creates a mosaic of areas that are typically burned at least once every 3 years. This mosaic will not only serve to enhance biodiversity, but decrease the severity and intensity of wildfires as well. In the future, size of burn units may be increased, but this mosaic pattern will still remain so that adjacent areas are not burned in the same year.

To reduce stress to residual trees from prescribed burning some areas will be burned on a one to two year rotation to avoid heavier fuel loads that create more intense fires and in areas where military training activities increase the occurrence of wildfires.

Fire breaks will be used in clusters only in emergency wildfire situations and when other cavity tree protection measures cannot be implemented safely or timely. When available, Conservation Branch technicians/biologists will protect cavity trees against accidental ignition by pre-burning around each cavity tree following current standard operating procedures. All personnel will be equipped with a backpack pump in case of tree ignition. During the nesting season, all cavity trees in the burn unit will be checked for nests on the day of the burn (climb or remote video camera). Extra caution will be taken when burning around a nest tree.

4-6.3 Erosion Control

The USFWS 2007 BRAC BO Reasonable and Prudent Measure number 3, states that Fort Benning must "develop the Installation's Land Management Plan that focuses on the Soil Conservation Program and Sustainable Ranges." Additionally, Term and Condition number 3 states that the "Land Management Plan" should include: 1) organizational structure that can support this initiative, 2) strategies to abate significant training impacts in highly erodible soils, 3) a management system with protocols that specify areas for training rotation when erosion impacts breach thresholds in the maneuver areas, and 4) specific roles and protocols for the Integrated Training and Management (ITAM) program and how the Range Training and Land Program (RTLP) will be implemented. Specifically, the BRAC BO states "avoidance and minimization of impacts to RCWs must be accomplished by a combination of institutional and engineering controls, and the programming of adequate resources necessary to proactively manage the impacts of the Transformation actions". This plan has been completed and is currently being implemented (Appendix 10).

The implementation of the 2007 Army Guidelines provides erosion control requirements related to RCW management across all of Post. Those Guidelines reinforce the RCW Recovery Plan recommended management practices including protection of existing cavity trees from damage due to human disturbance (including erosion and sedimentation and logging activities). The Guidelines also state that in protected clusters, "[i]nstallations will soon as practicable (normally within 3 working days of notification) repair damage to training land within a cluster to prevent degradation of habitat." Prompt repair of damage will minimize erosion impacts to RCWs.

Fort Benning will maintain an active soil erosion control program to minimize erosion and sedimentation impacts to RCW clusters and cavity trees. The overall goal of the Land Management Plan is to provide a suitable environment, focusing on soil stabilization to establish and maintain about approximately 80,000 acres of pine forest, suitable for RCW habitat, in order to reach Ft. Benning's recovery goal of 351 PBGs. Other non-RCW management actions were also covered in the Land Management Plan for convenience.

Soil erosion measures will be applied as prioritized. Active clusters and recruitment clusters will be first priority for soil erosion applications as well as sites that will potentially impact RCW habitat. Other erosion control projects will be performed subject to availability of funds. Details regarding ITAM and other sources of funding are provided in the INRMP section5.2.

All NPDES Best Management Practices are inspected periodically for required maintenance in accordance with the applicable NPEDS permit and/or laws and regulations. Informal monitoring of completed projects is done immediately after the project is completed and months after to evaluate the effectiveness of the projects. Maintenance is performed on an as-needed basis. Replanting of grasses and trees, fertilization of grasses, using rock and gravel for soil

stabilization, and excavation of sediment behind rock check dams are examples of maintenance performed.

4-6.4 Forest Management

Approximately 16 percent (28,642 acres) of the pine and pine-hardwood forests on Fort Benning are even-aged. The overall pine forest management objective is to produce and maintain uneven-aged pine and pine-hardwood forests on all manageable acres. The target pine BA^2 range for all clusters is 50-80 ft^2/acre. In addition BA^2 reductions will not exceed an average of 30 ft^2 / acre. Timber harvest prescriptions will be flexible. Timetables for entry into a compartment may be altered based on RCW activity or recruitment cluster placement. The cutting cycle will be every 10 years and the three major pine regeneration methods will be:

a. Single Tree Selection: This is the preferred method for healthy loblolly and shortleaf stands, but will also be used in mixed pine stands (loblolly, shortleaf, and longleaf). In mixed stands, single tree selection will favor longleaf pine. Once longleaf becomes the dominant stand species, the group selection method discussed below will be utilized.

b. Group Selection Method: This is the preferred method for longleaf pine regeneration. Less than thirty-one percent of Fort Benning's pine forests are longleaf dominated (47,286 acres), including all longleaf pine plantations. These forest stands will be regenerated through group selection by creating 1/4 to 2-acre openings. The cumulative total area of openings will be determined by dividing the total stand acreage by the number of 10-year age classes in the stand. These regeneration patches will be protected during timber thinning operations.

c. Clearcut Method: This method will be used to convert stands with off-site pine species (mainly loblolly and slash) back to longleaf pine. Any longleaf in these stands will be left. These off-site stands are very susceptible to scorching from prescribed fire when applications are at the upper limits of acceptable fire weather parameters, littleleaf disease, and southern pine beetle infestations which are the leading causes of RCW habitat loss on Ft. Benning. Clearcuts will generally be limited to 40 acres and will only be used to convert off-site pine to longleaf pine. Clearcuts near active or recruitment clusters will be no larger than 25 acres, and use of smaller patches are preferred. Clearcuts as large as 80 acres are permissible if they are at least 1 mile from active or recruitment clusters and have been approved in a timber prescription. All sites will be artificially regenerated with longleaf pine unless sufficient longleaf seed trees are available to provide natural regeneration.

Diameter cutting limits will be set in active and recruitment clusters to provide potential nest trees. Timber harvesting in active clusters is prohibited from 1 April through 31 July unless authorized by a staff RCW biologist. If these standards cannot be met, Fort Benning will consult as necessary with the USFWS.

Snags, relicts, and old growth residuals in thinning cuts will be retained unless they pose safety hazards to training activities, prescribed burning, wildfire suppression, etc. Pines over 60 years old (or the oldest age class present in the stand if less than 60 years old) will be favored as leave trees to provide foraging and more importantly potential cavity trees.

Longleaf pine will be favored for retention, followed by loblolly, and shortleaf in that order. This does not mean that a thinning cut should seek to eliminate all species other than longleaf. The goal is to have longleaf-dominated stands on all suitable sites. Other pine species will continue to be represented in the stand mix to the extent that they are compatible with frequent growing season fires. Ultimately, fire management regimes will be more important than harvest practices in shaping the species composition of the forest.
Fort Benning is making every effort to decrease impacts of harvesting on the environment. Current requirements only allow for mainly chipping operations for habitat management. Cut-to-length operations are no longer an option for timber harvesting because of such low volumes being removed. A fuelwood chipping operation will be for commercial timber harvests. The chipping operation has the capability to remove small numbers of sawtimber and pulpwood, but mainly pre-commercial vegetation. In the past, USACE was responsible for timber disposal on Fort Benning. Now Fort Benning has the authority to sell its on timber. This will allow greater oversight of each operation.

See INRMP Chapter 5.3 for more detailed information.

4-6.5 Pine Straw Harvesting

Pine straw harvesting is not permitted on Fort Benning.

4-6.6 Southern Pine Beetle Control

In the past ten years, southern pine beetle has not been a significant problem on Fort Benning. Southern pine beetle may become more active in the future due to extremities in weather conditions and other environmental factors. The following methods/guidelines will apply inside and immediately adjacent to active clusters.

a. Cut and Remove Method: This method will be used in all cases when access is available. Conventional logging equipment will be used to remove the infested trees and possibly a narrow buffer of un-infested green trees to prevent further spread. Log limbing and loading will occur outside of the 200-foot buffers of active clusters unless authorized by a RCW biologist. Trees to be cut inside active clusters and recruitment clusters will be inspected for unknown RCW cavities, and then marked for removal. No RCW cavity trees will be cut without prior consultation with the USFWS. Active clusters and recruitment clusters will receive top priority

for SPB treatment actions. The active heads will be cut first to prevent further spread. Cavity trees that are cut will be replaced with an artificial cavity within 12 hours.

b. Cut and Leave Method: This method will be used in spots where access is restricted or when tree removal efforts cannot be expedited. Infested trees will be felled toward the center of the spot and away from cavity trees. Merchantable trees will be removed as soon as possible provided there is access to them.

Such activities will be done in consultation with the USFWS when they may affect the RCW. Conversion to longleaf and maintaining a spacing of 20-25 feet between trees will help reduce the risk of pine beetle infestation (Gara and Coster 1968).

4-6.7 Storm Damage

All timber salvage operations in response to catastrophic storm events will adhere to Best Management Practices for Forestry as well as the following additional guidelines:

f.) All storm damaged areas will be delineated and reviewed under the NEPA process.
g.) Only standing trees will be marked for salvage with timber marking paint.
h.) Salvage operations occurring outside the 200 foot RCW cluster boundary will only be salvaged under the guidance/approval of a LMB forester.
i.) Salvage operations occurring within the 200 foot RCW clusters boundary will only be salvaged under the guidance/approval of a RCW wildlife biologist.
j.) Salvage occurring within the 200 foot RCW cluster boundary during nesting season (March – July) will be allowed only with the approval of the USFWS and the oversight of a RCW wildlife biologist present on site during the salvage operations.

4-6.8 Wildfires

Wildfires will be allowed to burn whenever feasible, but suppression of wildfires will continue to be necessary to protect personnel and facilities, avoid unacceptable smoke management risks, and to protect RCW cavity trees or other sensitive habitats. When weather conditions are unusually dry or windy, suppression may also be necessary to protect timber resources, although silvicultural practices and existing stand conditions (e.g., reestablishment of longleaf, reduced stocking density, frequent prescribed burning to reduce fuels) may minimize the need for fire suppression. Fires will be suppressed by non-soil disturbing means whenever possible. When soil disturbance (i.e. use of a crawler tractor) is necessary, efforts will be made to utilize existing firebreaks to control the fire. Firebreaks will not be plowed within 200 feet of an RCW cavity

tree except in emergency situations. Access to handle wildfires in areas that are not restricted will be done in accordance to the Fort Benning Environmental Access Plan (Appendix 9).

If a wildfire burns through an RCW cluster, CB staff will evaluate the site within 24 hours of notification of the event. Further investigation of the wildfire will be in coordination with the Fort Benning Directorate of Emergency Services. All evidence will be preserved. The appropriate Army offices will also be notified if there is damage to the cluster, including Office of the Staff Judge Advocate, Garrison Commander, DPTMS, Directorate of Training USFWS, IMCOM, and Headquarters Department of the Army. Each cavity tree that has been scorched will be peeped to determine if the cavity is still usable. If not, an artificial cavity will be installed as replacement. If a cavity tree is killed in the fire, a replacement cavity will be installed. If trees are scorched but still usable, the cluster will be visited on a monthly basis for 1 year to look for delayed mortality. If a cavity tree dies in this time frame, it will be replaced by an artificial cavity. All replacements will occur within 24 hours of determination of need. Incidental take is required for birds that may be killed outright during a wildfire or due to abandonment of the cluster due to tree scorching or delayed mortality and requested per this ESMC. This should amount to no more than 5 trees per year or three birds.

Wildfires that occur in the A20 impact area will be handled according to the A20 Wildfire Plan (Appendix 3).

4-6.9 Disturbance of Nesting Habitat During Nesting Season

Timber harvesting and similar activities will not be conducted in clusters during the nesting season (March - July). Exceptions may be allowed during March if it is determined that there is no nesting activity, or during June - July if it is determined that nestlings have fledged and are foraging outside the cluster, or as described above. Management activities can also be done in inactive clusters during the nesting season with approval of the RCW Coordinator and USFWS concurrence. Timber harvest activities during the nesting season will be conducted as described above.

4-6.10 Construction of Artificial Clusters

Restoration and construction/installation of artificial cavities is very important to increasing the rate of RCW recovery in the short term. Approximately 847 artificial inserts, drilled cavities and artificial starts have been installed on Fort Benning since December 1993 using the insert technique described by Allen (1991) and Copeyon's (1990) drilling technique. Lengthening rotation ages and elimination of rotation ages is expected to reduce the need for artificial cavities.

The need for artificial cavities will be evaluated each year during cluster evaluations. A minimum of 4 useable cavities is required for each cluster. Often, more are needed to accommodate fledgling use, helper use, and cavity competitors (e.g., southern flying squirrels *Glaucomys volans*). Additional artificial cavities will be constructed provided there are suitable trees. Construction of artificial cavities in existing clusters will be performed IAW Allen (1991) and Copeyon (1990) and will be accomplished by fully trained personnel.
In addition to providing sufficient useable cavities in all active clusters, artificial cavities will also be used to establish recruitment clusters that will either be PCs or UCs. Each PC and UC will be provisioned with at least 4 cavities. Recruitment clusters are a necessary tool to artificially supplement the natural expansion of the RCW population. The number of new clusters established each year is limited by available potential cavity trees, suitable foraging habitat and distance from active clusters. On an annual basis Fort Benning will evaluate the landscape to determine if any potential recruitment sites that will meet minimum standards can be installed.

4.7 SPECIAL HABITAT MONITORING

The following plans were required as a result of prior consultations with the USFWS as describe in section 1.0

4-7.1. Red-cockaded Woodpecker Monitoring Plan for the Digital Multi-Purpose Range Complex (DMPRC)

In the 22 July 2004 DMPRC BO (USFWS 2004), the USFWS identified as a "Reasonable and Prudent Measure" and "Term and Condition" the need to develop and implement a habitat monitoring plan to detect early warning signs of potential cluster abandonment and/or habitat degradation of the 8 RCW groups within 0.5 miles of the range footprint and the 5 RCW clusters within the SDZ. In addition to standard demographic monitoring of all affected groups, determination of specific home range and dispersal movements of DMPRC RCW groups were also required (Appendix 4).

Monitoring results during DMPRC timber harvest and construction phases and operational phase: Cluster (D13-01) (currently known as cluster DRC-A) became active with a breeding pair. This became the 8th cluster/group to receive incidental take. Taken cluster D14-04 went inactive in 2005 and was later deleted in 2010. This was to be expected since a significant amount of habitat was lost due to the timber harvest/land clearing (i.e. estimated 1/2 to 2/3 of habitat was lost). No clusters other than D14-04 have gone inactive due to timber harvesting, construction and/or training. RCW cluster J06-01b (currently known as DRC-C) was pioneered/discovered in 2009, and has been intermittently active since discovery and is currently considered captured by group J06-1a (currently known as DRC-C). Additionally, there is currently no evidence that

indicates the DMPRC has negatively impacted the ability of the RCW to naturally disperse to other clusters or attempt to reproduce.

RCW home range locations, shapes and sizes during the RCW non-breeding season (August through March) are estimated using RCW foraging location data (i.e. GPS information collected in the field) and a Fixed Kernel Density Estimator GIS application. Home ranges vary significantly among RCW groups. Home range estimates during the timber harvest and construction phases of the DMPRC (2004 to 2010) ranged from 120.4 to 267 acres. Final home range estimates during the operational phase will not be complete until after December 2015 (i.e. 5 years after beginning of training on DMPRC).

RCW habitat within 0.25 miles of the DMPRC boundary has been surveyed no less than twice per year for damage resulting from munitions impacts. Results from the surveys indicate that the an estimated 81% of the habitat damage discovered since the operational phase began is actually located within a portion of a pine stand inside the DMPRC footprint (non-manageable pine) near the boundary of training areas K37, D04 and the K15 impact whereas 19% of damage (i.e. 11 bullet strikes) was discovered within 0.25 mi of the south side of DMPRC boundary within training areas D04 and K37. All damage found in pine stands in D04 and K37 appears to be the result of small arms fire. No training impacts have been found within any of the clusters being monitored within 0.5 miles of the DMPRC.

4-7.2. Red-cockaded Woodpecker Habitat Impact Assessment Plan

The USFWS identified as "Reasonable and Prudent Measures" and "Terms and Conditions" in the 20 August 2007 Transformation/BRAC BO (USFWS 2007) and the 29 May 2009 MCoE BO (USFWS 2009) for the Installation to devise and implement a habitat monitoring strategy for RCW clusters impacted by the 15 new small arms ranges constructed in the NW corner of Fort Benning. The *RCW Habitat Impact Assessment Plan* is a monitoring plan designed to assess and monitor the potential impacts to down-range RCW clusters and habitat resulting from small arms munitions training in the new Oscar Range Complex (Appendix 5). Specifically, this plan will assess the effectiveness of full and partial earthen toe berms constructed on 5 of these ranges to protect RCW habitat. In addition, monitoring will confirm the projected limits of munitions damage to down-range habitat from non-bermed Oscar Complex ranges.

A detailed assessment of forest habitat downrange was conducted downrange of Oscar Ranges 2 (Call), 3 (Copple), and 4 (Davis) in 2011. A total of 248 long-term vegetation plots were established and surveyed to assess baseline forest stand condition prior to live-fire training in the Oscar Range Complex. Plot data are being analyzed at U.S. Army Corp Engineer Research Laboratory (CERL) to provide baseline forest stand conditions from which future plot sampling data will be compared.

Acoustical recording equipment was used to verify and quantify potential bullet overshot/ ricochets from small arms live-fire training at Oscar Ranges 2, 3, and 4 into the foraging partitions of four downrange RCW clusters during the 2012-2013 RCW nesting seasons. Data from these recordings may provide detailed information on verifying the number of rounds fired reported in RFMSS, timing of range activity, evidence and quantification of bullet overshot/ricochet into downrange RCW habitat, frequency spectra of bullet noise, and bullet fate (i.e., relative landing zone of bullets on/off range). Over 495 hours of sound data were recorded in 2012. This increased substantially in 2013, with more than 2,655 hours of recordings within the Oscar Range Complex due to the use of remote automated monitoring systems (RAMS), which allowed for continuous recordings. All acoustical data are being analyzed at U.S. Army CERL to relate RCW response to small arms live-fire training events, and to better understand how bullet overshot/ricochets might impact or degrade downrange foraging habitat over time.

Although no munitions impacts to trees have been detected to date within the 200 foot buffer of the four RCW clusters within the Oscar Range Complex during downrange surveys outlined in the plan, bullet strikes to trees have been detected within the foraging partitions. Therefore, the Army is conducting a biological assessment of bullet strikes to trees within the .5 mile foraging partitions to evaluate potential effects of which were not considered in previous biological opinions.

4-7.3. Monitoring Plan to Evaluate Effects of Heavy Maneuver Training on the Red-cockaded Woodpecker Population on Fort Benning, Georgia

In the 29 May 2009 MCoE BO (USFWS 2009), the USFWS identified as a "Reasonable and Prudent Measure" and "Term and Condition" the need to develop and implement a monitoring plan that will quantify and compare the response of RCWs subjected to heavy maneuver effects to those that are not. The *Monitoring Plan to Evaluate Effects of Heavy Maneuver Training on the Red-cockaded Woodpecker Population on Fort Benning, Georgia* (Appendix 6) was developed to meet these requirements of the MCoE BO and implementation of this monitoring plan was initiated in 2010. The primary objective of this monitoring effort is to document whether heavy maneuver training associated with MCoE activities affects the RCW population and its habitats in the Southern and Northern Maneuver Areas.

The Northern Maneuver Training Area (NMTA) was sited in an area that had been designated for heavy maneuver training on Fort Benning for numerous years. The NMTA is a designated trail system and off-road corridor for training using tracked and wheeled vehicles. Off-road heavy maneuver training is limited to within 25 feet of roads and trails unless otherwise approved through the Fort Benning NEPA process. Although the NMTA was completed in November 2013 and is available for light maneuver training, use has been limited and heavy maneuver training is not anticipated to begin before May 2014 due to various construction delays.

The Southern Maneuver Training Area (SMTA) was also sited in an area that had been designated for heavy maneuver on Fort Benning for numerous years. The SMTA is a trail system for training that was intended for tracked and wheeled vehicles as well as mounted and dismounted troops, primarily for the Army Reconnaissance Course (ARC). Within the SMTA, specific areas were designated for off-road heavy mechanized training. The course has three interconnected "fingers" of corridors that extend roughly north-south and are interconnected at the southern terminus. However, once construction of the SMTA was nearing completion, the training emphasis of the ARC changed, of which collectively required fewer and lighter wheeled vehicles conducting reconnaissance over much larger training areas in order to train to standard. Since the ARC was not planning to use tracked vehicles and was using a reduced number of vehicles from what was previously analyzed, the Army informally consulted with the USFWS using a BE (USFWS 2011) to drop the use of tracked vehicles in the SMTA and expanded the number of training areas available to conduct ARC training.

Since the intent of the monitoring plan was to quantify and compare the response of RCWs subjected to heavy maneuver training to those that were not, monitoring was initiated prior to construction activities in 2010 in order to establish baseline conditions at affected RCW clusters located within the NMTA and the SMTA. Monitoring activities in 2011 were focused on the actual construction activities of both maneuver areas.

Remote trail cameras and video surveillance equipment were used to assist with the evaluation of the potential effects of facility construction and heavy maneuver training on RCW nesting and non-nesting behavior within the NMTA and SMTA. All activities, to include pre- and post-construction and military training were documented using trail cameras, primarily at road intersections and trails. Trail cameras monitored roads/trails in proximity to RCW clusters to quantify the number, type, and frequency of vehicle use. A total of 32 RCW clusters were monitored for vehicle activity with trail cameras from 2010-13, recording a total of 1,532,191 images (i.e., encompassing vehicles and non-vehicle events) across 3,748 camera trap days of coverage during this period. Seventeen RCW clusters were monitored in 2010, recording 98,245 images across 1243 camera days of coverage. In 2011, 20 RCW clusters were monitored recording 989,019 images across 1300 camera days. A total of 13 RCW clusters were monitored in 2012 recording 218,509 images across 693 camera days. A total of 226,418 images were recorded for 7 RCW clusters in 2013 across 512 camera days. The majority of vehicle detections (e.g., road construction activities) recorded in 2011 were part of road construction activities taking place on Fort Benning in preparation of the transition of the MCoE to Fort Benning. Road construction activities accounted for the much higher number of trail camera images being recorded in 2011 compared to 2010 over a similar number of days of coverage. Trail camera data are being analyzed at U.S. Army CERL to relate RCW response to military training events.

Video surveillance techniques were used to record RCW nesting and non-nesting behavior in response to vehicle activity. A total of 24 RCW clusters were monitored for a total of 808 camera days with video cameras from 2011-13, recording over 16,146 hours of RCW nesting and non-nesting behavior. In 2011, 16 RCW clusters were monitored for 250 camera days, recording over 3,978 hours of RCW nesting behavior. A total of 12 RCW clusters were monitored for 332 camera days in 2012 through recordings of over 7,094 hours of nesting and non-nesting behavior. In 2013, a total of 5 RCW clusters were videotaped for 226 camera days, recording over 5,074 hours of nesting and non-nesting behavior. Video surveillance data are currently being analyzed at U.S. Army CERL to relate RCW response to military training events.

Given the fact that to date no heavy maneuver training has occurred in the NMTA and no heavy maneuver training by the ARC has ever occurred in the SMTA, the monitoring plan will not be able to quantify and compare the response of RCWs subjected to heavy maneuver effects to those that are not as was the intent and the design of the study. However, once all data collected is analyzed, comparisons of RCW response can be made looking at those groups subjected to the loss of habitat and disturbance from the actual construction activities, as well as changes in vehicular traffic of all vehicle types utilizing the improved roadways that were constructed in both the SMTA and NMTA.

Since the original study design for monitoring potential disturbance resulting from ARC training basically shifted from monitoring heavy maneuver training using tracked vehicles in a small confined area (referring to the three interconnected "fingers" of corridors comprising the SMTA) to monitoring light maneuver training using wheeled vehicles over larger training areas, changes to the monitoring approach were needed. Following a Conservation Recommendation of the USFWS's 2007 BO, the Army began attaching Global Positioning System (GPS) tracking devices to nearly all vehicles used during each ARC class (approximately 20 vehicles) that occurred during the RCW nesting season beginning in 2012. These devices record precise spatial and temporal data for nearly all vehicular movement associated with field activities for the Goldeneye and Blackjack phase of each ARC class. All GPS tracking data is currently being analyzed at U.S. Army CERL in conjunction with the CB's summary analysis of the demographic data for those RCW groups where ARC vehicles traveled within 200 feet or less of an active cavity tree.

4-7.4. Red-cockaded Woodpecker Monitoring Plan for the Multi-Purpose Training Range (MPTR)

A Multi-Purpose Training Range (PN 64551) was originally proposed for construction in training compartments K9, K11 and K13, to the north of, and overlapping, Hastings Range in the MCoE BA (USACE 2008). During the development of the MCoE BA Final Addendum, the Army reexamined its options and determined that it could fulfill the minimum training requirements by refurbishing the existing Hastings Range, an approximately 1,685-acre range.

The MCoE BA Final Addendum concluded that the only changes from the current use of Hastings Range would be the frequency and duration of training events; the target locations, firing points and types of ammunition used will not change (USACE 2009).

During the final design development of the Hastings Range upgrade, however, it was realized that minor changes to the target locations and firing positions would be necessary. The target positions and firing points had to change in order to meet the current training standards of a MPTR for target layout demanded by the new Tank Tables specified in the Department of Army 3 September 2009 revised Heavy Brigade Combat Team (HBCT) Gunnery Manual. Fort Benning concluded in their 15 July 2010 BE (Fort Benning 2010) that these changes to the MPTR design may affect, but is not likely to adversely affect, the RCW or surrounding habitat, and USFWS concurred during informal consultation. Fort Benning developed a monitoring plan as a minimization measure in order to validate that conclusion.

The RCW Monitoring Plan for the proposed MPTR (Appendix 7) addresses procedures designed to assess and monitor potential impacts to down-range and neighboring RCW clusters and habitat that could result from upgrading the existing Hastings Range to meet current training standards of a MPTR. Specifically, the objectives of this plan are to:

1. Validate the Line-of-Sight and view shed analyses conducted by the Fort Benning DPTMS, which suggests that down-range RCW clusters and habitat will not be adversely impacted by minor adjustments to target locations and firing positions associated with upgrading Hastings Range to meet current Army gunnery standards on a MPTR.

2. Monitor RCW response to additional noise impacts resulting from the increase in frequency, duration, and total number of large caliber rounds fired on the upgraded Hastings Range.

3. Implement standard RCW demographic monitoring protocols to document trends for all 20 RCW groups that could be potentially affected.

4. Identify potential problems early to allow for a timely response to take corrective actions.

Video surveillance and acoustical recording equipment were used to evaluate the potential effects of large caliber weapons fire from the MPTR on RCW nesting. A total of 11 RCW clusters were monitored for a total of 499 camera days with video cameras from 2011-13, recording over 9,782 hours of RCW nesting behavior. In 2011, 7 RCW clusters were monitored for a total of 217 camera days, recording over 3,432 hours of RCW nesting behavior. RCW clusters were monitored for 29 days in 2012 through recordings of over 644 hours of nesting and non-nesting behavior. In 2013, a total of 6 RCW clusters were videotaped for 253 camera days, recording over 5,705 hours of nesting and non-nesting behavior. Video surveillance data are

currently being analyzed at U.S. Army CERL to relate RCW response to large caliber live-fire training events from the MPTR.

Acoustical recording equipment was used to document and quantify large caliber weapons fire downrange of the MPTR. A total of 5 RCW clusters were monitored for a total of 263 recording days with video cameras from 2011-13, recording over 5700 hours of sound data. Two RCW clusters were monitored for a total of 4 days in 2012 through recordings of over 33 hours of sound data. In 2013, a total of 5 RCW clusters were monitored for a total of 259 recording days, recording over 5,667 hours of sound data. Large caliber weapons data are currently being analyzed at U.S. Army CERL to relate RCW response to large caliber live-fire training events from the MPTR.

To date, two incidences of tree damage from large caliber weapons firing have been detected during ground surveys that are specified in the monitoring plan. Both incidences occurred within the 200 foot buffer of a RCW cluster and resulted in closure of the suspected target/mover. No downrange munitions impacts have been detected to date since the last targets were closed.

4-7.5. A20 Red-cockaded Woodpecker Management Plan

According to the MCoE BO RPA, 36 A20 dudded impact area RCW clusters will be added to management that are not currently counted towards management/recovery. The BO also required that a management plan be developed. This was completed and is attached as Appendix 8 of this ESMC. The plan identifies 50 potential clusters that can be managed towards this goal. Every spring, all accessible A20 dudded impact area RCW clusters are inspected for activity and tracked to determine breeding status. Breeding status is only followed up until such time as 36 PGBs are identified. Thus, which clusters count towards the goal may vary from year to year. Management needs are also identified including cavity maintenance to achieve 4 suitable cavities per cluster, prescribed burning or herbicide requirements, and trail maintenance. The A20 dudded impact area is accessed during the following Fall/Winter in order to accomplish any habitat management needs identified during the spring inspections.

Since implementation of this plan in 2010, Fort Benning has been able to document 36 PBGs per year and has been able to assure 4 suitable cavities per cluster. This information is reported to the USFWS annually.

4-8 Restricted Activities

4-8.1 Markings

All cavity trees in PCs will be marked with 2 white painted bands approximately 6 inches wide and 6 - 12 inches apart. Bands are painted on the bole approximately 4 feet from the base of the

tree. Cavity trees are uniquely numbered with a stainless steel tag that is located just above the white painted bands. Artificial cavity tree numbers will have an "A" after the number. White, diamond-shaped warning signs (Figure 4) will be posted to demark a 200-foot buffer zone. This same signing will be used on PCs.

Figure 4. Red-cockaded Woodpecker Boundary Sign

Unprotected Clusters will not be signed, as they are invisible to training. Cavity trees in UCs will not be painted with white bands but all cavity trees with be numbered in the same manner as PCs. However, these cavity trees will be marked with a single orange band so that they can be easily identified by CB and LMB personnel for monitoring and management purposes.

4-8.2 Training Restrictions

Training restrictions will be implemented IAW the 2007 RCW Guidelines. Training restrictions for the RCW will apply to all clusters except those designated as UCs. Current SRCs will be converted to UCs and will remain invisible to training as defined in the 2007 RCW Guidelines. As new cavity trees (natural or artificial) are added to existing PCs in the future, they will also be

subject to training restrictions. Training restrictions will not apply to UCs as defined in the 2007 RCW Guidelines, or to any new cavity trees associated with them.

4-8.3 Removal of Training Restrictions

The 2007 RCW Guidelines allow for each Installations to systematically remove boundaries/training restrictions from protected clusters as certain PBG goals are met.

Installations with less than or equal to 250 PGBs will maintain the current number of protected clusters for both active clusters and recruitment clusters.

Installations with populations greater than 250 PBGs may remove training restrictions from clusters accordingly:

Total PBGs: 251-275 – training restrictions may be removed from clusters on a 1 to 1 ratio for every PBG above 250 (25 clusters), i.e. for every 1 PBG above 250, restrictions may be removed from 1 cluster, cumulative total 25;

Total PBGs: 301-350 – training restrictions may be removed from clusters on a 3 to 1 ratio for every PBG above 300 (150 clusters), i.e. for every 1 PBG above 300, restrictions may be removed from 3 clusters, cumulative total 225;

Total PBGs: 351 plus – training restrictions removed from all clusters.

On Fort Benning, the potential implementation of this process is complicated by the amount of incidental take that has been authorized via the DMPRC, BRAC and MCoE BOs. Even though there are currently 337 PBGs, when the taken clusters (due to USFWS BOs) are subtracted from this total, only 240 PBGs remain. Therefore, Fort Benning will follow the above matrix and will not begin designating new UCs and removing restrictions until the 250 PBGs threshold is met. Once this goal is met and training restrictions begin to be lifted, no cluster currently covered under an incidental take statement will be considered for UC status until such time as the incidental take statement is removed, the exception being SRCs which will become UCs.

4-9 Augmentation, Translocation, Recruitment, and Permitting

Augmentation may be used in any single bird groups identified during monitoring activities depending upon availability of appropriate sub-adult fledglings (< 1 year old). Priority will be given to the augmentation of solitary male groups on Fort Benning. Adult RCWs will not be translocated.

Fort Benning may provide sub-adult RCWs for translocation to support range-wide recovery efforts through the expansion and growth of smaller populations off-Post. This translocation effort is coordinated by the USFWS through the Southern Region Translocation Cooperative (SRTC) and requires attendance from all DoD properties with RCW populations participating in the annual translocation effort. The purpose of the cooperative is for all private, state and Federal properties in NC, SC, FL, GA, AL, and MS that have RCW populations to present their annual RCW breeding season reports. From these reports, SRTC members determine translocation priorities and needs for the year and collectively make decisions regarding the number of birds that donor populations can donate and the number of juvenile RCWs that recipient populations can receive based on the data that are presented. Populations are broken down into donor populations (those that have sufficient RCW population numbers to donate birds to the program) and recipient populations (those populations that have less than 30 potential breeding groups).

Fort Benning is considered a Donor Population and has been an active participant of the SRTC since 1999. To date, a total of 183 birds have been donated/translocated to other properties without impeding Fort Benning's population growth; in fact, Fort Benning's population has increased from 165 potential breeding groups to 337 potential breeding groups during this time. The Installation typically donates 12 individual sub-adult birds or 6 pairs each year to the SRTC every year. Participation in the SRTC with continue; however the number of RCWs that can be donated will vary depending upon RCW management needs on-Post and other factors.

Another purpose of the SRTC is to pair up recipient populations with donor populations and initiate coordination for the actual capture and transport (translocation) of juvenile RCWs, which typically takes place during October of each year. The Installation's participation in the SRTC has been a major factor in fostering improved relations with and support of the USFWS over the years. In addition, our long term involvement and support of the SRTC has strengthened relations with numerous private, State, and Federal agencies and has facilitated Fort Benning's emergence as a leader in RCW recovery efforts.

Fort Benning may also serve as a recipient site for imperiled RCWs being translocated IAW the State of Georgia’s Red-cockaded Woodpecker Habitat Conservation Plan. Fort Benning will possess current permits to conduct these activities.

4-10 Ordnance Impact Areas

There are 2 main dudded impact or duded areas on Fort Benning, A20 and K15. Historically, access into these areas has been extremely limited, however, recent ground and aerial surveys have been conducted.

A total of 69 RCW clusters have been documented in the A20 impact area, of which Fort Benning is currently managing 61. IAW the previous ESMP BO (USFWS 2002), 3 A20 clusters will continue to be managed. IAW the DMPRC BO (USFWS 2004), 11 A20 clusters will continue to be managed for minimization of that project. IAW the MCoE BO (USFWS 2009), 36 additional clusters will be managed (these clusters will vary from year to year depending on annual breeding season surveys and access). The additional 11 clusters in the A20 dudded impact area will be inspected yearly. One other cluster, A20-47, is known to exist in the A20 impact area that was documented during aerial surveys, but it is in a location that is too dangerous for ground access and will not be managed. There are also 7 clusters in A20 that are currently inaccessible due to a safety issue. Efforts are ongoing to re-gain access to these areas and therefore Fort Benning may be able to manage these clusters in the future. At least 4 RCW clusters were identified in K15 via aerial surveys. Since access to this training compartment is not allowed, none of these clusters will be monitored or counted towards recovery goals. K15 will still serve as a dispersal corridor between the northeast corner and the rest of the Fort Benning population.

Further information regarding the management of A20 dudded impact area RCW clusters can be found in the A20 RCW Management Plan that was written to satisfy a requirement of the MCoE BO (Appendix 8).

4-11 Minimization of RCW Management Impacts on the Fort Benning Mission

This ESMC is designed to factor RCW management into the Fort Benning training mission, and to factor the Fort Benning training mission into RCW management. The kind of open forest preferred by the RCW is also conducive to military training. Fort Benning's size will make it possible to support military training and still have adequate forest to support a recovered RCW population. Potential conflicts arise when training restrictions are imposed and when military training standards require large open areas. The implementation of this ESMC will seek to minimize conflict by establishing UCs where RCW habitat is good and training may be incompatible with the RCW.

RCWs appear to be tolerant of noise and military activity, as evidenced by the numerous active clusters adjacent to roads and ranges (see Delaney et al. 2011). The main concern is during the nesting season, when prolonged activity near a nest tree may cause the adults to abandon the nest. Artificial cavities can be installed to create a UC where there is little evidence of training activity. These sites can support RCWs, even if they are only a few hundred meters from a frequently used tank trail or range. UCs are invisible to training. They are not marked with the standard white bands and signs. They are not subject to training restrictions. Habitat management will be the same for all clusters. However, if it is necessary to convert forestland to non-forest use in order to support training mission requirements (e.g., new drop zones, firing ranges, maneuver areas, etc.), habitat for any unprotected cluster may be reduced or eliminated.

In such cases, the USFWS will be notified, and if necessary, efforts will be made to provision suitable adjacent habitat with artificial cavities to minimize any impact on the RCW group(s) in question. If the action reduces the installation's RCW carrying capacity, the ESMC will be modified during the next annual review to reflect the reduction.

4-12 Environmental Awareness Training

Fort Benning faces the challenge of simultaneously implementing endangered species management actions and fulfilling its military training and other land-use missions. If Installation personnel make good decisions about land use, both efforts can be successful. While thousands of Soldiers train at Fort Benning every year, most of them have no say in what they do or where they train. Therefore, with limited time and resources, Fort Benning directs its Environmental Awareness (EA) Training to individuals that make land-use decisions. These fall into three general categories, military unit leaders, military training instructors, and civilians (both government employees and contractors).

Persuading busy people to schedule time for EA Training is challenging. Fort Benning has a Policy Memorandum defining the responsibility of various organizations to support EA Training. Whenever possible, EA has been added to existing training events. This eliminates the need to schedule a separate class, and also provides a 'captive' audience.

Typically, the EMD Instructor goes to the training event in person to deliver the EA information. This face-to-face presence has been valuable in several ways. First, it enables the training message to be adjusted quickly as conditions change, and it allows opportunity for questions to be answered immediately. Additionally, the instructor meeting the students in person, will also obtain valuable feedback from the training audience.

EA Training related to endangered species can logically be combined with other EA topics, such as the protection of archaeological sites, soil erosion prevention, and the proper response to hazardous material spills. While these topics may be only tangentially related to the endangered species management work, presenting a holistic environmental message helps overcome the resistance that some personnel have to endangered species issues. The object is to change attitudes as well as to disseminate information.

Many military unit leaders can be trained when they arrive at Fort Benning in introductory classes such as the Commander/First Sergeant Orientation and the Cadre Training Course. Since Army Regulation 200-1 requires units to appoint Environmental Officers, Fort Benning offers separate monthly half-day environmental classes for Senior Environmental Officers (representatives of large organizations such as Brigades, Regiments, Battalions, Squadrons, Garrison Directorates or large contractor shops) and Environmental Officers (representatives of Companies, Troops, or similarly-sized organizations).

TRADOC Regulation 350-70 requires Army instructors to provide an Environmental Consideration statement as part of each lesson's introduction. A one-hour introduction to EA issues is presented to the instructor training classes provided (currently the Army Basic Instructor Course).

Civilian land-use at Fort Benning changes over time. Construction projects in recent years brought many contractor personnel to the Installation; most of them new to Fort Benning. Additional EA Training was established for this new audience, and over 300 people have been trained in twenty-five different sessions.

EA Training to all audiences emphasizes the importance of an environmental review and documentation on a Record of Environmental Consideration (REC) or Fort Benning 144-R for each specific land-use activity. Designed to comply with the requirements of the NEPA, RECs at Fort Benning have been adapted to provide a communication channel between the land user and the Environmental Management Division. The importance of the RECs cannot be overstated; any Fort Benning land-use activity conducted in compliance with the REC issued for that activity has very little chance to adversely affect endangered species management efforts in that location.

A decade of experience providing EA training at Fort Benning has demonstrated several things. First, military personnel turn over fairly quickly, so if a program can be kept in place for two or three years it will become part of the organization's 'culture.' Second, while it has not been possible to mandate or require EA training for all personnel, offering this as a service to the Installation's organizations can reach a surprising number of people (roughly 3500 people per year). Third, while trust within the Installation is built by being reliable, over time the EA Training Program must adjust to changing circumstances and meet new threats to endangered species and their habitat. And finally, the most persuasive argument with a military audience is that EA will help them accomplish their mission.

5.0 SURVEYS, INSPECTIONS, MONITORING AND BIOLOGICAL ASSESSMENTS

Effectiveness of the implementation of this ESMC will be monitored and future management plans will be adapted as necessary, based on the results of the monitoring program. Fort Benning will consult with USFWS for all proposed actions (construction or other significant land disturbing activity) that may affect RCWs (or other Federally listed species) and that are beyond the scope of this ESMC. Surveys for all species potentially affected will be conducted as necessary to support consultation. When conducting monitoring activities, efforts will be made to minimize disturbance of the species being monitored.

Prior to any timber harvest or other significant land disturbing activity, personnel trained and experienced in RCW survey techniques will conduct a 100% survey of the affected area and the area within a 1/2 mile radius of the project area.

Foraging habitat analyses (FHAs) will be conducted for projects that remove foraging habitat from active RCW clusters and will be evaluated IAW the standards determined in the Recovery Plan. An ARCGIS software extension (MATRIX) will be used to calculate all FHAs for these analyses.

Every cluster will be inspected annually. Inspections will be conducted in March - April. Data recorded will include, but are not limited to: hardwood midstory density, condition of cavity trees and cavities, activity status of each cavity, presence/absence of PBGs, description of any damage from training activity (tree damage, digging, CS or smoke canisters, etc.), fire, wind, erosion or kudzu problems, insect or disease problems, general stand management recommendations, and the location and status of any newly discovered cavity trees. Recommendations for remedial measures will be included whenever necessary. All recruitment clusters will also be inspected in the fall (September - October)

A 100 percent survey for new RCW clusters will be conducted every 10 years in all suitable stands. Ten percent will be surveyed on an annual basis so that all habitat will be surveyed every 10 years. These surveys will be conducted by persons knowledgeable of RCW habitat and will follow the survey techniques outlined in the Recovery Plan. New trees that are found will be marked and cluster boundaries adjusted in accordance with Section 4-8a, except for those trees found in UCs.

Status of midstory on Fort Benning is captured via 10 year forest inventory and yearly cluster evaluations. Given this level of habitat evaluation and that the Installation is on a three year burn rotation, Fort Benning proposes that additional 5 year midstory surveys are not necessary. Fort Benning began population monitoring in 1994. A total of 34 randomly selected active clusters were monitored through the 1996 nesting season. Fort Benning increased this sample to 64 to comply with the 1996 Army Guidelines and continued to monitor these clusters through the 2013 breeding season. Fort Benning will continue to monitor a 25% sample, stratified by protected and unprotected clusters and excluding clusters active for fewer than 3 years as required in the 2007 RCW Guidelines. Additionally, all clusters that have incidental take or are required to be monitored by other BOs will continue to be monitored. This brings the total number of RCW clusters being monitored to 260, or 68% of all clusters. Fort Benning will also continue to determine breeding status of all non-banding clusters depending on availability of resources for continued support of existing.

During the nesting season, all active clusters will be visited every 7-10 days to check for nesting activity. Suspected nest trees will be climbed or inspected with a remote video camera to

confirm presence of an RCW nest. All nests will be monitored to determine success (defined by at least 1 nestling fledged from the nest). Each group will be monitored to determine number of adults, number of eggs, number and sex of fledglings, number of nests (i.e., re-nesting attempts), and number of breeding groups (i.e., budding into 2 clusters). Fledglings will be counted as soon as possible after the projected fledging date. Birds from a 25% sample of active clusters will be banded. This sample set was randomly selected and will be maintained for monitoring purposes. As the Fort Benning population increases, clusters will be added to maintain at least a 25% sample of active clusters. The clusters to be added will be randomly chosen from all active clusters. All adults and nestlings will be banded with 3 color bands on one leg and one color band and an USGS aluminum numbered band on the opposite leg. Attachment B12.3 identifies which clusters are currently included in the sample.

In addition to clusters in the sample set, all recruitment clusters that become active will be monitored for productivity (number of fledglings) for 5 years after they activate. All nestlings and adults in these clusters will be banded. Thereafter, they will be integrated into the normal monitoring program by including them in the pool of clusters from which new sample clusters are randomly selected as the population grows.

Active clusters that do not nest by the end of May will be visited late in the nesting season (June-July) to determine if a PBG is present. Adults may be captured and banded if necessary to make this determination.

Survey and monitoring results for all clusters will be recorded and retained permanently, allowing for trend analysis. Map location data will be entered into the Installation GIS. Tabular data for trend analysis will be maintained in a database by CB biologists.

Monitoring results will be reviewed and analyzed annually. An annual report will be provided to the USFWS. If an annual analysis shows a population decrease of 5% or more, the Installation Commander will notify the USFWS and IMCOM and reinitiate consultation with the USFWS within 30 days. The Installation will conduct a review of available data in an attempt to determine the cause of the decline within 90 days. The Installation, in consultation with the USFWS, will then develop and implement a plan to prevent further declines. The remedial plan will require approval by the Installation Commander, and will not include the imposition of training restrictions on UCs unless expressly approved by the Installation Commander and IMCOM.

Fort Benning will enter into informal consultation with USFWS in accordance with Section 7 of the ESA to resolve potential problems and address issues as necessary. These may include but not limited to tree removal, range or building construction, or other actions that may impact RCW habitat but are deemed "not likely to adversely affect" and formal consultation is not required.

6.0 INCIDENTAL TAKE

Section 9 of the ESA and associated Federal regulations prohibit the take of endangered and threatened species without special exemption. Incidental take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the ESA as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of ESA section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered to be a prohibited taking under the ESA, provided that such taking is in compliance with the terms and conditions of the incidental take statement that is issued.

The measures described in the incidental take statements that have been issued to Fort Benning are non-discretionary, and must be undertaken by the Installation so that they become binding conditions of any grant or permit issued to Fort Benning, as appropriate for the exemption in section 7(o)(2) to apply. Fort Benning has a continuing duty to regulate the activities covered by the incidental take statement. If Fort Benning (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permits or grant documents, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Fort Benning must report the progress of the action and its impact on the species to the USFWS as specified in the incidental take statement. [50 CFR §402.14(1) (3)]

In the event of an unauthorized incidental take, USFWS and IMCOM will be notified immediately. Any suspected incidental take that was not previously authorized or other ESA violation will be reported IAW the requirements of AR 200-1.

6-1 Summary of Current Status Incidental Take Statements Issued to Fort Benning

A20 & K15 Impact Areas - the USFWS authorized 41 incidental takes with approval of the ESMP (USFWS 2002); no (0) takes have occurred. This total included 29 clusters that were known to exist at the time and an additional 12 unknown groups that were estimated to exist in both A20 and K15 Impact Areas. Incidental take would be due to the explosive munitions fired into these impact areas or wildfires caused by munitions. The USFWS rescinded incidental take

for all clusters in the A20 impact area that would be counted towards the Installation's recovery goal in their JBO for MCoE actions (USFWS 2009).

Supplemental Recruitment Clusters - 15 incidental takes were authorized in the 2002 ESMP; no (0) takes have occurred. Authorizations were issued for establishment of 15 SRCs that the USFWS felt could be incidentally taken as a result of military training at Fort Benning. All 15 SRCs are active; 14 are PBGs and 1 is a single bird group.

Cavity Trees - 5 incidental takes were authorized of active cavity trees per year; takes could be trees destroyed or injured as a result of military training and training related wildfires. Over the past 5 years, 18 active trees have died due to wildfires – all trees survived the actual wildfire event but later were found dead; at least 6 of these trees were also found to have an Ips beetle (*Ips sp.)* infestation so the wildfire may not have actually killed the tree but may have left it more vulnerable to beetle attacks. The USFWS has since rescinded incidental take coverage for "random cavity trees" that were lost due to wildfire because they felt it was most appropriate to treat wildfire as accidents and address any impacts via emergency consultations (USFWS 2009).

Capture and Banding RCWs - 1 incidental take of an RCW per year authorized as per the Federal banding permit. During the last 5 years 2 incidental takes occurred from monitoring activities under the Federal banding permit; 1 nestling in 2009 and 1 nestling 2012.

DMPRC - 8 anticipated incidental takes authorized (7 authorized in the original document and 1 added that was inactive at the time of writing the BA but subsequently became active); 1 take has occurred. Habitat was removed from cluster D14-04 during the DMPRC construction phase. Cluster D14-04 went inactive and was subsequently removed from management due to being inactive for 5 consecutive years.

BRAC/Transformation - 8 anticipated incidental takes authorized; 2 takes have occurred. The cavity trees for clusters O09-04 and O09-05 were located within the footprint of 2 proposed ranges and were physically removed once the ranges were constructed. The resident RCWs were translocated prior to range construction as a nondiscretionary minimization measure in the BO (USFWS 2007).

MCoE - 81 anticipated incidental takes authorized; 1 take has occurred (Note - one cluster that received an incidental take was subsequently determined to be a captured cluster and was never documented as having 2 nests so clusters were combined [J01-01 and J01-03 now called J02-A]). Two (2) other incidental takes that may potentially occur are SHC-02 (now called SHC-A) which has been inactive for 3 years (incidental take authorized due to neighborhood analysis) and U04-01 (now SHC-B) which has also been inactive for 3 years (incidental take authorized due to habitat loss). Although it is possible that these 2 clusters could be reactivated before the 5 year

life span of the BO, they are currently considered inactive and may be deleted if they remain inactive for 5 consecutive years.

Supplemental MCoE – 2 anticipated incidental takes authorized; 0 takes have occurred.

Malone Range Complex - 1 anticipated incidental take authorized; 0 takes have occurred.

6-2 Incidental Take of RCWs for Natural Expansion into Habitat Located Within HMU-1 (Impact Areas and Other Areas Subjected to Range SDZs)

6-2.1 Background

Fort Benning's RCW population has been steadily increasing as documented by the systematic population sampling and monitoring that began in 1996. Overall, the population has increased 134% from 1996 to 2013. More specifically, the population increase in HMU-1 has been approximately 14%. The actual increase is hard to determine because intensive monitoring of the A20 clusters only began in 2010. Much of the currently suitable, contiguous habitat is now occupied by RCWs; the average foraging partition size for the 357 active clusters on the Installation is 149.45 acres. Although recruitment/natural expansion opportunities still exist with some suitable and potentially suitable habitat unoccupied, the ability to sustain continued population growth at historical rates through artificial expansion via recruitment clusters is limited over the short term. The primary challenge is balancing RCW population growth and recovery with forest restoration activities in a manner that is sustainable through the long term, while simultaneously fulfilling the Army's training requirements.

This is especially true considering the fact that whenever a new cluster is placed onto the landscape, RCW Matrix calculations require every adjacent foraging partition within 0.5 miles to be proportionally reduced in size and "reallocated" in order to accommodate the new territory into the neighborhood. Minor adjustments to the new cluster center location can be the difference on whether or not the new recruitment cluster will meet Recovery Plan (USFWS 2003) minimum foraging standards. It can also be the difference on whether or not some or all adjacent RCW clusters stay within or fall below minimum foraging standards after their foraging habitat is reallocated. When the status of a cluster's allocated forage is determined to be deficient, the net effect can often trigger a costly regulatory process that impacts, delays, or even stops ongoing approved actions to include military training and forest restoration activities. The irony of the situation is that increasing the population density of RCW groups biologically speaking is a sign of a stable, healthy population. However the regulatory challenges that are created from increased densities of RCWs from a management perspective may discourage or prevent various restoration efforts, while simultaneously impairing training or construction activities. This is mainly attributed to the fact that RCW Matrix calculations do not accurately

represent actual observed home ranges of individual and neighboring RCWs on Fort Benning (Fort Benning unpublished data).

In recent years Fort Benning has documented increases in the numbers of new clusters being formed through natural budding and pioneering as RCWs take advantage of remaining suitable habitat. It is these unplanned recruitment clusters that can create the greatest management and regulatory challenges since RCWs often ignore their 'assigned' partition boundaries, forage allocations, guidelines, or consider RCW Matrix calculations when establishing new territories. When RCWs form new clusters through natural budding or pioneering into habitat that does not meet Recovery Plan foraging habitat guidelines (recovery or managed stability standards), again, a domino effect of perceived foraging deficit issues can be created to some or all existing adjacent groups that trigger a costly regulatory process that impacts, delays, or even stops ongoing approved actions to include military training and forest restoration activities. The problem is complicated even further when these new clusters and or a portion of their foraging habitat are established downrange of live-fire military ranges.

RCW groups located downrange that may be within ordnance impact areas on military installations have been well documented. Nesting and foraging habitat situated downrange of active live-fire military ranges, often times represent some of the best available and desired future conditions for foraging habitat on DoD Installations due to the restrictive access and frequent fires from munitions. In many instances, these restricted areas that were subject to frequent fires ignited from the live-fire military training, often represented the last foothold of small populations on the brink of extirpation (Marston et. al. 2003). However since these areas are located on the periphery of active range fans, they are also subjected to infrequent, indirect ammunition strikes primarily as a result of ricochets. Arguably, there are few trees within these downrange areas that are not considered "metal contaminated". Fort Benning has periodically monitored and mitigated anticipated affects for many of these downrange areas at varying degrees of intensity for nearly 2 decades.

Since 1997, RCWs have successfully pioneered (N=26) and budded (N=16) in various locations throughout the installation (not including A20); 24 of the 42 pioneered or budded clusters have occurred within HMU-1. Given the current and increasing RCW population density, these new "natural" territories typically create logistical and regulatory challenges when habitat is assigned to new clusters in the form of RCW Matrix allocations. These challenges include, but are not limited to:

(1) Deficient foraging habitat allocation to the new group (by Recovery Plan (USFWS 2003) definitions);
(2) Reduction of foraging partition size and associated habitat allocation for adjacent clusters to a deficient status;
(3) Short-term impacts to habitat management and forest restoration activities;

(4) Short-term impacts to artificial recruitment site establishment;
(5) Diversion of increasingly limited resources towards unanticipated mitigation and monitoring requirements that have not been programmed into the budget;

- As previously referenced, the Installation recently prepared a BA and received a BO for impacts from downrange RCW clusters analyzed in the Malone Complex from small arms munitions fire, is currently working on 2 BAs (Dixie Road Ranges and Oscar Range Complex) of potential impacts to downrange RCWs and their habitat from munitions originating from various live-fire ranges, in addition to implementing 2 monitoring plans that deal primarily with long-term effects that may be anticipated.

(6) Short- and long-term impacts to military training activities. Impacts can be short-term in the sense that activities can be (and have been) stopped, delayed, modified, and or monitored until resolution of the issue via consultation (informal or formal) with the USFWS has been completed;

- The 1994 JBO first identified impacts from munitions to downrange RCW habitat and required the construction of berms on many of the ranges on the installation to minimize damage to clusters and habitat.
- Long-term impacts have even included range closure which was the case for the Army's Platoon Live Fire Exercise training at Griswold Range in 2009. This range had been in operations for well over 15 years before finally being forced to close due to a nearby RCW group pioneering new cavities in close proximity to the targets.

The most serious impacts to military training from new RCW group formation on Fort Benning have been associated with groups that either budded or pioneered within the range fans of live-fire ranges. By virtue of their location in or near extremely hazardous areas, they are always at some level of risk to being subjected to varying degrees of munitions impacts, either directly or indirectly from live-fire military training. The extreme outer limit of this low risk area is defined as the safety buffer of the SDZ and also represents the boundary to which all access to the training compartment(s) is restricted. SDZs usually have a ricochet zone inside the safety zone, and then the impact area lies in the interior of the SDZ. Fort Benning also often conducts modeling or analysis to indicate the zone that is typically devoid of trees situated immediately downrange of the range targets that receives direct, repeated and sustained impacts from live-fired munitions referred to as the beaten zone. Between the edge of the beaten zone and the boundary of the SDZ is the area where the risk of effects ot RCWs from range usage causes challenges (USFWS 2013). This zone receives impacts from munitions that are not direct, repeated, or sustained and are more likely attributable to ricochets or human error. Although detectable upon close inspection of individual trees, the level of impact from munitions within a given stand generally do not show signs of excessive tree mortality that would suggest a problem, at least for the short-term. Many of these ranges have been operational for decades and

yet downrange RCW PBG density has continued to increase over that same time period in all of these areas; overall RCW reproductive success is comparable to those groups outside of HMU-1; and visual comparison of historical vs. current aerial photography suggests that the overall total amount of forested area within these limited access areas appears to actually have increased since it became a military live-fire range.

When RCWs establish territories downrange, their cavity trees and foraging habitat can be exposed to bullet strikes from any number of weapon systems and types of munitions, primarily 5.56 mm, 7.62 mm, 9 mm, .50 cal., 25 mm, 40 mm, and 120 mm. Impacts from munitions (or the components/shrapnel originating from the round) to downrange trees can either by direct (human error shooting over a target or from ricochets) or indirect (trees damaged by munitions are thought to be more susceptible to wildfire or disease and insect attack). The probability of subsequent loss of nesting and foraging habitat depends on cluster location, munitions type, and amount of range use.
Although the USFWS and Fort Benning have attempted to resolve these downrange impact area/RCW issues when they occur, resolution takes a long time (particularly if formal consultation is required), mitigating impacts can be cost prohibitive (e.g., berm construction), and both agencies are operating reactively versus proactively. Fort Benning requires a long-term solution to these ongoing challenges that better meets the needs of both the resource management program and, more importantly, Army training requirements.

6.2-2 Proposal

Based on the natural expansion of RCWs in downrange habitat it is apparent that RCWs find such habitat suitable, at least in the short-term. The longest known, (i.e. documented by a Fort Benning biologist as a "new cluster") naturally formed cluster situated downrange was found in 1997. Although downrange habitat is being occupied naturally by RCWs, Fort Benning does not plan to facilitate downrange expansion occupancy, using artificial recruitment cluster installation, until most (or all) other suitable habitat is occupied.

Fort Benning believes the solution lies in pre-approved incidental take, authorized via this ESMC, specifically focused on RCWs that now, or will in the future, naturally expand the population through budding or pioneering in suitable (or even unsuitable) habitat downrange of training ranges or within designated impact areas.

Currently, there are 30,084 acres of habitat included in HMU-1 of which 2,650 acres are future habitat. The 30,084 acres represents 43% of the total manageable acres for the RCW. With the exclusion of the K15 dudded impact area, HMU-1 includes all the land that could be affected by SDZs collectively; SDZs and their related access restrictions are active only when the range is in use. Fort Benning estimates that the future carrying capacity of these downrange habitat acres to be 201 RCW clusters (at 150 acres/cluster). In 2013, there were 184 active clusters in SDZs

(Figure 3). No artificial recruitment clusters are planned for HMU-1 until a long-term solution to this issue is found. However, as noted above, in the past 17 years 24 new RCW clusters have been established in HMU-1 via budding or pioneering. Additionally over that same time period, Fort Benning biologists have never documented or suspected an active, monitored cluster within HMU-1 as going inactive as a result of habitat loss or harassment attributed to munitions fire. Although incidental take of M06-G was requested by the Army and authorized by USFWS, this approach was a precautionary measure in the event of a worst case scenario (USFWS 2013). Although this cluster still receives varying degrees of bullet strikes, the general appearance of the cluster in terms of pine health and BA is unchanged. Since 2009, M06-G has successfully fledged 6 young. Based on the current total number of active clusters within HMU-1 (184) and the projected potential for approximately 201 total clusters, there is habitat to support an additional 17 groups of RCWs in this HMU (at 150 acres/cluster).

When a new cluster is discovered within HMU-1, the Installation proposes to incorporate that cluster into its regular demographic monitoring schedule and count this new cluster towards its population recovery goal. If at some point in time it is discovered that a portion of its habitat is found to be receiving impacts from munitions, Fort Benning biologists will evaluate the extent of the anticipated impact in coordination with the USFWS. If the newly budded or pioneered cluster is deemed to be subjected to a higher degree of risk of incidental take as a result of significant projectile damage to foraging or nesting habitat, Fort Benning will notify the USFWS. Fort Benning, in coordination with the USFWS, will evaluate the extent of the impact if possible and make a determination on whether or not the observed impacts from munitions could reasonably be expected to rise to the level of harm and harass and would likely adversely affect the cluster. If the determination is that there is no immediate threat to the cluster, the cluster will be included into regular RCW demographic and habitat monitoring and would therefore be counted toward the Installation's recovery goal. Conversely, if the USFWS and Fort Benning can reasonably conclude that the short-term viability of the cluster as threatened by significant damage to the trees, incidental take would immediately be requested via informal consultation. Significant damage is defined as a direct strike to the bole of the tree from a large caliber round or repeated, or sustained direct fire from small caliber munitions. Examples would include: severing of the tree, shearing off all or most of the canopy, or any wound that would compromise the structural integrity of the tree that would make it susceptible to toppling. Other considerations on evaluating significant damage would be the overall extent of the affected area and the overall pine BA reduction following the Fort Benning Revised SMS (section 4-2.2.3).

Pre-approved incidental take would therefore be available to provide immediate protection to existing authorized military training when RCWs bud or pioneer new clusters that are determined to be in harm's way.

6-3 Summary of Proposed Incidental Take Authorizations for Fort Benning

1. The prior ESMP authorized 4 incidental takes in the K15 dudded impact area. Although no take is anticipated, the Installation requests incidental take coverage for 4 RCW groups that are known to exist within the K15 impact area that were identified from 2009 aerial surveys, as well as for any unknown or future clusters that could form through natural expansion in K15. These groups are located within areas that DPTMS and EOD personnel currently and historically have identified as having the potential to contain types and quantities of Unexploded Ordnance (UXO) that are deemed too hazardous for personnel to access from the ground. No monitoring or management for RCWs will take place in the K15 impact area as it is off limits to all personnel. Therefore, no clusters within this compartment will be counted towards fulfillment of the Installation's recovery goals.

2. The prior ESMP authorized 41 incidental takes in the A20 dudded impact area. Although no take is anticipated, the Installation requests incidental take coverage for 8 RCW groups within the A20 impact area (A20-02, A20-36, A20-47, A20-58, A20-59, A20-65, A20-67, and A20-68). These groups are located within areas that Fort Benning has identified as having the potential to contain a type of UXO that is deemed too hazardous for personnel to access from the ground. No monitoring or management of RCWs will take place in areas that have been designated as off limits to all personnel until the presence or absence of this UXO type can be confirmed. Therefore, no clusters with cavity trees within these areas that are declared off limits will be counted towards fulfillment of the Installation's recovery goals. If any of these clusters are deemed safe for personnel to access from the ground in the future, the Installation will notify the USFWS and re-instate that group into the pool of monitored RCW clusters as described in the A20 RCW Monitoring Plan (Appendix 8).

3. The Installation requests incidental take coverage for up to 5 active RCW cavity trees and three RCWs per year over the 5-year life of this RCW ESMC, resulting from prescribed fire management activities, training related wildfires or wildfires that are allowed to burn. The incidental take coverage would include both direct and indirect effects of the fires, including the removal of habitat.

Individual RCWs, nests containing eggs and/or nestlings, cavity trees, and foraging habitat can be injured or destroyed as the result of prescribed burning. Measures taken to prevent damage or destruction to RCWs and/or cavity trees include raking or burning around cavity trees and the use of water and fire retardant materials. Foraging habitat is protected during prescribed burns by preparing and implementing a burn plan. The burn plan describes parameters such as weather and fuel conditions and equipment and personnel required to accomplish prescribed burn objectives while not adversely affecting RCW habitat. Even with these precautions, local weather changes, higher than estimated fuel loads, and other unforeseen factors may cause escaped prescribed burns or out of prescription burns. Measures will be taken to extinguish

prescribed burns that are out of prescription. Fire plows will be used in clusters only during emergency situations.

The presence of UXO prevents the use of reasonable and prudent fire protection measures such as raking or burning around cavity trees. Fire plows and other standard fire suppression activities cannot be performed within designated impact areas due to UXO hazards. Wildfires can only be controlled at the perimeter of existing roads or from backfiring off existing trails. Therefore, incidental take may occur as a result of wildfire. This take may be in the form of harass, harm, wound or kill, loss of nest, active cavity, or adult. Any active cavity deemed unusable by a wildlife biologist or any cavity tree that dies will be reported to the USFWS and replaced with an artificial cavity within 24-72 hours of discovery, depending upon the number of suitable cavities that remain in the cluster compared to the number of birds comprising the group. A minimum of 4 suitable cavities will be maintained.

4. Although no takes are anticipated, the Installation requests incidental take coverage for up to 3 RCW clusters through the 5-year life of this RCW ESMC that may bud or pioneer new territories into habitat situated downrange of live-fire areas within HMU-1 where incidental take has the potential to occur. When a new cluster is discovered within HMU-1, the Installation will incorporate that cluster into its regular demographic monitoring schedule of its RCW population and count this new cluster towards its population recovery goal. If it is discovered that a portion of its habitat is found to be receiving impacts from munitions, Fort Benning biologists will evaluate the extent of the anticipated impact in coordination with the USFWS. Fort Benning would abide by the 2007 Army Guidelines; where there is significant risk of projectile damage to foraging or nesting habitat, measures to minimize the impacts to RCWs will be considered. These minimization measures may include range layout modification/shielding where practical and economically feasible to protect HMUs from projectile damage. Fort Benning will also consider other protective measure including reorienting the direction of weapons fire, shifting target arrays, establishing "no firing areas" around RCW clusters or HMUs, revising maneuver lanes, construction berms, etc. Monitoring of the affectiveness of these minimization measures will be conducted over a reasonable period of time to evaluate their effectiveness. If the newly budded or pioneered cluster is deemed to be at risk of rising to the level of incidental take as a result of significant projectile damage to foraging or nesting habitat as previously described above, the Installation will informally consult with the USFWS, request use of one of its authorized incidental takes, and subsequently no longer count the cluster towards its population recovery goal. Any habitat that cannot be protected from significant damage from munitions would be removed from the Installations total baseline habitat.

5. Although no takes are anticipated, the Installation requests continued incidental take coverage for the 15 RCW groups that are currently designated SRCs and which will be

converted to UCs. Fort Benning also requests that these groups continue to count towards its population recovery goal as allowed by the 2007 RCW Guidelines.

6. Capture and Banding RCWs – Fort Benning will continue to abide by the incidental take statement that is issued by the USFWS for the required Federal banding permit for all demographic monitoring and translocation activities for RCWs on the Installation. This permit is renewed every 3 years or as necessary due to personnel changes.

7. Fort Benning will continue to abide by the terms and conditions of all previously issued incidental takes authorized in previous BOs described above as well as continuation of all required RCW monitoring for the population.

6-4 Proposed Process to Review and Reanalyze Incidental Takes Authorized in Previous BOs

Fort Benning currently has 96 RCW clusters covered under incidental take statements (excluding SRCs). With the exception of SRCs, groups that are anticipated to be taken as a result of the assessed impact(s), are no longer considered to play a role in recovery and are not counted towards the Installation's recovery goal. However biologically speaking, most of Fort Benning's taken clusters still exist on the landscape, defend territories, nest, successfully fledge young, and are believed to be a functional component of the Fort Benning RCW population. The Installation continues to intensively manage and monitor all taken groups that can be safely accessed by natural resources personnel. Preliminary analyses of the demographic monitoring data and RCW Foraging Matrix calculations from these taken clusters suggests that a number of anticipated impacts to many of these groups either have not occurred or were overestimated. Fort Benning intends to re-evaluate training related takes to determine if that take status can be removed and the clusters can be counted toward recovery. Fort Benning will consult with USFWS for any changes in cluster take status.

7.0 TIME, COSTS, AND PERSONNEL

The time frame for implementation of this ESMC is 5 years, even though most activities needed to reach RCW recovery extend beyond this period. Projected funding for the CB/RCW Section is about $800,000 annually for salaries and about $1,000,000 for projects. These funds are obtained via annual Garrison Environmental Requirements Build requests to IMCOM. Individual projects are listed in Table 6.1 of the INRMP for 2014-2018. Table 2 identifies the personnel required to operate only the RCW Management Section. Activities of the Land Management Branch (LMB) such as forestry, prescribed burning, and GIS operations that support RCW management are under separate funding. Any significant reductions to the LMB would require adjustments to RCW management funding and staffing in order to continue

implementing this ESMC. The funding listed here and in the INRMP is for planning purposes and based upon historical knowledge; however, this funding should not be interpreted to commit Fort Benning to any action in violation of the Antideficiency Act, and all management activities are subject to the availability of funds.

Table 2. Conservation Branch/RCW Section Staff

Position Title	Required Staffing	Current Staffing	
		DA	Contract
Conservation Branch Chief	1	1	
Lead Wildlife Biologist	1	1	
Wildlife Biologist	3	2	
Wildlife Technician	11	7	1

8.0 COORDINATION AND CONSULTATION

Fort Benning will enter into formal consultation with the USFWS regarding this ESMC to incorporate the 2007 RCW Guidelines and existing BOs issued in 2002, 2004, 2007, 2009, 2010, and 2012.

9.0 GLOSSARY

Augmentation - Relocation of a RCW, normally a juvenile female, from one active cluster to another active cluster.

Basal Area - The cross-sectional area (square feet) of trees/acre measured at approximately 4.5 feet from the ground.

Buffer Zone - The zone extending outward 200 feet from the outermost cavity trees in a cluster.

Cavity - an excavation made in a tree, or artificially created, for roosting or nesting by RCWs.

Cavity restrictor - a metal plate that is placed around an RCW cavity to prevent access by larger species. A restrictor also prevents a cavity from being enlarged, or if already enlarged, shrinks the cavity entrance diameter to a size that prevents access by larger competing species.

Cavity start - an incomplete cavity excavated by, or artificially created for, RCWs.

Cavity tree - A tree containing 1 or more active or inactive RCW cavities or cavity starts.

Cluster - The aggregate area-encompassing cavity trees occupied or formerly occupied by an RCW group plus a 200-foot buffer zone (formerly called "colony").

Group - A social unit of at least 1 RCW that inhabits a cluster (formerly called a "clan"). A group may consist of a solitary territorial male, a mated pair, or a pair with helpers (offspring from previous years).

Habitat Management Unit (HMU) – A designated area managed for threatened and endangered species.

Impact areas - The land within the training complex used to contain fired, air-dropped, or launched ammunition or explosives and resulting fragments, debris, unexploded ordnance, and components from various weapons systems.

Population - A RCW population is the aggregate of groups that are close enough so that the dispersal of individuals maintains genetic diversity and all the groups are capable of genetic interchange. Population delineation should be made irrespective of land ownership.

Population goal - A desired RCW population size.

Potential breeding group – An adult female and adult male that occupy the same cluster, whether or not they are accompanied by a helper, attempt to nest, or successfully fledge young.

Recovery population – One of a set of populations designated necessary to the recovery of the species.

Recruitment – The addition of individuals into a breeding population through reproduction and/or immigration and attainment of a breeding position.

Recruitment cluster - A cluster of artificial cavities in suitable nesting habitat, located close to existing groups. On Fort Benning there are 2 types of recruitment clusters:

1. Protected Cluster - A recruitment cluster managed for the purpose of attracting an additional RCW group to help achieve the recovery goal; applicable training restrictions apply.
2. Unprotected Cluster - A recruitment cluster managed for the purpose of attracting an RCW group to help achieve the recovery goal; training restrictions do not apply.

Relict tree - A pine tree, usually more than 100 years old, having characteristics making it attractive to the RCW for cavity excavation.

Stand - An aggregation of trees occupying a specific area and sufficiently uniform in species composition, age, arrangement, and condition so as to be distinguishable from the forest on adjoining areas.

Translocation - The relocation of 1 or more RCWs from an active cluster to another active cluster or a recruitment cluster.

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ATTACHMENT 1
DEPARTMENT OF THE ARMY 2007 MANAGEMENT GUIDELINES FOR THE RED-COCKADED WOODPECKER ON ARMY INSTALLATIONS

productivity due to lack of breeder experience in their first 2 years of occupancy. Excluding recently activated clusters from the sample will help make comparisons between protected and unprotected clusters more meaningful.

b. To compare recruitment rates and demographic stability between protected clusters and unprotected clusters, installations will use monitoring data collected in accordance with paragraph V.E.1.

5. The monitoring standards established in the preceding paragraphs are the minimum requirement. Any time RCWs are banded, the RCW Recovery Plan sets the minimum data collection standards. Installations may implement additional monitoring activities or programs in support of other management and research objectives as necessary, e.g. translocations.

F. *Habitat Management*

1. Installation RCW ESMCs will identify nesting and foraging areas sufficient to attain and sustain installation RCW population goals. These areas will be designated RCW HMUs. HMU delineation is an important step in the planning process because it defines the future geographic configuration of the installation RCW population. Areas designated as HMUs for all active and recruitment clusters, regardless of training restriction status, must be managed according to these guidelines. HMUs should be large enough to enable the installation to meet or exceed its recovery goal as identified in the Recovery Plan.

2. Areas Included in HMUs

a. HMUs will encompass all clusters, areas designated for recruitment, and adequate foraging areas as specified in d., below.

b. Clusters that have been documented as continuously inactive for a period of five consecutive years or more may be deleted from RCW management requirements. Designated recruitment clusters that have not been occupied for a period of five consecutive years may also be deleted from HMUs. Once deletion of a cluster from management is approved by the USFWS, existing cavities may be covered to discourage reactivation.

c. In designating HMUs, fragmentation of nesting habitat will be avoided. Installations will attempt to link HMUs with corridors, allowing for demographic interchange throughout the installation population.

d. Adequate foraging habitat in acres, quality, and location must be provided with HMUs. Installations will determine availability of and manage for foraging habitat in accordance with guidelines established in Chapter 8.I. of the RCW Recovery Plan, i.e., the recovery standard.

ATTACHMENT 2
FORT BENNING FY13 ACTIVE AND INACTIVE CLUSTERS

CLUSTER	STATUS	INACTIVE FOR LESS THAN 5 YEARS	INACTIVE FOR MORE THAN 5 YEARS	FUTURE MANAGEMENT STRATEGY	RECRUITMENT CLUSTER: NATURAL OR ARTIFICIAL	25% SAMPLE CLUSTER	CLUSTER TAKEN BY PROJECT
A02-A	ACTIVE			PC			
A03-A	ACTIVE			PC			
A03-C	ACTIVE			PC			
A06-A	ACTIVE			PC	ARTIFICIAL		
A08-A	ACTIVE			PC		X	
A09-A	ACTIVE			PC			
A09-B	ACTIVE			PC			
A09-C	ACTIVE			PC	NATURAL		
A10-A	ACTIVE			PC			Y
A10-B	ACTIVE			PC	NATURAL		
A10-C	ACTIVE			PC	NATURAL		
A10-D	ACTIVE			PC	NATURAL		
A11-A	ACTIVE			PC		X	
A11-B	ACTIVE			PC			
A11-C	ACTIVE			PC			
A13-A	ACTIVE			PC	ARTIFICIAL		
A13-B	ACTIVE			PC			
A14-A	ACTIVE			PC	NATURAL		
A14-B	ACTIVE			PC	NATURAL	X	Y
A19-A	ACTIVE			PC		X	
A20-04	ACTIVE			PC			
A20-05	ACTIVE			PC			
A20-06	ACTIVE			PC			
A20-07	ACTIVE			PC			
A20-08	ACTIVE			PC			
A20-09	ACTIVE			PC			
A20-10	ACTIVE			PC			

A20-12	ACTIVE			PC			
A20-13	ACTIVE			PC			
A20-14	ACTIVE			PC			
A20-16	ACTIVE			PC			
A20-17	ACTIVE			PC			
A20-19	ACTIVE			PC			
A20-20	ACTIVE			PC			
A20-21	ACTIVE			PC			
A20-23	ACTIVE			PC			
A20-24	ACTIVE			PC			
A20-25	ACTIVE			PC			
A20-26	ACTIVE			PC			
A20-27	ACTIVE			PC			
A20-29	ACTIVE			PC			
A20-30	ACTIVE			PC			
A20-32	ACTIVE			PC			
A20-33	ACTIVE			PC			
A20-34	ACTIVE			PC			
A20-35	ACTIVE			PC			
A20-37	ACTIVE			PC			
A20-38	ACTIVE			PC			
A20-39	ACTIVE			PC			
A20-40	ACTIVE			PC			
A20-41	ACTIVE			PC			
A20-42	ACTIVE			PC			
A20-43	ACTIVE			PC			
A20-44	ACTIVE			PC			
A20-45	ACTIVE			PC			
A20-46	ACTIVE			PC			
A20-48	ACTIVE			PC			
A20-49	ACTIVE			PC			
A20-50	ACTIVE			PC			
A20-51	ACTIVE			PC			
A20-52	INACTIVE	X		PC			
A20-53	ACTIVE			PC			
A20-54	ACTIVE			PC			
A20-55	ACTIVE			PC			

A20-57	ACTIVE			PC			
A20-60	ACTIVE			PC			
A20-61	ACTIVE			PC			
A20-62	ACTIVE			PC			
A20-64	ACTIVE			PC			
A20-66	ACTIVE			PC			
A20-70	ACTIVE			PC			
A20-71	ACTIVE			PC			
A20-72	ACTIVE			PC			
A20-73	ACTIVE			PC			
A20-74	ACTIVE			PC			
A20-75	ACTIVE			PC			
A20-76	ACTIVE			PC			
A20-79	ACTIVE			PC			
A20-80	ACTIVE			PC			
A20-81	ACTIVE			PC			
A20-82	ACTIVE			PC			
A21-A	ACTIVE			PC		X	
A21-B	ACTIVE			PC	NATURAL	X	
A21-C	ACTIVE			PC	NATURAL		
A21-D	ACTIVE			PC	NATURAL		
A22-A	ACTIVE			PC			
A22-B	ACTIVE			PC			
A22-C	ACTIVE			PC		X	
A22-D	ACTIVE			PC			
A22-E	ACTIVE			PC			
A22-F	ACTIVE			PC	NATURAL		
A23-A	ACTIVE			PC			
A23-B	ACTIVE			PC			
A23-C	ACTIVE			PC	NATURAL		
A23-D	ACTIVE			PC			
A24-A	ACTIVE			PC	NATURAL		
A24-B	ACTIVE			PC			
A24-C	ACTIVE			PC			
A24-D	ACTIVE			PC			
A25-A	ACTIVE			PC	NATURAL		
A25-B	ACTIVE			PC	NATURAL		

A25-C	ACTIVE			PC	NATURAL	X	
A26-A	ACTIVE			PC		X	
A26-B	ACTIVE			PC			
A26-C	ACTIVE			PC			
A26-D	ACTIVE			PC			
A26-E	ACTIVE			PC	NATURAL	X	
A26-F	ACTIVE			PC	NATURAL	X	
A26-G	ACTIVE			PC	NATURAL		
A27-A	ACTIVE			PC	ARTIFICIAL		
A28-A	ACTIVE			PC			
A28-B	ACTIVE			PC			
A29-A	ACTIVE			PC			
A30-A	ACTIVE			PC			
A30-B	ACTIVE			PC			
A30-C	ACTIVE			PC			
A30-D	ACTIVE			PC			
A30-E	ACTIVE			PC			
A30-F	ACTIVE			PC			
A30-G	ACTIVE			PC			
A30-H	ACTIVE			PC			
AA04-A	ACTIVE			PC	ARTIFICIAL		
AA04-B	ACTIVE			PC	NATURAL		
BB01-A	ACTIVE			PC	ARTIFICIAL		
BB01-B	ACTIVE			PC	NATURAL		
BB08-A	ACTIVE			PC	ARTIFICIAL		
BB10-A	ACTIVE			PC	ARTIFICIAL		Y
C01-A	ACTIVE			PC		X	
C01-B	ACTIVE			PC			
C01-C	ACTIVE			PC			Y
C02-A	ACTIVE			PC			
C02-B	ACTIVE			PC			
C03-A	ACTIVE			PC	NATURAL		
C04-A	ACTIVE			PC		X	
D03-A	ACTIVE			PC	ARTIFICIAL		
D04-A	ACTIVE			PC		X	Y
D04-B	ACTIVE			PC	ARTIFICIAL		
D04-C	ACTIVE			PC	ARTIFICIAL		Y

D06-A	ACTIVE			PC	ARTIFICIAL		
D06-B	INACTIVE	X		PC	ARTIFICIAL		
D07-A	ACTIVE			PC	ARTIFICIAL		
D07-B	ACTIVE			UC	ARTIFICIAL		Y
D09-A	ACTIVE			PC		X	
D09-B	ACTIVE			PC		X	
D09-C	INACTIVE	X		PC	NATURAL	X	
D11-A	ACTIVE			PC			Y
D11-B	ACTIVE			PC			Y
D11-C	ACTIVE			PC	ARTIFICIAL		Y
D11-D	ACTIVE			PC		X	
D12-A	ACTIVE			PC		X	
D13-A	ACTIVE			PC		X	Y
D14-A	ACTIVE			PC			Y
D14-B	ACTIVE			PC		X	
D15-A	ACTIVE			PC	ARTIFICIAL		Y
D19-A	ACTIVE			PC	NATURAL		Y
DRC-A	ACTIVE			PC			Y
DRC-B	ACTIVE			PC	ARTIFICIAL		Y
DRC-C	ACTIVE			PC		X	Y
DRC-D	INACTIVE	X		PC	NATURAL		Y
E01-A	ACTIVE			PC			
E01-B	ACTIVE			PC	NATURAL		
E01-C	ACTIVE			PC		X	
E01-D	ACTIVE			PC		X	
E01-E	ACTIVE			PC		X	
E01-F	ACTIVE			PC			
E01-G	ACTIVE			UC	NATURAL		
E01-H	ACTIVE			PC	NATURAL		
E02-A	ACTIVE			PC		X	
E03-A	ACTIVE			PC			Y
E04-A	ACTIVE			PC		X	
E05-A	ACTIVE			PC	NATURAL		
E05-B	ACTIVE			PC	ARTIFICIAL		
E06-A	ACTIVE			PC			
E07-A	ACTIVE			PC	NATURAL	X	Y
E07-B	ACTIVE			PC	NATURAL	X	

E08-A	ACTIVE			PC			
E08-B	ACTIVE			PC	ARTIFICIAL		
E08-C	ACTIVE			PC	ARTIFICIAL		
E09-A	ACTIVE			PC		X	
E09-B	ACTIVE			PC			
E10-A	INACTIVE	X		PC			
E11-A	ACTIVE			PC			
E11-B	ACTIVE			PC			
F02-A	INACTIVE		X	PC	ARTIFICIAL		
F05-A	ACTIVE			PC	ARTIFICIAL		
F06-A	ACTIVE			PC	NATURAL		Y
F07-A	ACTIVE			PC	NATURAL		
F07-B	ACTIVE			PC			
F07-C	ACTIVE			UC	ARTIFICIAL		
F09-A	ACTIVE			PC			
F09-B	ACTIVE			PC	NATURAL		
G02-A	ACTIVE			PC	ARTIFICIAL		
G06-A	ACTIVE			PC		X	
G06-B	ACTIVE			PC		X	
G06-C	ACTIVE			PC	NATURAL		
G06-D	ACTIVE			UC	ARTIFICIAL		
G07-A	ACTIVE			PC	ARTIFICIAL		
G08-A	ACTIVE			PC	ARTIFICIAL		
GRC-A	ACTIVE			PC		X	
GRC-B	ACTIVE			PC			
H04-A	ACTIVE			UC	NATURAL		
H05-A	ACTIVE			PC	ARTIFICIAL		
H05-B	ACTIVE			UC	NATURAL		
HCC-A	ACTIVE			UC	NATURAL		
HCC-B	ACTIVE			PC	NATURAL		
HCC-C	ACTIVE			PC	ARTIFICIAL		Y
HCC-D	ACTIVE			PC	ARTIFICIAL		Y
HRC-A	ACTIVE			PC			Y
J02-A	ACTIVE			PC			
J03-A	ACTIVE			PC	NATURAL		Y
J04-A	ACTIVE			PC			Y
J04-B	INACTIVE		X	PC	NATURAL		Y

J07-A	ACTIVE			PC		X	
J07-B	ACTIVE			PC		X	Y
J08-A	ACTIVE			PC			Y
J09-A	ACTIVE			PC		X	
K03-A	ACTIVE			PC	ARTIFICIAL		
K04-A	ACTIVE			PC			
K06-A	INACTIVE		X	PC	ARTIFICIAL		Y
K07-A	INACTIVE		X	PC	ARTIFICIAL		
K12-A	ACTIVE			PC			
K12-B	ACTIVE			PC	NATURAL	X	
K13-A	ACTIVE			PC		X	
K13-B	ACTIVE			PC			
K13-C	INACTIVE	X		PC	ARTIFICIAL		
K13-D	ACTIVE			PC	NATURAL		
K14-A	ACTIVE			PC			
K14-B	ACTIVE			PC		X	
K16-A	ACTIVE			PC			
K16-B	ACTIVE			PC			Y
K20-A	ACTIVE			PC			
K20-B	ACTIVE			PC	ARTIFICIAL		Y
K20-C	ACTIVE			PC	ARTIFICIAL		
K21-A	ACTIVE			UC	NATURAL	X	
K23-A	ACTIVE			PC	NATURAL		
K23-B	ACTIVE			PC			
K24-A	ACTIVE			PC		X	
K24-B	ACTIVE			PC	ARTIFICIAL		
K25-A	ACTIVE			PC	ARTIFICIAL		
K26-A	ACTIVE			PC		X	Y
K26-B	ACTIVE			PC	ARTIFICIAL		
K27-A	ACTIVE			PC			
K27-B	ACTIVE			PC			
K27-C	ACTIVE			PC			
K28-A	ACTIVE			PC			
K28-B	ACTIVE			PC	NATURAL		Y
K28-C	ACTIVE			PC	ARTIFICIAL		
K31-A	ACTIVE			UC	ARTIFICIAL		
K31-B	ACTIVE			PC	ARTIFICIAL		

K31-C	ACTIVE			PC	NATURAL		
K32-A	INACTIVE	X		PC	ARTIFICIAL		
K34-A	ACTIVE			PC	ARTIFICIAL		
K34-B	ACTIVE			PC	NATURAL		
K35-A	ACTIVE			UC	ARTIFICIAL		
K35-B	ACTIVE			PC	NATURAL		
K35-C	ACTIVE			PC	NATURAL		
K35-D	ACTIVE			UC	ARTIFICIAL		
K36-A	ACTIVE			PC		X	
K37-A	ACTIVE			PC	NATURAL	X	
K37-B	ACTIVE			PC	NATURAL		Y
L06-A	ACTIVE			UC	ARTIFICIAL		Y
L07-A	ACTIVE			PC			Y
M01-A	ACTIVE			PC			Y
M02-A	ACTIVE			PC		X	
M06-A	ACTIVE			PC			
M06-B	ACTIVE			PC			
M06-C	ACTIVE			PC			
M06-D	ACTIVE			PC			
M06-E	ACTIVE			PC			
M06-F	ACTIVE			PC			
M06-G	ACTIVE			PC	NATURAL		
M06-H	ACTIVE			PC			Y
M06-I	ACTIVE			PC			
M06-J	ACTIVE			PC	NATURAL		
M06-K	INACTIVE	X		PC	ARTIFICIAL		
M06-L	INACTIVE	X		PC	ARTIFICIAL		
M06-M	ACTIVE			PC			
M06-N	ACTIVE			PC	NATURAL		
N03-A	ACTIVE			PC	ARTIFICIAL		
N04-A	ACTIVE			PC			Y
N04-B	ACTIVE			PC			
N04-C	ACTIVE			UC	NATURAL		
N04-D	INACTIVE	X		PC	ARTIFICIAL		Y
N05-A	ACTIVE			PC	NATURAL		
N07-A	ACTIVE			PC			
N07-B	ACTIVE			PC		X	

O01-A	ACTIVE			PC	ARTIFICIAL		
O03-A	ACTIVE			PC		X	
O03-B	ACTIVE			PC	ARTIFICIAL		Y
O04-A	ACTIVE			PC		X	Y
O04-B	ACTIVE			PC	NATURAL		Y
O05-A	ACTIVE			PC		X	Y
O05-B	ACTIVE			PC			Y
O06-A	ACTIVE			PC	ARTIFICIAL		Y
O06-B	ACTIVE			PC			Y
O06-C	ACTIVE			PC		X	Y
O06-D	ACTIVE			PC			Y
O06-E	ACTIVE			PC			Y
O07-A	ACTIVE			PC			Y
O07-B	ACTIVE			PC			Y
O07-C	ACTIVE			PC	NATURAL		
O08-A	ACTIVE			PC	ARTIFICIAL		Y
O10-A	ACTIVE			PC		X	
O10-B	INACTIVE	X		PC			Y
O11-A	ACTIVE			PC			Y
O11-B	ACTIVE			PC			Y
O12-A	ACTIVE			PC			Y
O14-A	ACTIVE			PC		X	Y
O14-B	ACTIVE			PC	ARTIFICIAL		Y
O15-A	ACTIVE			PC			Y
O15-B	ACTIVE			PC		X	Y
O15-C	ACTIVE			PC			Y
O16-A	ACTIVE			PC	NATURAL		Y
O17-A	ACTIVE			PC		X	Y
O17-B	ACTIVE			PC			Y
O18-A	ACTIVE			PC		X	Y
O18-B	ACTIVE			PC	ARTIFICIAL		Y
O19-A	ACTIVE			PC			
O19-B	ACTIVE			PC	ARTIFICIAL		Y
O21-A	ACTIVE			PC	ARTIFICIAL		
O21-B	ACTIVE			PC	ARTIFICIAL		Y
O23-A	ACTIVE			PC	ARTIFICIAL		Y
O24-A	ACTIVE			PC			Y

O24-B	ACTIVE			PC			Y
O24-C	ACTIVE			PC			Y
O24-D	ACTIVE			PC	NATURAL		Y
O25-A	ACTIVE			PC			Y
O25-B	ACTIVE			PC	ARTIFICIAL		Y
O26-A	ACTIVE			PC		X	Y
O26-B	ACTIVE			UC	NATURAL		Y
O28-A	ACTIVE			PC			Y
O28-B	ACTIVE			PC		X	
O30-A	ACTIVE			PC	ARTIFICIAL		Y
O32-A	INACTIVE	X		PC	ARTIFICIAL		
O34-A	ACTIVE			PC	NATURAL		Y
Q03-A	ACTIVE			PC		X	Y
Q03-B	ACTIVE			PC			
Q03-C	ACTIVE			PC	ARTIFICIAL		
R01-A	ACTIVE			PC		X	
R01-B	ACTIVE			PC	ARTIFICIAL		Y
R03-A	ACTIVE			PC	ARTIFICIAL		Y
S02-A	ACTIVE			PC	NATURAL		Y
S02-B	ACTIVE			PC	ARTIFICIAL	X	Y
S04-A	ACTIVE			PC			
S04-B	ACTIVE			PC	ARTIFICIAL		Y
SHC-A	INACTIVE	X		PC		X	Y
SHC-B	INACTIVE	X		PC	NATURAL		Y
T03-A	ACTIVE			PC		X	Y
T03-B	ACTIVE			PC	NATURAL	X	
T04-A	ACTIVE			PC			
T05-A	ACTIVE			PC			
T05-B	ACTIVE			PC	ARTIFICIAL		
T06-A	ACTIVE			PC	ARTIFICIAL		Y
T06-B	ACTIVE			PC	NATURAL		Y
T07-A	ACTIVE			PC			Y
T07-B	ACTIVE			PC		X	
T07-C	ACTIVE			PC	ARTIFICIAL		Y
T08-A	ACTIVE			PC	ARTIFICIAL		Y
T10-A	ACTIVE			PC			
T10-B	ACTIVE			PC		X	

T11-A	ACTIVE			PC			
U01-A	ACTIVE			PC			
U03-A	ACTIVE			PC	NATURAL		
U04-A	ACTIVE			PC	NATURAL	X	
U08-A	ACTIVE			PC	ARTIFICIAL		
U09-A	ACTIVE			PC	ARTIFICIAL		
U09-B	ACTIVE			UC	NATURAL		

ATTACHMENT 3

2009-2013 NEST SUCCESS AT FORT BENNING (25% SAMPLE)

CLUSTER	13 ATTEMPT	S OR F	12 ATTEMPT	S OR F	11 ATTEMPT	S OR F	10 ATTEMPT	S OR F	09 ATTEMPT	S OR F
A08-A	Y	S	Y	S	Y	S	Y	F	Y	S
A11-A	Y	S	Y	S	Y	S	Y	S	Y	S
A14-B	Y	S	Y	S	Y	S	Y	F	Y	S
A19-A	Y	S	Y	S	Y	S	Y	F	Y	S
A21-A	NP		Y	S	Y	S	Y	S	Y	S
A21-B	Y	S	Y	S	Y	S	Y	F	Y	F
A22-C	Y	S	Y	F	Y	F	Y	S	Y	S
A26-A	Y	S	Y	F	Y	S	Y	S	Y	S
A26-E	Y	S	Y	S	Y	S	Y	S	Y	S
A26-F	Y	F	Y	S	Y	S	Y	F	Y	S
C01-A	Y	S	C		NS		Y	F	Y	F
C04-A	Y	S	Y	S	Y	S	Y	S	Y	S
D04-A	Y	S	Y	S	Y	S	Y	S	Y	S
D09-A	Y	S	Y	S	Y	S	Y	S	Y	S
D09-B	Y	S	Y	S	Y	S	C		C	
D09-C	NN		NP		NN		NP		NP	
D11-D	Y	S	Y	S	Y	S	Y	S	Y	F
D12-A	NP		Y	F	Y	F	Y	S	Y	S
D13-A	Y	F	Y	S	Y	S	Y	S	Y	F
D14-B	Y	F	Y	S	Y	F	Y	S	Y	S
DRC-C	Y	S	Y	S	Y	S	Y	S	Y	S
E01-C	Y	S	NP		Y	F	Y	S	Y	F
E01-D	Y	S	Y	S	Y	S	Y	S	Y	S
E01-E	Y	S	Y	F	Y	S	Y	S	Y	F
E02-A	Y	S	Y	S	Y	S	Y	F	Y	F
E04-A	Y	F	Y	S	Y	S	Y	S	NP	
E07-A	Y	S	Y	F	Y	S	Y	S	Y	S
F07-B	Y	S	Y	S	Y	F	Y	S	Y	S
G06-A	Y	S	NP		NP		NP		Y	S
G06-B	Y	S	Y	S	Y	S	Y	S	Y	S
GRC-A	Y	F	Y	S	Y	F	NP		C	
J07-A	Y	F	Y	F	Y	S	Y	F	Y	S
J07-B	Y	S	Y	S	Y	S	Y	S	Y	S

J09-A	Y	F	Y	F	Y	S	Y	F	Y	S
K12-B	Y	S	Y	F	Y	S	Y	F	Y	F
K13-A	Y	F	Y	S	Y	S	Y	F	Y	S
K14-B	Y	F	Y	S	NS		NP		Y	S
K24-A	Y	F	Y	F	Y	S	Y	S	Y	S
K26-A	Y	F	Y	S	Y	F	Y	F	Y	S
K36-A	Y	F	Y	S	Y	S	Y	S	Y	S
K37-A	Y	S	Y	S	Y	S	Y	F	Y	F
M02-A	Y	S	Y	F	Y	S	NP		Y	S
M06-C	Y	S	Y	S	Y	S	Y	S	Y	S
M06-J	Y	F	NN		NS		Y	F	Y	F
N07-B	Y	S	Y	S	Y	S	Y	S	Y	S
O03-A	Y	F	Y	S	Y	S	Y	S	Y	F
O04-A	Y	S	Y	S	Y	S	Y	S	Y	S
O05-A	Y	S	Y	S	Y	S	Y	S	Y	S
O06-C	Y	F	Y	S	Y	S	Y	S	Y	S
O10-A	Y	S	Y	S	Y	F	Y	F	Y	S
O14-A	Y	F	Y	S	NS		Y	F	NP	
O15-B	Y	S	Y	S	NP		Y	S	Y	F
O17-A	Y	F	Y	S	Y	F	NP		Y	F
O18-A	Y	S	Y	F	Y	S	Y	S	Y	S
O26-A	Y	S	NP		Y	S	Y	S	Y	S
O28-B	Y	S	Y	S	Y	S	Y	S	Y	S
Q03-A	Y	F	Y	S	Y	S	Y	S	NP	
R01-A	NS		Y	S	Y	S	Y	S	Y	S
S02-B	Y	F	Y	F	Y	S	Y	S	Y	S
SHC-A	I		I		I		NS		NN	
T03-A	Y	S	Y	F	Y	S	Y	S	Y	S
T03-B	Y	F	NP		Y	S	Y	S	Y	F
T07-B	Y	S	Y	S	Y	S	Y	S	Y	S
U04-A	Y	F	NS		Y	S	Y	F	Y	F

TOTALS	59	38	55	42	56	47	56	39	57	42
	failed = 21	dnn = 3	failed = 13	dnn = 7	failed = 9	dnn = 6	failed = 17	dnn = 7	failed = 15	dnn = 6

	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
Y	59	55	56	56	57

S	38	42	47	39	42
F	21	13	9	17	15
UNK	0	0	0	0	0
NS	1	1	4	1	0
NP	2	5	2	6	4
C	0	1	0	1	2
X	0	0	0	0	0
NN	1	1	1	0	1
I	1	1	1	0	0
TOTAL	64	64	64	64	64

Y=ATTEMPTED TO NEST
S=SUCCESSFULLY FLEDGED AT LEAST 1 NESTLING
F=NEST ATTEMPT FAILED
UNK=FATE OF NESTLINGS UNKNOWN
NS=NO NEST, SINGLE BIRD OR NO PBG (MULTIPLE BIRDS BUT NO PAIR)
NP=NO NEST, PAIR
C=CAPTURED CLUSTER
X=DID NOT MONITOR, CLUSTER NOT ESTABLISHED
YET
NN=NO NEST, NO BIRDS BUT CLUSTER APPEARED ACTIVE IN
SPRING
I=INACTIVE

Appendix 1

Fort Benning "Off-Post RCW Conservation Plan"

to benefit the survival and recovery of the red-cockaded woodpecker

August 13, 2010

Table of Contents

Executive Summary

A plan to secure property interests, assure long-term management, and restore and conserve habitat for the Red-Cockaded Woodpecker (RCW) is proposed here for the region around Fort Benning. This plan is intended to meet the requirements of the MCOE BA (DA 2008) and MCOE BO (USFWS 2009).

This plan will primarily utilize a program currently in place, Fort Benning's Army Compatible Use Buffer (ACUB) Program, which is implemented by The Nature Conservancy (TNC) and its partners via Army-funded acquisition of both conservation easements and fee title. Current ACUB advisory, prioritization, and approval mechanisms would be extended to address explicit RCW conservation purposes. Alternative protection instruments are discussed, which this plan seeks to accommodate pending authorization of some approaches by the U.S. Fish and Wildlife Service (USFWS).

A significant portion of the existing protected ACUB landscape can be brought into this Off-Post RCW Plan, and its future functionality is promising. Analysis of landscape conditions suggests there are over 4000 acres of land east of Fort Benning already protected under ACUB and over 10,000 acres likely or possible to be protected, on which restored habitat would have a good to excellent chance of adding to the stability of Fort Benning's Primary Core Recovery Population, based on a 3-mile RCW dispersal distance. Significant opportunities for protecting or restoring "satellite habitat," as disjunct subpopulations or as targets for future connectivity and interaction with Fort Benning's population, also exist and can be accommodated by this Plan.

Purpose

This Off-Post Red-cockaded Woodpecker Conservation Plan (hereafter "Off-Post RCW Plan") establishes an Army habitat conservation initiative in the Fort Benning region. This plan is intended to help offset RCW habitat impacts of the Maneuver Center of Excellence (MCOE) and insure the long-term stability of the Fort Benning RCW population. Fort Benning will accomplish this habitat conservation in such a way as to benefit the survival and recovery of the red-cockaded woodpecker.

More specifically, as stated on pages 29-30 of the MCOE Biological Opinion (USFWS 2009), this plan is intended to meet the following requirements:

1. A map identifying the geographic boundaries and a list of priority parcels targeted for conservation through acquisition of a perpetual conservation easement or fee title from willing landowners.

2. A corresponding explanation of the likelihood of the acquisition of an interest in each parcel, a projected time-frame for the acquisition, the existing habitat condition, and an assessment of the contribution the parcel will make to both the short and long-term recovery of the RCW.

3. A template habitat management plan describing a desired future condition for the parcel and management goals, objectives and practices necessary to achieve the desired future condition, and the projected cost estimate.

4. A template conservation easement assuring that uses of protected parcels are restricted to those compatible with RCW habitat conservation and requiring the easement holder to obtain perpetual access to the property to implement a parcel-specific habitat management plan.

5. A commitment of currently available funding for the acquisition of conservation easements and implementation of parcel-specific management plans with an initial target of not less than $9,000,000. The plan shall project the ratio of funds that will be dedicated to acquisition and long-term habitat management. This section should also include Fort Benning's commitment to program and seek funding of its ACUB program for future fiscal years.

6. Identification of a financial instrument, such as an endowment or trust, necessary to provide for the long-term RCW habitat management on protected parcels.

7. Identification of the specific entity or entities responsible for the acquisition and holding of conservation easements and the long-term management of protected parcels with copies of agreements establishing the necessary legal relationships to carry out the foregoing responsibilities.

8. A procedure for informally consulting with the [U.S. Fish and Wildlife] Service to seek concurrence prior to initiating acquisition of an RCW-related conservation easement on a specified parcel.

9. To the maximum extent practicable priority will be given to parcels that have the highest biological value for the conservation and recovery of Ft. Benning's primary core recovery population of RCW.

10. The plan shall identify parcels of land already protected through Ft. Benning's ACUB program that it seeks to include as an off-site conservation action. In order to be considered for inclusion, the Army must demonstrate that the pre-existing conservation parcel will directly or indirectly support RCW survival or recovery. A habitat management plan shall be developed and the Army must certify that the necessary instruments are in place and funding committed to assure long-term implementation of the parcel-specific plan.

11. An assessment of the effects of implementing the plan. Over the planning horizon, the Army will provide a projected time-line for near-term, mid-term, and long-term conservation easement acquisition and habitat management actions; predict the likely acreage to be protected and its condition; and provide a determination of the overall effect and contribution of off-Post habitat protected under the plan to recovery of Ft. Benning's primary core population of RCW.

We have chosen to rely heavily on the existing Fort Benning Army Compatible Use Buffer (ACUB) Program which has existing mechanisms to implement the goals of this plan. Readers unfamiliar with the ACUB Program should consult the ACUB Proposal (2006), the ACUB Cooperative Agreement (2006), and the ACUB Annual Reports (2007-2009)[1]. Fort Benning will initially pursue off-Post habitat conservation via the existing ACUB Program framework, which provides authority, roles, procedures, and funding mechanisms whereby lands in the vicinity of Fort Benning may be encumbered for Army-compatible conservation purposes without outright acquisition and control by the Army.

Geographic Scope **(Requirement 1)**

Fort Benning's ACUB Program focuses on the area illustrated in Figure 1, extending primarily east and west of Fort Benning in the Fall Line sandhills. The Fall Line is an approximately twenty-mile wide band running northeast through Georgia from Columbus to Augusta that represents the Late-Cretaceous shoreline of the Atlantic Ocean and is the geological boundary that separates piedmont and coastal plain geology. The ecological character of the Fall Line sandhill landscape, which is shared by most of Fort Benning, represents enormous opportunity for the conservation of biological diversity and the sustainable management of natural resources.

To date, The Nature Conservancy and/or its partners have acquired ACUB property interests as far as 8 miles east of Fort Benning (in Georgia), and one small property on the west of Fort Benning (in Alabama). The approved program area extends 13 miles east and approximately 30 miles to the west of the installation (Figure 1). The property interests acquired include conservation easements with conservation-minded landowners (~2300 acres), and fee title on lands recently divested by forest products companies and other private landowners (~5000 acres). The properties are briefly described in Appendix 1.

Additional privately-held conservation properties, with easements negotiated by local land trusts outside of, and usually prior to, the ACUB Program also exist in

[1] All documents available from Brant Slay (ACUB POC), Land Protection Manager, The Nature Conservancy, 706-682-0217, PO Box 52452, Fort Benning GA 31995. Email bslay@tnc.org .

the vicinity of Fort Benning. One such property is a wetland mitigation bank whose protection instrument is a restrictive covenant in favor of the U.S. Army Corps of Engineers. The other protected non-ACUB parcels in Figure 1 are conservation easements on two large tracts of current and potential RCW habitat on either end of the western side of the approved ACUB area.

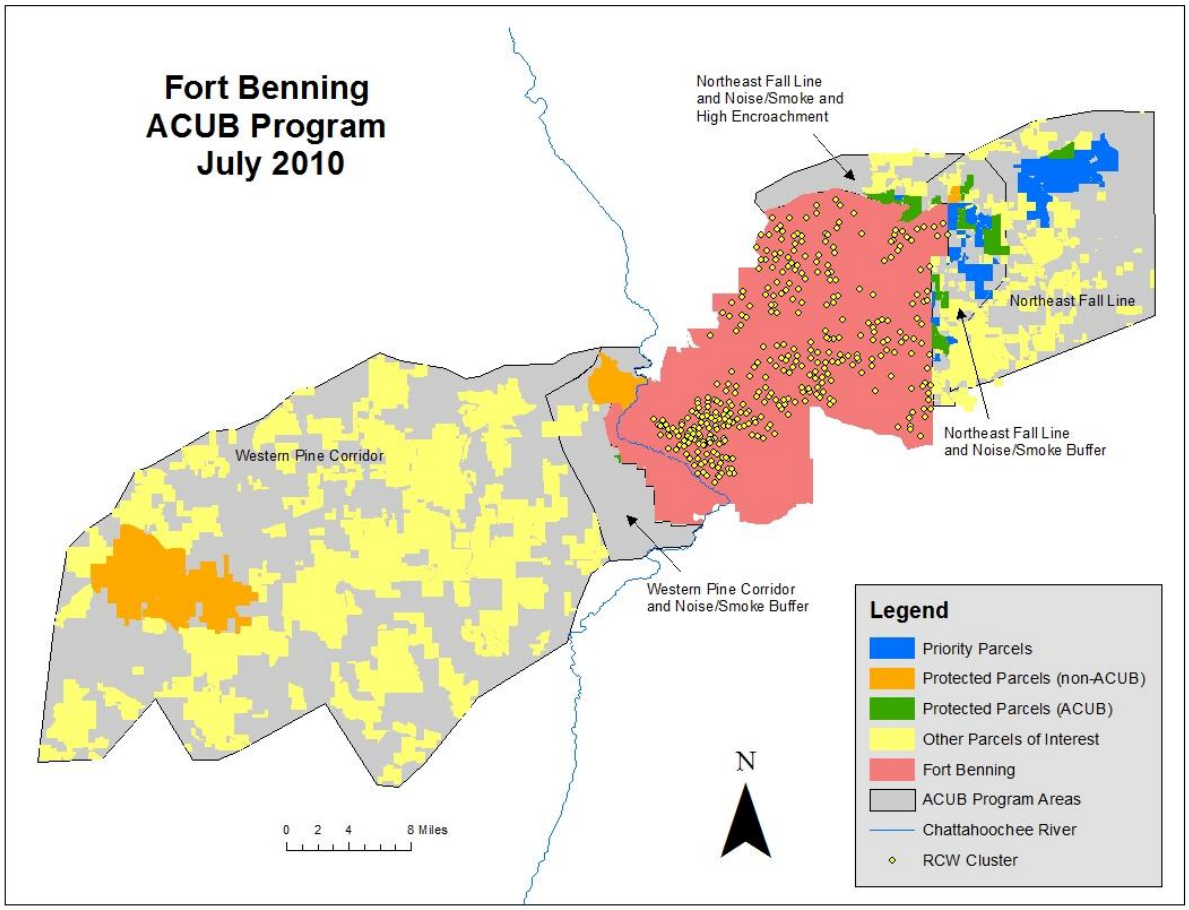

Figure 1. ACUB Program area, geographic boundaries and July 2010 status. "Protected Parcels" includes both fee and easement acquisition by conservation entities.

The non-ACUB instruments currently lack the "ACUB language" (Appendix 4, Section E) guaranteeing the Army's contingent right to hold, administer, and enforce the easement itself, or find another land trust or agency willing to do so, should the current easement holder fail in that responsibility. Any such properties within the approved ACUB area could be brought into the program by negotiation

and purchase of that contingent right (or similar agreed-upon terms consistent with ACUB program goals).

The priority parcels associated with the ACUB Program are identified annually by The Nature Conservancy and Fort Benning in Fort Benning's REPI[2] Request—usually in the summer preceding the new Fiscal Year on 1 October (with funding usually available to execute projects the following spring). Priorities are frequently updated throughout the year due to the changing real estate market and emerging opportunities. To date, the ACUB Program has focused on the landscape east of Fort Benning, as indicated by the eastern concentration of "priority parcels" in Figure 1.

This Off-Post RCW Plan encompasses the same approved ACUB Program area, with a similar mechanism for identifying priority parcels. Should any parcels outside the current ACUB Program area be deemed appropriate for off-Post RCW conservation, then the ACUB Program may be extended to include those parcels. Such a decision would be made by Fort Benning as described in the ACUB Cooperative Agreement (2006), with input from USFWS as described below.

Approval of RCW Priority Parcels (Requirement 8)

The ACUB RCW Priority Parcels will be reviewed and updated annually as part of the annual REPI Request. Information to support the designation of a parcel as an ACUB RCW Priority Parcel includes cost, likelihood of protection, time-frame for protection, protection instrument, existing habitat condition, and the projected contribution of the parcel to the short-term and long-term recovery of RCW.

A Fort Benning ACUB advisory group guides TNC in initial approval of the REPI Request list (the priority parcels and specific plans for each) and its adjustment throughout the year. That group has in the past consisted of Fort Benning's Conservation Branch Chief, EMD Chief, and Garrison staff including the Garrison Commander. The Range Division Chief is included as well, when available and as practical. Informal consultation with the USFWS will be sought for concurrence that land proposed under this plan as RCW Priority Parcels directly or indirectly promotes the survival and recovery of the RCW. Such consultation will include

[2] Readiness and Environmental Protection Initiative (REPI) is the Defense Department program that funds military installation buffering projects such as the Army's ACUB program.

participation in discussion portions of ACUB advisory group meetings, and written descriptions and analyses of the RCW conservation potential of each parcel. This written documentation will be submitted to USFWS for concurrence, and prepared by TNC on behalf of the Army. Submission will be in conjunction with Fort Benning's "Notice to Proceed" on TNC's acquisition of ACUB property interests. USFWS concurrence need not be required for Fort Benning to direct TNC or its partners to pursue parcels that represent (1) ACUB priorities or strategies not covered by this Plan, or (2) opportunities to promote RCW conservation for which risks of failure and/or uncertainty of success are deemed by USFWS as great enough to preclude concurrence. ACUB parcels protected under either condition will not be considered as RCW Priority Parcels under this Plan.

Fort Benning will direct TNC to seek a broader conservation partnership, including a working group on off-post RCW recovery. This partnership will include other stakeholders and coordinate with other conservation opportunities and programs in the region. In addition to Fort Benning, TNC, and USFWS, these stakeholders would include the states of Georgia and Alabama, other non-profits or non-governmental organizations (NGOs), and other federal or state agencies. The RCW recovery working group will provide additional input and consultation for the selection, management, and administration of RCW Priority Parcels.

RCW Priority Parcels **(Requirements 1, 2, 9, 10)**

We propose that parcels prioritized for the ACUB Program should receive an "Off-Post RCW" priority when appropriate. This RCW conservation priority will be given to parcels that Fort Benning determines and USFWS concurs are eligible to contribute to the conservation and recovery of Ft. Benning's primary core recovery population of RCW. *Eligible parcels* will be classified by the following conditions (see below for definitions of italicized key terms):

Condition 1, "*Imminent* RCWs." Parcel supports existing RCWs, or existing *suitable nesting habitat*, with *sufficient acreage* to support at least five groups, with reasonable probability of *near-term* future *demographic and/or genetic connectivity* to Ft. Benning.

Condition 2, "Adjacent Habitat." Parcel (or assemblage of parcels) of any size that can be restored to suitability for RCWs with reasonable probability of insuring *near-term* future habitat stability (additional *suitable foraging habitat*)

for existing RCW clusters on Ft. Benning and/or providing potential nesting habitat for future RCW recruitment clusters with reasonable probability of *long-term* future *demographic and/or genetic habitat connectivity* to Ft. Benning. Conservation of off-Post adjacent RCW habitat is made relevant by the viability of existing nearby RCW clusters on-Post and the likelihood of dispersal onto adjacent lands. Viability and dispersal is largely dependent on: number of clusters within an average dispersal distance, average group size and potential breeding groups (PBGs) over the last 5 years 2006-2010, the aggregation or density of those existing clusters, and sufficient available habitat acreage to support recruitment clusters.

Condition 3, "Satellite Habitat." Parcel with *suitable or potential* nesting habitat (or part of an assemblage of available parcels whose cumulative suitable/potential nesting habitat acreage is *sufficient*) to support or connect a satellite support population with *sufficient acreage* for at least ten groups, with reasonable probability of *long-term* future *demographic and/or genetic connectivity* to Ft. Benning.

Definitions of Key Terms used in Condition Descriptions:

Adjacent habitat: parcel is within 3 miles of an existing RCW cluster and has *potential habitat* (foraging or nesting). Range-wide dispersal distance for RCWs is approximately 3 miles (DA 2004). Ft. Benning's RCW average dispersal distance is between 2.5 (DA 2008) and 3.0 (DA 2004) miles, sufficiently close to the range-wide average to be consistent.

Demographic and/or genetic connectivity: Parcel is within 3 miles of *highly aggregated* existing RCW clusters.

Eligible Parcel: A parcel that fits into at least one of the three conditions 1, 2, and 3 described above, and deemed to contribute to the survival and recovery of Fort Benning's RCW population if the parcel receives appropriate *long-term* management.

Highly aggregated: Five or more clusters occur within a 1.25 mile radius. For the group density analysis used in the BRAC (DA 2007) and MCOE (DA 2008) Biological Assessments, RCW clusters having approximately 5 active clusters within 1.25 miles were considered healthy and highly aggregated. Clusters with 2.6 to 4.6 active clusters within 1.25 miles were considered to have "moderate" aggregation. Clusters with ≤2.5 active clusters within 1.25 miles were considered "sparse," and therefore more

vulnerable to abandonment (and less likely to disperse) because of lack of emigration/ immigration (Conner and Rudolph 1991a).
Imminent: within 5 years with appropriate management actions.
Long-term: Forty (40) to 60 years. Parcel could potentially contribute RCW nesting habitat. Pine habitat must be at least 60 years old (USFWS 2003).
Near-term: Five (5) to 30 years. Parcel could potentially contribute to RCW foraging habitat by stand age 30 (USFWS 2003) and could be used as a dispersal corridor by stand age 10. RCWs have been observed to disperse through young pine stands as well as hardwood stands (Walters et. 2009).
Potential habitat: Parcels of land on which habitat suitable for RCW (foraging or nesting defined below) could realistically be established through restoration and management. For most parcels, all upland acres (non-wetland) are considered potential habitat.
Sufficient acreage: The acreage needed to support a recruitment cluster. Sufficient acreage for an off-Post recruitment cluster is at least 200 acres of potential habitat and no more than 200 feet between patches of habitat within the 200 acres (contiguous habitat)[3].
Suitable foraging habitat: Habitat meets the current RCW recovery standard[4] of Good Quality Foraging Habitat (RCW Recovery Plan, USFWS 2003).
Suitable nesting habitat: Habitat is suitable for nesting and foraging, and overstory pine, pine/hardwood, and hardwood/pine stands must contain pines 60 years in age or older (USFWS 2003).

Parcels with little or no acreage in these condition classes or those that rank low for RCW conservation might still rate highly as priority parcels for ACUB for other

[3] To avoid over- estimating potential off-Post RCW habitat, sufficient acreage (200 ac) for off-Post RCW recruitment clusters is based on the low site productivity (site index <60) acreage recommendation in the RCW Recovery Plan (USFWS 2003). The year that the cluster becomes available for recruitment is dependent on the proximity of a potentially occupied cluster and the age of the pine stand (must be at least 60 years old) (DA 2008). See Appendix 2 for potential RCW recruitment on ACUB lands. Also, for this Plan, the Standard for Managed Stability is deemed inadequate because the intent is to provide greater stability and scope to a Primary Core Recovery Population

[4] For this Plan, the Standard for Managed Stability is deemed inadequate because the intent is to provide greater stability and scope to a Primary Core Recovery Population.

conservation objectives such as watershed protection and conservation of other at-risk species (gopher tortoise) as well as serving as a buffer from off-Post encroachment, all of which could indirectly contribute to RCW conservation, but would fall outside the jurisdiction of this Off-Post RCW Plan. Often parcels rate high as an ACUB priority if multiple objectives (including RCW conservation) can be achieved.

Figure 2 depicts parcels currently under study in Ft. Benning's ACUB Program Area according to Conditions 1, 2 and 3 above. Most of the ACUB land protection work to-date has focused on the eastern region of the ACUB Program Area and has been driven by a combination of conservation (gopher tortoise, watershed, rare plant communities, RCW), encroachment risk, and real estate opportunity. While the current RCW Recovery Plan constrains the western edge of the Sandhills Recovery Unit to the western boundary of Fort Benning, we assume here that properties west of Fort Benning within the approved ACUB study area will be eligible for consideration[5].

Condition 1 Parcels, "Imminent RCWs"

An existing non-ACUB conservation easement encumbers approximately 4600 acres of predominantly fire-managed pine woodland on a private recreational property along the west boundary of Fort Benning. On-site reconnaissance and aerial photo interpretation suggests this parcel could presently hold at least 5, and possibly as many as 20, RCW groups via artificial cavities and translocation. Over time and with management, the capacity of this parcel to support 20 RCW groups would become increasingly certain.[6] However the habitat structure is currently only marginally suitable for RCW groups, and pine growth rates on this property will be slow. Also, the existing conservation easement provides no rigorous incentive or requirement to support RCWs though it does encourage longleaf management and prescribed fire and protection of all imperiled species, including any RCWs that should exist. Another caveat is the lack of existing RCW groups on the Alabama side of Fort Benning; the closest existing RCWs are 2 miles to the east across the Chattahoochee River in Georgia (Figure 2).

Condition 2 parcels, "Adjacent Habitat"

[5] Will McDearman, USFWS RCW Recover Coordinator, personal communication to Wade Harrison, February 2010
[6] Beau Dudley, USFWS biologist, personal communication to Wade Harrison, June 2010

An analysis was conducted to quantitatively assess parcels already protected through Fort Benning's ACUB Program and prioritize parcels of ACUB interest for RCW conservation relevance under Condition 2 "Adjacent Habitat." A 3-mile dispersal buffer was generated for each existing RCW cluster on Ft. Benning. This buffer is intended to represent the range-wide average distance (see definition for adjacent habitat) a RCW would reasonably travel from its natal cluster to a new breeding location assuming no dispersal barriers[7]. Parcels falling within the 3- mile RCW dispersal buffer were considered adjacent and were ranked based on the following additional attributes: (1) number of RCW clusters whose 3 mile dispersal buffer is intersected by the parcel, (2) viability of those clusters (average group size and number of years with a PBG within the last five years 2006-2010), (3) number of RCW clusters within 1.25 miles of the parcel (a measure of aggregation), and (4) the parcel's restorable upland habitat acreage (i.e. how many potential recruitment clusters could inhabit the site). This analysis did not include

[7] RCWs will disperse through pine or hardwood that is at least 10 years old. Large open areas are considered barriers to dispersal. RCWs will cross openings of up to 150 m, but beyond that gap width the probability of crossing declines (Walters et. al. 2009).

existing RCW clusters that are categorized as "taken" by MCOE projects.

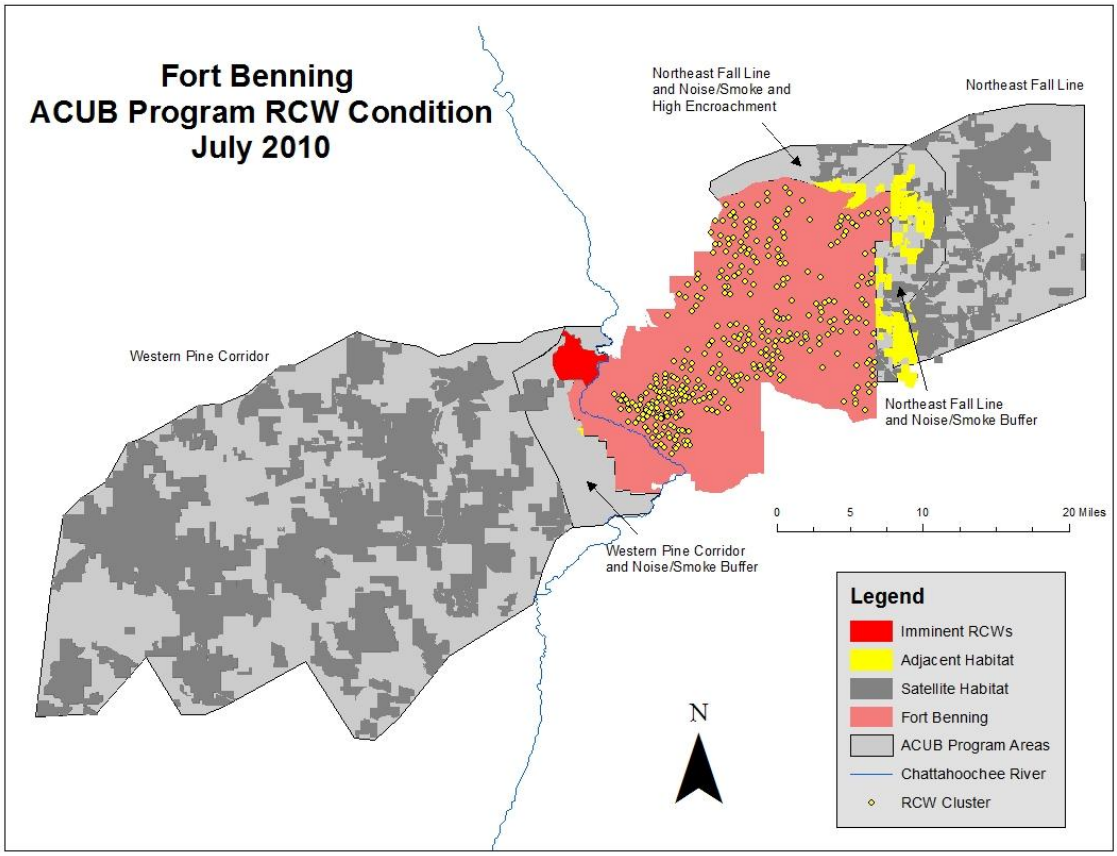

Figure 2. Fort Benning ACUB Program with parcels of interest classified according to RCW suitability Conditions. See text for definition of Conditions.

The range of each of these attributes was divided into equal intervals of low (1), medium (2), or high (3) ranges to rank their RCW conservation value (Table 1). For each parcel, these attribute ranks were applied and an overall RCW score for each parcel was then calculated based on the unweighted average rank (Figure 3). Average scores were then categorized along equal intervals as moderate (1.40-1.85), good (1.86-2.30), or excellent (2.31-2.80) for overall parcel contribution to RCW conservation based on this analysis (details in Appendix 2). Use of equal-interval categories in both steps of this analysis resulted in reasonable distributions with no obvious "outlier" categories.

Figure 3 demonstrates that much of the pre-existing ACUB protected parcels and other ACUB parcels of interest within the 3mile RCW dispersal buffer rank good

to excellent as "Adjacent Habitat" for RCWs based on the attributes defined in Table 1. Of the ACUB parcels already protected (fee or easement), about 4000 acres rank as good to excellent as Adjacent Habitat in terms of RCW conservation (Table 2). These parcels will are proposed as RCW Priority Parcels, representing a near-term future conservation gain for insuring habitat stability[8] for existing RCWs on Ft. Benning and a long-term future RCW conservation gain through potential RCW recruitment and demographic/genetic connectivity as habitat is restored to RCW suitability over time. Management plans for these parcels are currently being developed and are generally discussed in the Habitat Management Planning section of this Plan. Over 10 000 acres rank good to excellent that are not already protected (Table 2). These parcels have a high protection (fee or easement) priority and will be considered by Fort Benning's ACUB advisory group and its REPI request process .The spatial arrangement of these parcels may offer strategic recruitment for connecting Adjacent Habitat to potential Satellite Habitat.

Table 1: Attributes used to rank parcels for RCW relevance as "Adjacent Habitat" under Condition 2. Attribute ranges were considered as low, medium, or high for RCW relevance based on known RCW biology.

	Parcel Ranking		
Red-Cockaded Woodpecker Parcel Attributes	***Low Rank=1***	***Medium Rank=2***	***High Rank=3***
Number of 3-mile RCW dispersal buffers that intersect parcel [9]	≤ 5.0	5.1-9.9	≥ 10
Average group size over the last 5 years (2006-2010) for RCW clusters whose 3-mile dispersal buffer intersect each parcel	0-2.4	2.5-3.0	3.1-3.6
Average number of years over the last 5 years (2006-2010) a Potential Breeding Group occurred for RCW clusters whose 3mi dispersal buffer intersect each parcel	0-3.8	3.9-4.3	4.4-4.8
Number of RCW clusters within 1.25 miles of parcel (aggregation)	0-1	2-4	≥ 5
Carrying capacity for potential future recruitment clusters on	0-0.5	1-2	>2

[8] Walter's et al. (DA 2008 Appendix E) suggest that post-MCOE construction the northeastern and eastern RCW clusters on Ft. Benning may become vulnerable and have increased abandonment due to edge effect and geographic isolation from the core of the RCW population on Ft. Benning. Buffering habitat and reducing edge effects could increase the stability of these clusters.

[9] Research on small populations suggests that a minimum of 10 clusters is necessary to keep small populations demographically viable (Crowder et al. 1998, Walters et al. 2002).

parcel within the 3-mile RCW dispersal buffer (based on potential available habitat, see Appendix 3)			

Condition 3 Parcels, "Satellite Habitat"

Parcels outside the 3 mile RCW dispersal buffer in both east and west portions of the ACUB Program area are of high interest as future Satellite RCW habitat. These parcels have enough restorable upland acres to support at least ten RCW clusters, the minimum number for a demographically viable sub-population. Most notable in terms of ecological and real estate opportunity (see discussion below) are approximately 10,000 acres in two large parcels east of Ft. Benning (Figure 3). These parcels are located less than three miles from high priority Adjacent Habitat, providing reasonable probability of long-term future habitat connectivity to Ft. Benning, and represent potentially viable stand-alone habitat. An 8000-acre parcel is available for purchase, and a 2600-acre parcel is available for a conservation easement.

A non-ACUB conservation easement encumbers a large tract in Alabama, thirty miles west of Fort Benning, illustrated in Figure 1 at the far western end of the ACUB Program area. This parcel has a small RCW population, in recent years augmented by translocated birds from Fort Benning. This particular landowner has shown interest in RCW management by becoming the first enrollee in Alabama's Safe Harbor initiative. His property includes some 12,000 acres of suitable habitat, most of it under a conservation easement, and mostly unoccupied by RCWs. Several other properties in Alabama, whose habitat areas range in size from 2,000 to 5,000 acres, are known to have had small numbers of RCW groups in the past ten to twenty years; at least one is known to include suitable habitat. Other Alabama parcels similarly managed may also qualify as well (Figure 2), and the potential to restore others is high. However these properties are generally not for sale, and may require considerable negotiation for RCW-favorable conservation easement terms.

Protection of satellite habitat represents a strategic insurance policy for strengthening and protecting the long-term viability of Ft. Benning's RCW population against environmental stochasticity and unknown future land constraints (including military construction) in the vicinity of Ft. Benning.

Real Estate Markets and Opportunity

While parcels are first prioritized in order by Conditions 1, 2, and 3 above, real estate markets and opportunities often influence the prioritization process. Land values, availability of willing sellers, likelihood of restoration (management assurances), and parcel size must be layered with the Conditions described above to insure efficient use of dollars spent to protect land for RCW and other ACUB objectives. Table 2 shows current total acreage of Adjacent and Satellite RCW habitat for those protected and potentially-protected parcels currently prioritized in Fort Benning's ACUB program (mapped in Figure 3).

In addition to descriptions of currently protected ACUB lands, Appendix 1 (Table A1) lists the ACUB parcels prioritized for protection in FY 2011 east of Fort Benning (mapped in Figure 3) based on habitat priority and market opportunity, with probability of successful protection.

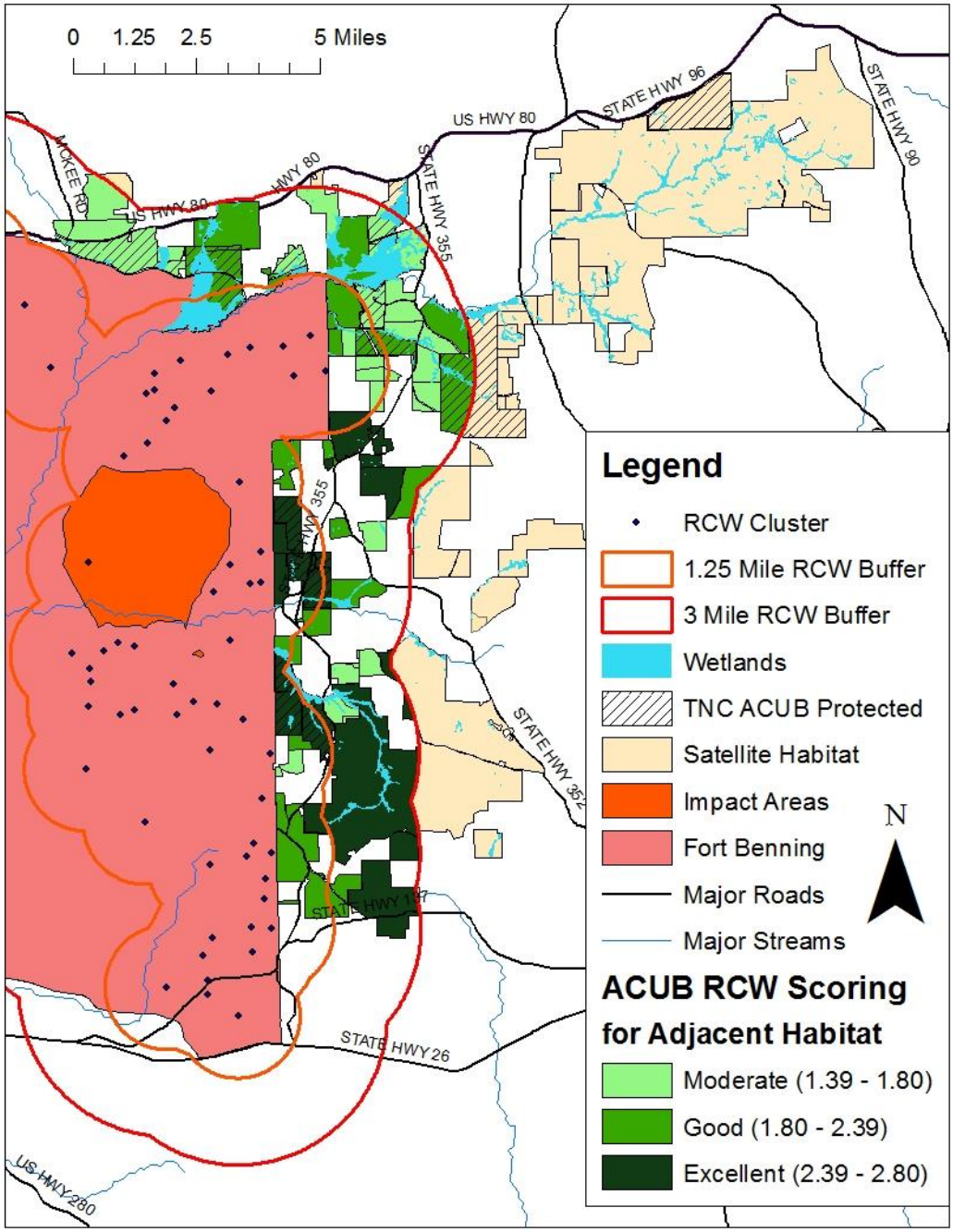

Figure 3: For parcels that fall within the 3 mile RCW dispersal buffer (parcels in shades of green), this map depicts average RCW Parcel Scores that represent parcel's overall contribution (excellent, good, or moderate) to RCW conservation based on "Adjacent Habitat" attributes described in Table 1.

Table 2. Current total acreage of Adjacent and Satellite RCW habitat for ACUB parcels mapped in Figure 3.

Habitat Condition	ACUB Protected	Possible ACUB Protection	Total acres
Adjacent (w/in 3 mile dispersal buffer)	4,260	13,638	17,898
Satellite	1,894	15,457	17,351
Total acres	6,154	29,095	35,249

Spatially Explicit Probability Modeling (SEMP)

Several RCW spatially explicit demographic (Walters et. al. 2009) and population viability (Hayden and Melton 2009) models are currently under development and may offer a more scientifically elaborate validation and prioritization tool to inform this Off-Post RCW Plan in the future. Plans are in place for initiating discussion of such strategies in fall/winter 2010, to include Fort Benning, USFWS, TNC, and model developers. Outcomes from these discussions will be incorporated in this Plan as they are developed. Model analyses may also be considered or sought by the RCW recovery working group of the regional conservation partnership proposed above.

East versus West

As Figures 1 and 2 dramatically illustrate, the west (Alabama) side of Fort Benning includes a tremendous amount of potential conservation land, some of it already in the "Imminent RCW" habitat condition due to fire-management for recreational hunting. The opportunity this landscape affords for Fort Benning's RCW responsibilities and for overlapping ACUB goals has long been analyzed and discussed by Army, USFWS, and TNC planners. To date, however, the Fort Benning ACUB Program has focused on the east (Georgia) side for several reasons.

(1) Many of the eastern lands are for sale, due to corporate timberland divestitures in 2004-2007 and subsequent over-speculation in real estate prior to the collapse of the real estate market in 2008. The opportunity to purchase fee simple interests and begin ecological restoration actions without negotiating easement terms was seen as timely and important. While these opportunities sometimes exist on the western side, they have been less numerous and further from the Installation boundary. Most attractive conservation opportunities in the west are with landowners whose

land management choices suggest they could be interested in conservation easements.

(2) Many of the eastern lands include existing, inhabited, or easily-restorable gopher tortoise habitat. RCW habitat restoration would be a longer-term endeavor but entirely consistent with managing gopher tortoise populations. Many examples of at-risk plant communities of interest to Fort Benning are also known to exist on the eastern parcels, especially in narrow wetlands and ravines that dissect the Fall Line sandhills. Tortoise and rare plant opportunities in the west exist as well, but at a greater distance and/or with less certainty. The Fall Line sandhills physiography west of the Chattahoochee River becomes less distinctive.

(3) The western landscape is primarily viewed as having RCW value, but other than the one "Imminent RCW" parcel illustrated in Figure 3, all are greater than three miles distant from the nearest RCWs on Fort Benning. Most of the lands adjacent to Fort Benning's western boundary are experiencing significant real estate development to support Fort Benning's expanded employment and training.[10] Also, Fort Benning has yet to expand its RCW population into the Alabama side of Fort Benning. Hence the probability of connecting Fort Benning RCWs with the vast amount of Satellite Habitat potentially available in the west is lower than for similar Satellite Habitat opportunities in the east.

However, none of that rationale and history should preclude the consideration of western parcels for off-Post RCW conservation. To date the ACUB Program has been less focused on broader objectives, and this Plan's narrow focus on RCWs could well dictate more investment in current or potential habitat in Alabama, especially if the USFWS should recognize a contribution of disjunct or Satellite Habitat conservation to the recovery of Fort Benning's RCW population.

Protection Instrument (Requirements 4 & 7)

As a minimum and prerequisite for RCW conservation, each parcel should be assigned appropriate development restrictions in a *conservation easement* or *deed restriction* that limits the ability of current and future landowners to engage in land

[10] For example, see http://www.columbusandthevalley.com/archives/so09/Alabama.html

uses or subdivision of ownership that would adversely affect habitat restoration, management, and monitoring.

As an example, a hypothetical 1000-acre parcel might be encumbered as enumerated in Table 2, with any exceptions approved jointly by the easement grantee (e.g. TNC) and the Army via the ACUB approval process.[11] Table 4 is intended as a high-level description appropriate for the planning and negotiation phase of an Off-Post RCW parcel project. The actual easement or ownership terms would be developed in far greater detail prior to closing. See Appendix 4 for TNC's detailed "template easement" appropriate for ACUB parcels. Some terms are negotiable and other grantees may utilize different templates.

Table 4. Example easement or deed-restriction terms for a hypothetical 1000-acre ACUB parcel appropriate for RCW restoration and management purchased in fee or encumbered by an ACUB easement.

No uses that conflict with conservation values[12] , including potential to restore a self-sustaining fire-managed longleaf pine ecosystem with native herbaceous groundcover, habitat for RCW and associated species, and diversity of longleaf pine age classes from regeneration to old-growth.
No structures except as approved in admin/ops area.
No new roads or road improvements other than maintenance.
No subdivision.
No mining.
No dumping.
No motorized vehicles other than on main access roads or for management purposes.
No agricultural/commercial/industrial use other than ecological forest management (as specified on forest management plan) or recreational wildlife management.
No invasive exotic species.
Non-native species only as approved for wildlife management or soil stabilization.
Timber/vegetation management only as specified in forest management plan and as necessary for admin/ops area.
No impoundment or diversion of waters other than to restore previously altered

[11] Fort Benning personnel review and approve all ACUB easement terms negotiated by TNC and/or its partners.

[12] A statement of CONSERVATION VALUES is required in any conservation easement. ACUB conservation easement language is developed by TNC and/or its partners and reviewed/approved by Fort Benning personnel. Easements intended for off-post RCW conservation would likely include the establishment and management of RCW groups as an explicit conservation value.

streams/wetlands.

Note that the template encumbrances or restrictions in Table 4 do not include *affirmative obligations,* i.e. they enumerate what cannot be done rather than what must be done. Historically, conservation easements have depended on firm prohibitions *against* certain actions or land-uses, while including (as an attachment or related document) a management plan such as that outlined in the next section. This management plan is typically considered a living document, whose details may be adapted over time to new practice and changing constraints while continually protecting the fundamental conservation values (e.g. functional habitat, elements of biological diversity) stated firmly in the easement document itself. Historically, the degree to which such management plans carry weight as legally-enforceable documents, as opposed to guidelines a landowner is encouraged but not compelled to follow, has varied among easement transactions, land trusts, and circumstances.

Nevertheless, many states including Georgia and Alabama have adopted the Uniform Conservation Easement Act (UCEA), which specifically authorizes durable "affirmative obligations to be attached to real property to protect natural and historic properties." The UCEA is intended to revise the traditional, common law understanding of affirmative easements, and enforcement of easements is a particular focus of the UCEA. Future off-post RCW conservation efforts may require that management plans include an enforceable affirmative position.

The mechanism to assure active conservation management for RCWs on lands protected under this plan may vary from parcel to parcel. See Appendix 5 "Protection Models" for these important details. Broadly speaking, any parcel considered for off-Post RCW conservation include explicit land-use restrictions and management requirements, whether as part of conservation easement terms or a deed restriction. If a landowner is unwilling to accept affirmative RCW management terms in a conservation easement, an option is to allow Fort Benning personnel, or another third party, to conduct RCW management on the property. Additional detail on management planning appears in the following chapter.

Habitat Management Planning **(Requirement 3)**

Part of the acquisition/encumbrance process for each ACUB RCW Priority Parcel will be development and approval of a Habitat Management Plan detailing the work required (if any) to restore the parcel's manageable habitat to RCW

suitability (according to federal guidelines defined by the 2003 RCW Recovery Plan), and to maintain the habitat in that condition in perpetuity. The responsibilities and legal assurances associated with this plan will depend somewhat on the protection instrument utilized for the parcel (Appendix 5). Depending on the condition and ultimate fee-ownership of the parcel, it may be appropriate to eventually restore the parcel to generally-accepted self-sustaining desired future conditions for ecologically-managed upland pine landscapes (Harrison et al. 2009), requiring fire management and little else. In other cases, where commercial timber management is a part of the land ownership objectives, a more intensively-managed approach, ranging from even-aged to individual-tree-selection silviculture, may be appropriate with constraints that allow RCW nesting and foraging. Timeframe and cost projections for such restoration and maintenance should be part of the habitat management plan.

As an example, management of a hypothetical 1000-acre parcel intended for self-sustaining longleaf pine restoration might be planned out as illustrated in Table 5. Habitat management plans with levels of detail similar to that in Table 5 will be developed for any Off-Post RCW parcel under consideration, with more detail developed as a formal management plan after closing.

Table 5. Example management plan for a hypothetical 1000-acre ACUB parcel purchased in fee or encumbered by an ACUB easement in 2010. Approximate costs only.

Property attribute	Management Action	Timing	Cost
100 acres of sand pine plantation, pulpwood/fuelwood size.	Clearcut, chemical site prep as needed, burn, plant longleaf Burn on 3-yr rotation @ $15/ac	2011-2012 2015, 2018, etc.	Funded by timber $ $1500 every 3 years
250 acres of loblolly pine plantation, various merchantable products	Thin to BA of 50-60 sqft/ac Burn on 3-yr rotation @ $15/ac Convert to longleaf gradually via thinning, under-plant, gap plant	2011 2012, 2015, etc. 2020, 2030, etc.	Funded by timber $ $3750 every 3 years Funded by timber $
100 acres of cutover land and non-merchantable scrub-shrub	Chemical site prep as needed, burn, plant longleaf @ $200/ac Burn on 3-yr rotation @ 15/ac	2011-2012 2015, 2018, etc.	$20,000 $1500 every 3 years
150 acres of mixed upland pine-hardwood natural stand, various merchantable products	Remove all hardwood and leave pine BA at no more than 60 sqft/ac, favoring longleaf. Chemical site prep @ $100/ace Burn on 3-yr rotation @ $15/ac Uneven-aged timber management	2011 2012 2012, 2015, etc. 2020, 2030, etc.	Funded by timber $ $15,000 $2250 every 3 years Funded by timber $
350 acres of slope, riparian, and floodplain hardwoods	Allow prescribed fire to encroach down slopes, no active mgt.	NA	NA
45 acres powerline and railroad rights-of-way	Burn as appropriate along with adjacent units.	NA	NA
5-acre admin/ops area	Secure/stabilize for parking, equipment staging, potential	In association with other mgt actions	Funded by timber $

Property attribute	Management Action	Timing	Cost
	home/building site		
3 miles of main access roads	Periodic maintenance and patching	In association with other mgt actions	Funded by timber $
4 gates, fencing, bdy lines, signs, mgt plans, taxes	Install and maintain as necessary	Annually	Funded by hunt lease $

Appendix 6, presented as an example, is a management plan for an existing ACUB conservation easement, designed to improve and restore a longleaf pine property that could serve as Adjacent Habitat (Condition 2) for Fort Benning. Neither that plan, nor the hypothetical scenario described in Table 5, account for RCW cavity inserts and RCW monitoring, both of which would occur outside the 10-20 year restoration activities described here.

Funding and Financing (Requirements 5 & 6)

As mentioned above, the funding needs for ACUB acquisition of fee or easement interests will be identified through the already-existing REPI Request program. This program accommodates funding required for land management as well as acquisition.

There are limits (currently $3M in REPI funding annually) beyond which most Army installations are not to expect appropriated funding, but the REPI Request mechanism accommodates the specification or expectation of additional funding from REPI for high-priority projects, as well as funding from other sources, that exceeds this $3M limit. Non-REPI funding sources include Fort Benning installation management funds, other Army funds, funds appropriated to mitigate for military construction projects, partner funds including state/federal grants, partner donations, and income derived from ACUB lands such as proceeds from timber income, recreational lease income, or proceeds from conservation-buyer sales. Annual funding totals over the period 2007-2009 ranged from approximately $2M (2007) to nearly $10M (2008). Total funding obligated by various DOD sources through 2010 is approximately $25M. Partner contributions, dominated by the value of donated conservation easements, have exceeded $2M. Program income from timber sales have added over $200,000.

Financing the long-term management and monitoring of ACUB projects, especially Off-Post RCW projects, is a special need. Addressing this need relates

to the diversity of protection instruments discussed in Appendix 5, and may also require clarification of federal rules (Office of Management and Budget, or OMB, Circular A-110) prohibiting investment of federal funds in interest bearing accounts, without returning accrued interest to U.S. Treasury.

In the 2010 REPI Report to Congress, a clarification or amendment to the legislation that authorizes installation buffering is proposed by the Defense Department that would clearly enable Army funding of endowments intended for the monitoring and enforcement of conservation easements:

> "… it would be desirable for Congress to clarify, either through report language or an amendment to §2684a, that—notwithstanding OMB Circular A-110 and DoD [Department of Defense] implementing regulations—DoD and the Military Departments may make a one-time, up-front payment to a §2684a partner to provide for the perpetual monitoring and enforcement of the easement, and that the recipient of such a payment need not separately account for and remit any interest earned on any such payment."

A similar funding issue may complicate the establishment of endowments for land management and holding costs[13] as well. Until such clarity is achieved for permanent management funding, the Army plans to commit to short-term (five-year) management agreements for Off-Post RCW parcels purchased in fee by conservation entities via ACUB; however, nothing in this plan is intended to violate the Anti-Deficiency Act. Should short-term management funding or in-kind assistance cease prior to establishment of permanent funding, TNC (or other landholding conservation entities) would reserve the right to divest itself of the property, encumbered by a restrictive conservation easement without permanently assured RCW management, returning any sale proceeds to the ACUB program. Currently TNC has sought land management (including holding cost) support from ACUB funds on an as-needed basis, having used direct ACUB funding, "program income" from timber sales required for ecological restoration on ACUB lands, Fort Benning in-kind assistance, as well as TNC private and/or partner funding. No management endowments have been established for any ACUB properties. Using current estimates of silvicultural costs, property taxes, land values, and a five-percent real rate of return, endowments necessary to fund annual land management costs for ACUB properties under RCW conservation management would require some 10 to 30 percent of the total acquisition, management, and holding cost. The

[13] Holding costs refer to costs associated with landownership such as property taxes, administration, security, road and boundary maintenance, etc.

range results from variation in land value, property tax rates, availability of timber sale and recreational lease revenue, necessity for one-time site-preparation, and necessity/timing for RCW cavity augmentation and monitoring. An example calculation appears below:

Tract size: 1000 acres
Acquisition cost (including due diligence): $2.5M
Property taxes: $15,000 annually ($15/year)
Prescribed burn cost: $4000 annually (80% of tract on 3-year rotation @ $15/ac)
RCW cavities: $3000 annually (2 clusters @ $1500/year)
Other holding costs (admin, security, maintenance): paid for by recreational hunt-lease revenue
Total annual requirement: $22,000
One-time site prep: paid for by timber-sale revenue
Required endowment @ 5% interest: $440,000
Total investment: $2.94M, 15% management, 85% acquisition.

In this example, the annual holding/management requirement is dominated by property taxes. Property taxes currently range from $10 to $25 per acre on ACUB fee lands. An arrangement whereby property taxes were forgiven, or not required as with state ownership of properties, could remove half to over three-quarters of an annual management/holding endowment for a fee-owned conservation property.

Responsibility for Easement and/or Fee Ownership (Requirement 7)

Under Fort Benning's current ACUB Program, these responsibilities have usually fallen to TNC. In 2009 TNC brought in their first sub-grantee as an easement holder, the Chattahoochee Valley Land Trust (CVLT), a local Columbus GA area non-profit which is staffed via contract with the Georgia/Alabama Land Trust organization. In addition, TNC has actively sought engagement with the Georgia Department of Natural Resources (DNR) as potential easement holders and holders of certain fee lands. Discussion with many other potential protection partners, both public and private, has occurred and many options remain open. Currently the partnership structure relies on TNC as the sole direct recipient of Fort Benning ACUB funds, through its Cooperative Agreement with the Army to implement

Fort Benning's ACUB. Sub-grants (like the one with CVLT, recently re-negotiated for additional conservation easement purchases and donations) extend these funds to additional partners. It would also be possible for Fort Benning to develop parallel cooperative agreements with other ACUB partners, whether land trusts or public agencies.

For Off-Post RCW parcels, Fort Benning will retain the existing partnership structure, with potential for additional sub-grant partners. A greater diversity of land trusts may provide greater flexibility in dealing with issues discussed in Appendix 5 regarding affirmative easements and endowment funding. The funding needs of Off-Post RCW parcels, if initially met by Fort Benning, may also provide the economic capacity for Georgia DNR to begin holding some fee ownership as Wildlife Management Areas or State Natural Areas.

Responsibility for Management (Requirement 7)

Management responsibility necessarily varies according to the many protection and funding scenarios discussed in Appendix 5, which this plan seeks to accommodate and implement as appropriate.

In the current ACUB Program, management responsibility on easement parcels resides with the landowner, and no special RCW-driven requirements (nor funding) have been provided.

Management responsibility on fee parcels also resides with the landowner (currently TNC), although such management has been funded via ACUB and via timber sale revenue from ACUB parcels (a form of "grant program income"), and recently, to a limited extent, by other TNC funding sources. On one parcel, firebreaks were created, and a prescribed fire for site preparation conducted, by Fort Benning according to plans provided by TNC under a cooperative management agreement. A renewal of that agreement is currently being negotiated between Fort Benning and TNC.

The broad stewardship plans proposed or under development for all the TNC-owned parcels in their present state are indistinguishable from explicit RCW-centric management plans, i.e. re-introduce fire, reduce stand density, restore groundcover, restore longleaf pine. Not until the recovering habitat supports more trees old enough to provide foraging and nesting would explicit RCW-centric management plans possibly diverge from general TNC stewardship plans.

Role of Existing Protected Lands (Requirement 10)

Many existing protected parcels, both TNC-owned and easement-encumbered, are likely to fit into the Off-Post RCW program. Some may have conservation easements that pre-date the ACUB program, or were protected outside of ACUB. While initially acquired with the expectation of short-term divestiture to conservation buyers with restrictive easements, TNC-owned lands have remained in TNC ownership with management actions begun as described above. TNC retained these lands at Fort Benning's request in expectation of an emerging Off-Post RCW Program, but without foreclosing opportunities to divest these parcels (now more desirable due to ongoing restoration/management) when/if appropriate. One of the first tasks of a broader regional conservation partnership would be to build upon the analysis of habitat conditions reported above in this Plan, validate current assumptions on the role of these fee lands, and make recommendations regarding management priorities, including appropriate funding and responsibility.

Long-term overall assessment (Requirement 11)

The Off-Post RCW program described here represents a flexible and far-reaching mechanism to secure habitat, direct funding, and engage partners in RCW conservation that transcends Fort Benning's boundaries. Its flexibility can accommodate a number of different protection, funding, and management models, and avoids over-commitment to any one strategy. Experience thus far with both easements and land acquisitions on this landscape suggests that significant habitat restoration and conservation is not only possible but likely. Appendix 3 represents an optimistic assessment of how an RCW population might be "built out" from the east side of Fort Benning, with RCW group locations color-coded by the year their habitat becomes available, assuming all these lands were protected in the current decade. It is uncertain that these particular lands, especially those coded "ACUB Long-Term," can be placed under RCW conservation management. This plan offers some population extensions very likely to be demographically-interacting with Fort Benning, as well as others providing genetic interchange and "landscape insurance" with a fair likelihood of future demographic interaction.

The nature of the private real estate market and conservation transactions by TNC and others makes it difficult to create a timeline for near-term, mid-term, and long-term conservation acquisitions and management actions. Plans and opportunities are almost always in flux as landowners respond to economic conditions. Land ownership and land management often changes. Today's skeptical landowner is tomorrow's willing seller, and vice-versa. Local governments may incentivize developments or land uses in ways incompatible with RCW or ACUB objectives, despite all attempts to develop multi-stakeholder plans. However, Fort Benning is directing TNC to rapidly develop strategies and funding requests for near-term actions (next five years) to secure lands via fee and easement transactions as illustrated in Appendix 1 (Map A2), to develop a habitat configuration like that illustrated in Appendix 2, or similar configurations likely to be functional for RCWs. If successful, this initiative would see cumulative conservation protection of some 20,000-30,000 acres of RCW Priority Parcels by 2015, after which most investments would be directed to management and restoration. The protection effort would likely expand to some eight to twelve years if funding and execution remained near the present (2007-2009) average protection rate (averaging ~2000 acres per year).

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Appendices

Note: These Appendices contain information on landowner names and parcel locations which should remain confidential. Please consult with The Nature Conservancy before sharing this information.

Appendix 1: ACUB Protection Strategies and Protected Property Descriptions

Fee Acquisition (to date 6 tracts totaling ~5000 acres)

These tracts, with the exception of one 800-acre tract (Blackjack Crossing), are either directly adjacent to Fort Benning or fall within a one-to-three mile buffer of the installation (Map A1). The purchase of these ACUB properties prevents further incompatible development on the northern and eastern boundaries, reducing the potential for noise complaints from existing and future MCOE ranges across the eastern portion of Fort Benning. They also help prevent encroachment by smoke-sensitive residential/commercial areas that would complicate prescribed burning in key areas for RCW recovery, and vastly increase wildfire hazard. Preventing or minimizing development on these parcels also protects watersheds and stream channels upstream of Fort Benning, which is another goal for the ACUB program. These objectives of preventing or reducing noise and smoke complaints (and other "external encroachment" issues), as well as upstream watershed protection, are the factors that drove the one-to-three mile buffer zone delineation.

Beyond simply providing a buffer against incompatible development, however, these properties can also provide off-Post habitat for several threatened and endangered species that can be found on Fort Benning. While this function often requires restoration actions and significant time spans, it is of increasing importance to Fort Benning. Foremost among these species is the RCW. All of the properties, again with the exception of Blackjack, fall within a 3-mile buffer of Fort Benning. The parcels are being restored to longleaf pine and will all have fire reintroduced on approximately three year intervals. In addition to providing future RCW habitat, most of these properties have existing populations of Gopher tortoise and several rare plant species as well. They also provide significant watershed protection, which is another goal of the ACUB program.

High quality sand hill parcels outside the no-development zone like the ACUB's Blackjack tract along with other adjacent properties (Almo) could create a contiguous nine thousand acre conservation area at the headwaters of Juniper Creek for future RCW habitat and existing Gopher tortoise habitat. While there is potential (and ongoing progress via fee and easement acquisition negotiations) to link this conservation area with existing protected ACUB lands within the 3 mile zone, this large disjunct area would also have value to the Army as a stand-alone

Gopher tortoise, longleaf restoration area that provides watershed protection for Upatoi Creek flowing through Fort Benning. The Army continues to pursue acquisition of properties that meet the primary goals of the ACUB program, with preference given to parcels that could be restored to RCW and Gopher tortoise habitat.

Fee Tract Descriptions:

Bill Heard: ~700 acres adjacent to Fort Benning. Timber predominantly loblolly, scheduled for thinning in 2011 and prescribed fire starting in 2012. Includes the Fall Line reach of Kendall Creek and other tributaries of Upatoi.

North Mead/Buck: ~600 acres just east of the installation. The North Mead property was thinned recently and the entire parcel should be prescribe-burned in 2011. Includes portions of Juniper and Little Juniper Creeks, including a significant population of rare Macbridea caroliniana and remnant Atlantic white cedar.

Ingram: ~1700 acres just east of the Buck property. This year had 345 acres of sandpine removed, and will be replanted to longleaf and burned in the next 2 years. Includes isolated wetlands amid xeric sandhill gopher tortoise habitat, with potential for additional herpetofauna diversity and restoration.

Mead Brown Springs: ~300 acres adjacent to the installation. ~200 acres of sandpine was recently removed and replanted to longleaf. This property also recently received 100 relocated Gopher tortoises from the Hastings range area on Fort Benning. Scheduled to be prescribe-burned in 2011-12.

South Mead/Little Pine Knot: ~900 acre parcel adjacent to the installation. The South Mead section was recently harvested and replanted to longleaf. The entire parcel is scheduled to be burned in 2011.

Blackjack: ~800 acres in Talbot County. Recently removed ~50 acres of sandpine, longleaf regeneration/planting will ensue. Active fire management of this tract has been ongoing since TNC acquired it in 2006. Includes extensive gopher tortoise population, and several seepage bog plant communities with imperiled status.

Conservation Easements (~2300 acres with fee ownership by five landowners)

The ACUB conservation easements vary to a degree in level of restriction depending on the landowner, but generally disallow development and provide protections for a series of conservation values including watershed and threatened/endangered species. Easement language is typically crafted to

encourage (but not require) significant habitat restoration, which assures eligibility of these landowners for future incentive programs to actively restore and manage habitat. These ACUB conservation easements may therefore have value as land-use buffer, watershed protection, habitat linkage, or core functional habitat, depending on location and landowner incentive.

Conservation Easement Tract Descriptions

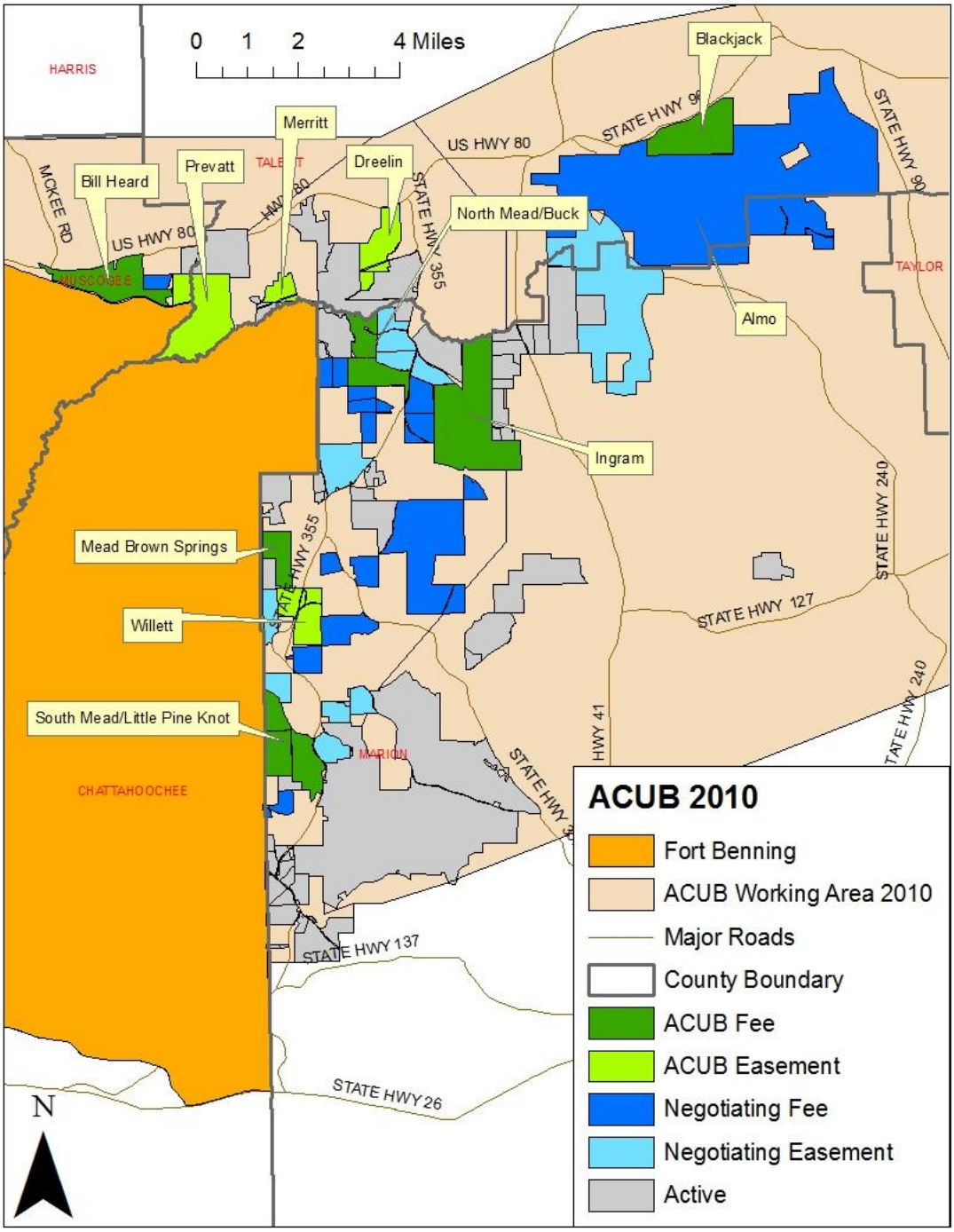
Prevatt: ~1100 acres adjacent to Fort Benning, dominated by wetlands. The uplands are mostly plantation loblolly along with a young longleaf stand. Provides significant watershed and wetland protection and has one of the largest populations of Relict Trillium that we have found in the area.

Dreelin: 487 acres with approximately half of the acreage in wetlands. Relict trillium found in the Upatoi Creek floodplain at this site. Fort Benning purchased wetland mitigation credits from the owner of this property for construction on the installation.

Willett: ~500 acre tract with excellent upland sandhill habitat. The owner has thinned much of his timber and is engaged in active fire management. The property has quality gopher tortoise and pocket gopher habitat. This tract is within .5 miles of the installation and is connected by one of TNC's fee properties.

Hart: ~87 acres in Alabama adjacent to Fort Benning along Uchee Creek.

Merritt: ~165 acres adjacent to Fort Benning along Upatoi Creek.

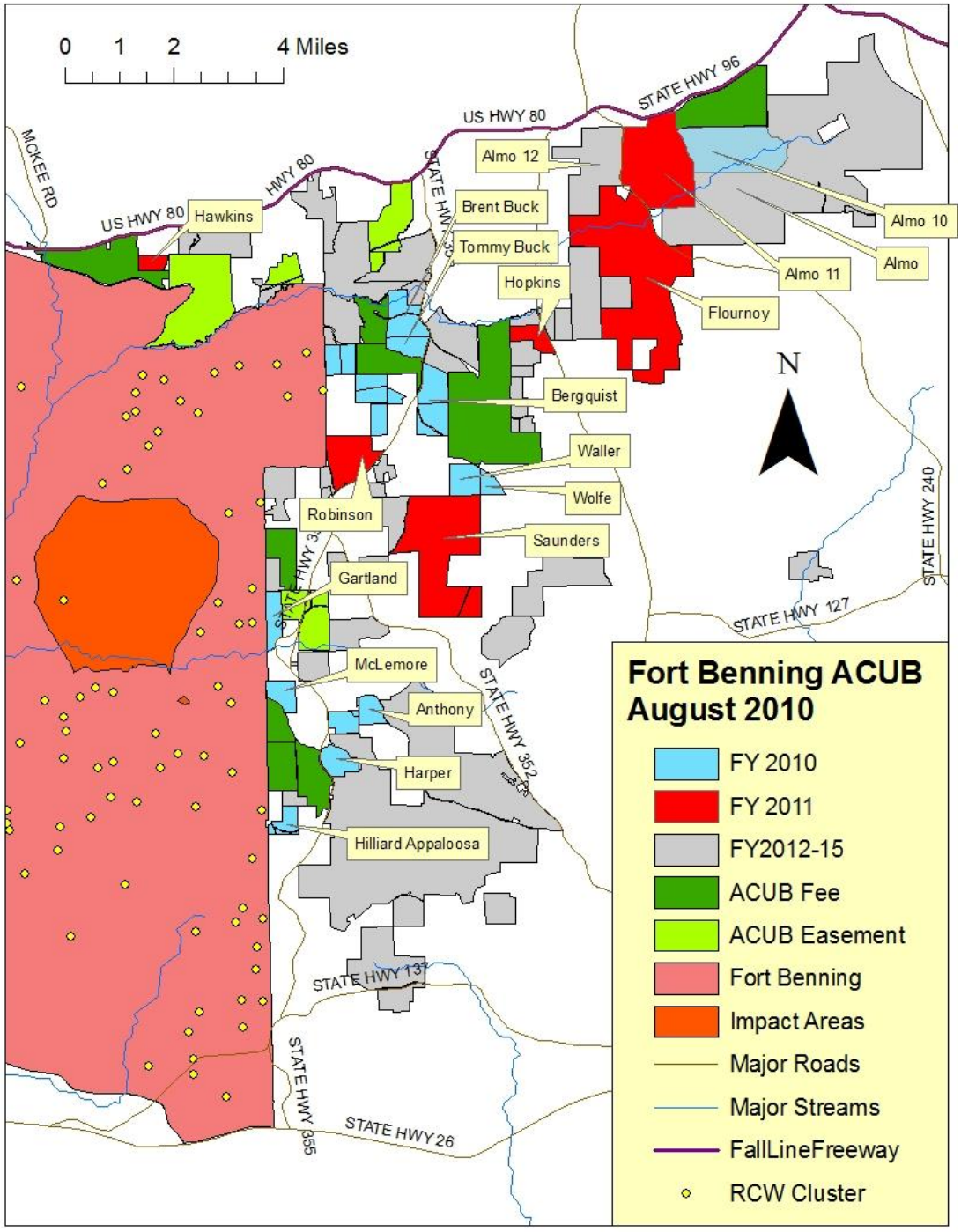


Map A1: Location of protected ACUB properties through FY 2010

Table A1: RCW priority parcels for which funding has been requested through REPI for FY11 ACUB acquisition.

Priority for FY 2011	Acquisition Fee/Easement	Acreage	Likelihood of Acquisition	Adjacent or Satellite Habitat
Almo (phased purchase*)	Fee	1500+/-	90%	Satellite
Bergquist	Fee	428	70%	Adjacent
Appaloosa	Fee	113	90%	Adjacent
Saunders	Fee	1585	90%	Adjacent
Flournoy	Easement	2600	70%	Satellite
Hawkins	Fee	100	90%	Adjacent
Robinson	Easement	450	70%	Adjacent
TOTAL		**5276**		

*Almo property is proposed to be purchased in phases over several years.



Map A2. Parcels in negotiation (FY2011) or under study (FY2012-15) to expand the Fort Benning ACUB Program.

Appendix 2. Parcel attribute values used to rank individual parcels for RCW conservation and their scores as described in Table 2

Parcel Name	UplandAcres	Total_Acres	Clusters within 3 mi	3-mile cluster score	PBG Viability	Viability score	Group Size	Group Size Score	Clusters within 1.25mi	1.25mi clusterscore	Capacity	Capacity score	Avg score
Mead Brown Springs	303	304	13	3	4.8	3.0	3.1	3.0	5	3	1.5	2	2.8
Bill Beasley	60	110	10	3	4.8	3.0	3.3	3.0	5	3	0.5	1	2.6
Robinson	450	450	11	3	4.4	3.0	2.6	2.0	2	2	2.5	3	2.6
Willett	400	513	10	3	4.7	3.0	3.3	3.0	4	2	2	2	2.6
Gartland	125	175	14	3	4.4	3.0	3.0	2.0	6	3	0.5	1	2.4
Hilliard Plantation	6295	10000	19	3	3.7	1.0	2.8	2.0	5	3	20	3	2.4
Little Pine Knot	368	580	20	3	3.9	2.0	2.8	2.0	4	2	3	3	2.4
King	68	86	11	3	4.5	3.0	2.5	2.0	3	2	0	1	2.2
Medelean	257	322	9	2	4.7	3.0	3.5	3.0	0	1	1	2	2.2
South Mead	268	297	21	3	3.9	2.0	2.8	2.0	3	2	1	2	2.2
Bentley	155	190	13	3	4.2	2.0	2.8	2.0	2	2	0.5	1	2.0
Bourf	275	281	21	3	4.7	3.0	2.7	2.0	1	1	0.5	1	2.0
Buck Fee	310	365	7	2	4.3	2.0	2.5	2.0	2	2	2	2	2.0
Desportes	800	1492	7	2	4.3	2.0	2.5	2.0	4	2	1	2	2.0
DL Jordan	629	696	10	3	4.5	3.0	2.5	2.0	0	1	0	1	2.0

Ingram	1479	1724	3	1	4.7	3.0	2.7	2.0	0	1	3.5	3	2.0
McLemore	132	162	15	3	3.9	2.0	2.7	2.0	3	2	0	1	2.0
McLemore2	61	66	9	2	4.7	3.0	3.4	3.0	0	1	0	1	2.0
Phil Preston	61	75	25	3	3.3	1.0	2.4	1.0	11	3	1.5	2	2.0
Plum Creek LJC	81	100	8	2	4.4	3.0	2.5	2.0	4	2	0.5	1	2.0
Prevatt	251	1100	17	3	4.1	2.0	2.2	1.0	7	3	0	1	2.0
Sndrs/ Alex Bros	1374	1585	4	1	4.5	3.0	3.0	2.0	0	1	2.5	3	2.0
Willett Sale	57	57	12	3	4.4	3.0	2.7	2.0	0	1	0	1	2.0
Anthony	250	250	12	3	3.8	1.0	2.8	2.0	0	1	1	2	1.8
Bergquist	398	428	4	1	4.5	3.0	2.6	2.0	0	1	2	2	1.8
Bob Elliott	139	163	4	1	4.5	3.0	2.6	2.0	0	1	1	2	1.8
Buck Marion	323	388	7	2	4.3	2.0	2.5	2.0	0	1	1.5	2	1.8
Harper	147	186	12	3	3.4	1.0	2.6	2.0	0	1	1	2	1.8
Heard	694	723	15	3	3.7	1.0	2.0	1.0	0	1	2.5	3	1.8
Hilliard Appaloosa	96	113	16	3	3.2	1.0	2.3	1.0	3	2	1	2	1.8
Hilliard LJC	289	352	8	2	4.3	2.0	2.4	1.0	4	2	1	2	1.8
Merritt	135	167	8	2	4.4	3.0	2.5	2.0	0	1	0	1	1.8
North Mead	244	292	6	2	4.2	2.0	2.4	1.0	2	2	1	2	1.8
Small Saunders	86	93	7	2	4.3	2.0	2.5	2.0	3	2	0.5	1	1.8
Brent Buck	296	296	5	1	4.0	2.0	2.5	2.0	0	1	1.5	2	1.6
Hawkins	60	100	10	3	4.1	2.0	2.2	1.0	0	1	0	1	1.6
Watkins	350	392	4	1	4.5	3.0	2.3	1.0	0	1	1.5	2	1.6
Heard North	300	355	9	2	4.5	3.0	2.4	1.0	0	1	1	2	1.8
Springer	122	181	5	1	4.6	3.0	2.9	2.0	0	1	0.5	1	1.6

Buck Talbot	201	480	5	1	4.0	2.0	2.5	2.0	0	1	0	1	1.4
Dreelin	279	487	5	1	4.0	2.0	2.5	2.0	0	1	0	1	1.4
Mark Robinson	309	350	6	2	4.2	2.0	2.4	1.0	0	1	0	1	1.4
Tommy Buck	137	104	5	1	4.0	2.0	2.5	2.0	0	1	0.5	1	1.4

Definitions:

Upland Acres= Parcel acres that are potentially restorable to RCW habitat

Clusters within 3 miles = number of RCW clusters whose 3 mile dispersal buffer is intersected by the parcel

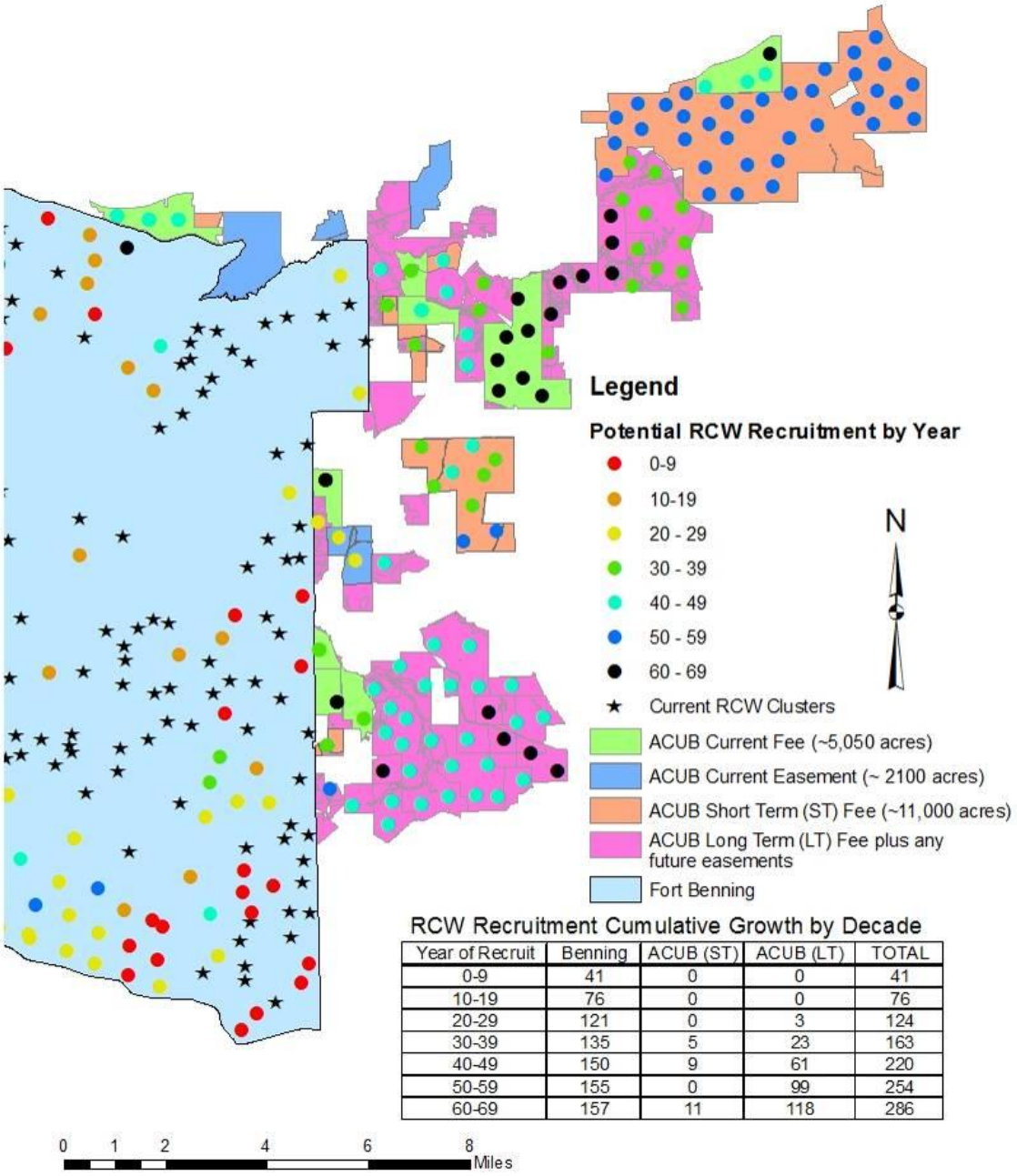
PBG Viability= for adjacent clusters, average number of years with a potential breeding group (PBG) within the last five years 2006-2010

Group Size= for adjacent clusters, average group size (birds per group) over the last five years 2006-2010

Clusters within 1.25 mi = number of RCW clusters within 1.25 miles of the parcel (a measure of aggregation)

Capacity = number of potential recruitment clusters that could inhabit the site based on the parcel's restorable upland habitat acreage

Appendix 3: Future recruitment potential of RCWs east of Fort Benning (given current, short-term priority, and long-term study parcel configurations taken from MCOE BA (DA 2008)).



RCW Recruitment Cumulative Growth by Decade

Year of Recruit	Benning	ACUB (ST)	ACUB (LT)	TOTAL
0-9	41	0	0	41
10-19	76	0	0	76
20-29	121	0	3	124
30-39	135	5	23	163
40-49	150	9	61	220
50-59	155	0	99	254
60-69	157	11	118	286

Appendix 4: Conservation Easement Template

DRAFT: FOR DISCUSSION PURPOSES ONLY

RECORD AND RETURN TO:

_____
The Nature Conservancy
1330 W. Peachtree Street
Suite 410
Atlanta, GA 30309

DEED OF CONSERVATION EASEMENT

NOTICE: THIS PROPERTY INTEREST HAS BEEN ACQUIRED WITH ASSISTANCE FROM THE UNITED STATES ARMY (THE "ARMY") IN FURTHERANCE OF THE COOPERATIVE AGREEMENT BETWEEN THE NATURE CONSERVANCY AND THE U.S. ARMY RESEARCH DEVELOPMENT AND ENGINEERING COMMAND ON BEHALF OF FORT BENNING (THE "COOPERATIVE AGREEMENT"). THIS DEED CONTAINS RESTRICTIONS ON THE USE AND DEVELOPMENT OF THE PROPERTY WHICH ARE INTENDED TO PROTECT ITS CONSERVATION VALUES IN FURTHERANCE OF THE COOPERATIVE AGREEMENT. THE ARMY FOUND THAT THE ACCEPTANCE OF THIS DEED IS IN THE PUBLIC INTEREST.

THIS INDENTURE (this "Conservation Easement") is made this ___ day of _____200_, between _____(collectively, the "Grantor"); and THE NATURE CONSERVANCY, a non-profit corporation incorporated under the laws of the District of Columbia and having its headquarters at 4245 North Fairfax Drive, Suite 100, Arlington, Virginia 22203-1606, and a local address at the Georgia Chapter Office, 1330 West Peachtree Street, Suite 410, Atlanta, Georgia 30309 (together with its successors and assigns, the "Grantee").

WHEREAS, the Grantor is the owner in fee simple of certain real property located in _____ County, Georgia which has wildlife, fish, and plant habitat, and natural, aesthetic, scientific, educational, and ecological value in its present state as a natural area, and which property is described in Exhibit A attached hereto and by this reference incorporated herein (the "Protected Property"); and

WHEREAS, the Protected Property is adjacent to (or in the vicinity of) the Fort Benning Military Installation ("Fort Benning"), a military training facility maintained by the United States Army with an active conservation stewardship program, and is therefore a part of a larger protected ecological system, and Fort Benning's suitability for the purpose of military training is expected to be maintained or enhanced by the permanent protection of the conservation values of the Protected Property; and

WHEREAS, the Grantee is a tax exempt public charity under Sections 501(c)(3) and 509(a)(1) of the Internal Revenue Code, and the Grantee's primary purpose is to preserve plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive; and

WHEREAS, the Protected Property qualifies as "a relatively natural habitat of fish, wildlife, or plants, or similar ecosystems," as that phrase is used in Section 170(h)(4)(a)(ii) of the Internal Revenue Code; and

WHEREAS, the Protected Property represents one of the highest priority areas of Fort Benning's
Army Compatible Use Buffer (ACUB) study area. It will buffer important training areas on Fort Benning, facilitate critical land management practices such as prescribed burning, protect critical wetlands and watersheds surrounding Fort Benning, and provide critical habitat for endangered species and species of concern; and

WHEREAS, the Protected Property possesses significant wildlife, fish, and plant habitat, and significant ecological and hydrological values, and significant buffer value to Ft. Benning, all as described below (collectively, the "Conservation Values"), which Conservation Values are of great importance to the Grantor and Grantee; and

WHEREAS, the Conservation Values are further documented in the Conservation Easement Documentation Report for the Protected Property, dated _____, and incorporated herein by this reference (the "Report"), completed by the Grantee and signed by the Grantor and the Grantee, a copy of which Report is on file with both the Grantor and the Grantee, and which Report establishes the condition of the Protected Property at the time of the gift [OR SALE] as provided in Treasury Regulation Section 1.170A-14(g)(5); and

WHEREAS, the Grantor and Grantee have identified and agreed that the Conservation Values are concisely described as follows, and more completely described in the Report:

> Significant land area to remain largely undeveloped, vegetated, occupied by native flora and fauna, and contiguous with a larger landscape conservation program (Fort Benning's Army Compatible Use Buffer, hereafter "ACUB" Program and the Grantee's Chattahoochee Fall Line conservation area);
>
> Recovering hydrology and ecology of the _____ floodplain, and associated forested and herbaceous wetlands;

Provide permanent forest structure for red-cockaded woodpecker foraging or nesting habitat in the future;

Occurences of _____ (potential for Carolina Bog mint, etc..)

WHEREAS, the Grantor desires to ensure that the conservation easement granted herein complies with the provisions of Section 2031(c) of the Internal Revenue Code, relating to the Federal Estate Tax treatment of lands subject to a qualified conservation easement, and intends that the lands which are the subject of this Conservation Easement will so qualify for such treatment; and

WHEREAS, the Grantor and Grantee have the common purpose of conserving the above-described Conservation Values of the Protected Property in perpetuity, and the State of Georgia has authorized the creation of conservation easements pursuant to the Georgia Uniform Conservation Easement Act, and Grantor and Grantee wish to avail themselves of the provisions of that law, Ga. Code Sections 44-10-1 et. seq (1992); and

WHEREAS, the Grantor and the Grantee have the common purpose of protecting the Conservation Values by voluntarily placing restrictions upon the use of the Protected Property and by providing for the transfer from the Grantor to the Grantee of affirmative rights for the protection of the Protected Property.

NOW, THEREFORE, the Grantor, as an absolute gift, with no monetary consideration, [REVISE IN CASE OF PURCHASED EASEMENT] and in consideration of the covenants, mutual agreements, conditions, and promises herein contained, does hereby freely give, grant, bargain, sell, and convey unto the Grantee, its successors and assigns, forever, a conservation easement as defined in the Georgia Uniform Conservation Easement Act, Georgia Code Sections 44-10-1 et. seq. (without intending that the existence of this Conservation Easement be dependent on the continuing existence of such laws)**,** in perpetuity, over the Protected Property, of the nature and character and to the extent hereinafter set forth.

A. PURPOSE

The purpose of this Conservation Easement is to do all of the following (collectively, the "Purpose"): (i) to assure that the Protected Property will be retained forever predominantly in its natural condition; (ii) to protect the native plants, animals, and plant and animal communities on the Protected Property; (iii) in all other respects to prevent any use of the Protected Property that would impair or interfere with the Conservation Values; and (iv) to provide a buffer for the adjacent Fort Benning to protect the training mission and existing Conservation Values on Fort Benning by doing all of the following: (1) to limit any development or use of the Protected Property that would be incompatible with the mission of Fort Benning; and (2) to preserve habitat on the Protected Property in a manner that: (A) is compatible with governmental requirements; and (B) may eliminate or relieve current or anticipated governmental restrictions that would or might otherwise restrict, impede, or otherwise interfere, whether directly or indirectly, with current or anticipated military training, testing, or operations on Fort Benning. The Grantor intends that this Conservation Easement will confine the use of the Protected Property to such activities as are not inconsistent with the Purpose of this Conservation Easement.

B. AFFIRMATIVE RIGHTS OF THE GRANTEE

To accomplish the Purpose of this Conservation Easement, this Conservation Easement conveys the following rights to the Grantee:

1. Conservation Values. The right to preserve and protect the Conservation Values in perpetuity.

2. Right of Entry. The right of the Grantee's officers, employees, and/or designated agents to enter the Protected Property in a reasonable manner and at reasonable times for the following purposes:

   (i) to inspect the Protected Property to determine whether the Grantor is complying with the covenants and Purpose of this Conservation Easement;

   (ii) to enforce the terms of this Conservation Easement in accordance with the Grantee's remedies as set forth in Section F hereof;

   (iii) to make scientific and educational observations and studies and research projects and to monitor the condition of the rare plant and animal populations, plant communities, and natural habitats on the Protected Property.

Provided, however, that except in cases where the Grantee reasonably determines that immediate entry is required to prevent, terminate, or mitigate a violation of this Conservation Easement, the Grantee shall give notice to the Grantor no less than three (3) days before entering the Protected Property, and the Grantee shall not in any event unreasonably interfere with the Grantor's use and quiet enjoyment of the Protected Property. In the event Grantor elects to maintain gated, locked access to and through the Protected Property, Grantor shall provide Grantee with keys for all such locks.

3. Enforcement. The right to prevent any activity on, or use of, the Protected Property that is inconsistent with the Purpose of this Conservation Easement, and to require the restoration of such areas or features of the Protected Property that may be damaged by any inconsistent activity or use, pursuant to Section F hereof.

C. PROHIBITED USES

Any activity on or use of the Protected Property inconsistent with the Purpose of this Conservation Easement is prohibited. Without limiting the generality of the foregoing, the following activities and uses are expressly prohibited:

1. Subdivision. There shall be no division, partitioning, or subdivision in any manner of the Protected Property. A boundary line adjustment shall not be considered a division provided either: (i) each parcel affected by the boundary line adjustment is subject to a conservation easement granted to the Grantee, which conservation easement contains terms and conditions at least as protective of the Conservation

Values as the terms and conditions of this Conservation Easement, or (ii) advance written approval of the boundary line adjustment is obtained from the Grantee.

2. Agricultural, Commercial, and Industrial Uses. There shall be no agricultural, commercial, or industrial uses of the Protected Property. The parties agree that this paragraph shall prohibit use of the Protected Property for commercial recreational activities within the meaning of Section 2031(c)(8)(B) of the Internal Revenue Code.

3. Structures. There shall be no constructing or placing of any temporary or permanent building, structure, or facility (including, but not limited to, any of the following: mobile home, tennis or other recreational court, landing strip, swimming pool, fence, sign, billboard, or other advertising display (other than those reasonably required by the Grantor or the Grantee for appropriate management, including, without limitation, posting of "No Trespassing" or similar signs denying public access to the Protected Property), asphalt or concrete pavement, antenna, utility pole, tower, conduit, line, sodium vapor light, dock, bridge, and pier), except as expressly provided in Section D. The following _____(_) structures currently existing on the Protected Property and documented in the Report may be repaired, maintained, or replaced:_____, but not enlarged.

4. Roads and Trails. There shall be no constructing of any roads or trails on the Protected Property except as expressly provided in Section D.

5. Topography. There shall be no ditching, draining, diking, filling, excavating, dredging, drilling, removal of topsoil, sand, gravel, rock, peat, minerals, or other materials, or any other intentional, material change in the topography of the Protected Property, except as necessary for the maintenance of existing or otherwise authorized footpaths.

6. Minerals. There shall be no mining (including surface mining) on the Protected Property, and no minerals, gas, or oil shall be extracted from the Protected Property.

7. Dumping. There shall be no dumping or storage of trash, garbage, or any other unsightly or offensive material in, on, or under the Protected Property.

8. Timber. There shall be no timber harvesting on the Protected Property except as expressly permitted in Section D. 3. hereof**.**

9. Vegetation. There shall be no significant removal, destruction, cutting, trimming, or mowing of any vegetation except as follows:

(i) in accordance with a "Forest Management Plan" approved by the Grantee, as defined in Section D.3. below;

(ii) as necessary to eradicate or control the spread of Non-native Invasive Plant Species in accordance with Section C.10. below;

(iii) as is necessary to maintain existing or otherwise authorized roads and footpaths; and

(iv) as reasonably necessary for an action specifically allowed under Section D.

Grantor shall consult with the Grantee prior to conducting any vegetation removal activities in order toplan such activities to avoid negative impacts to the Conservation Values.

10. Non-native Invasive Plant Species. For the purposes of this Easement, "Non-native Invasive Plant Species" is defined as any non-native invasive plant species listed by the Georgia Exotic Pest Plant Council (the "Council") or a similar body, in the event the Council dissolves at a later date, including, but not limited to, [REFERENCE PARTICULAR PLANT SPECIES AS NECESSARY], and any other plant species that Grantor and Grantee may agree in writing to designate as Non-native Invasive Plant Species. Grantor will eradicate or control spread of Non-native Invasive Plant Species from the Protected Property to the degree practical**.** There shall be no planting or introduction on the Protected Property of any Non-native Invasive Plant Species, or any other non-native species of vegetation, without the express prior written approval of the Grantee, which may be withheld in the Grantee's sole discretion. At any and all times, the Grantee shall have the right, but not the obligation, to remove non-native invasive vegetation and wildlife from the Protected Property.

11. Waters and Hydrology. There shall be no disruption, alteration, pollution, depletion, or extraction on or from the Protected Property of existing surface or subsurface water flow or natural water sources, fresh water lakes, ponds and pond shores, marshes, creeks, or any other water bodies, nor shall any activities or uses be conducted on the Protected Property that may reasonably be expected to cause detriment to water purity or alter natural water levels and/or flow in or over the Protected Property.

12. Vehicles. There shall be no parking or operation of automobiles, dune buggies, motorcycles, all-terrain vehicles (ATVs), or any other type of motorized vehicles on the Protected Property except as permitted in Section D..

13. Pesticides. There shall be no application of pesticides (including, but not limited to, insecticides, fungicides, rodenticides, and herbicides) on the Protected Property, except that herbicides may be used in a reasonable manner in accordance with the Forest Management Plan approved by the Grantee in accordance with Section D.3. below, or as part of a program to control or eradicate Non-native Invasive Plant Species as provided in paragraph 9 of this section.

14. Prohibited Use. Any use of the Protected Property and any activity thereon, which, in the reasonable opinion of the Grantee, is or may become inconsistent with the Purpose of this grant of Conservation Easement is prohibited.

D. THE GRANTOR'S RESERVED RIGHTS

The Grantor reserves to itself all rights accruing from its ownership of the Protected Property, including the right to engage in, and to permit or invite others to engage in, all uses of the Protected Property that are not expressly prohibited herein, provided such uses are not inconsistent with the Purpose of this Conservation Easement. Without limiting the generality of the foregoing, and subject to the terms of Section C hereof, the following rights are expressly reserved to the Grantor:

1. Right to Sell. The right to sell, give, or otherwise convey or encumber the Protected Property, provided that any such conveyance or encumbrance shall be subject to the terms of this Conservation Easement.

2. Recreational Use. The right to the continued use and enjoyment of the Protected Property for non-commercial recreational purposes such as hunting or fishing, that are not prohibited in Section C hereof or elsewhere in this Conservation Easement, that have limited, localized impacts not destructive of the Conservation Values, and that are consistent with the Purpose of this Conservation Easement.

3. Timber Harvesting. The right to selective timber thinning, harvesting, and prescribed burning on the Protected Property. Any such timber thinning and harvesting shall accomplish the following goals: maintain the soil productivity of the Protected Property, conserve or enhance the water quality of waterbodies, wetlands and riparian zones on the Protected Property, protect or enhance the wildlife habitat attributes of the Protected Property, maintain or create a balance of forest age classes and native species composition on the Protected Property, maintain or enhance the overall quality of the timber resources on the Protected Property, and conserve or enhance the viable populations of native plant and animal species on the Protected Property. Further, any timber harvesting on the Protected Property shall be carried out in accordance with then-current, generally accepted best management practices for the sites, soils, and terrain of the Protected Property and in accordance with a detailed forest management plan that accomplishes the goals set forth above, and shall include at least the following elements (the “Forest Management Plan”): a) Grantor’s forest management objectives; b) an appropriately scaled, accurate map indicating such items as forest stands, streams and wetlands, and major access routes (truck roads, landings and major skid trails); c) forest stand ("treatment unit") descriptions (forest types, stocking levels before and after harvesting, soils, topography, stand quality, site class, insect and disease occurrence, previous management history, and prescribed silvicultural treatment); d) any intended silvicultural use of herbicides; e) plant and wildlife considerations (identification of known significant habitats and management recommendations, and Grantor’s plan with regard to retaining snag trees, den trees, and downed trees); and f) recreational considerations. Grantor’s Forest Management Plan shall be updated and amended (if and as necessary) every ten (10) years, and shall always take into account current federal, state, and regional forest management

policies and procedures. Grantor's Forest Management Plan and all updates thereto shall be submitted to and approved in writing by Grantee prior to implementation.

E. THE CONTINGENT RIGHTS OF THE UNITED STATES ARMY

This Easement was accepted by the Grantee subject to the purposes, terms and obligations of the Cooperative Agreement between the Conservancy and the U.S. Army Research Development and Engineering Command on behalf of Fort Benning (as such agreement may be amended from time to time), and the Conservancy shall hold, monitor and enforce the Easement consistent with the purposes, terms and obligations set forth in the Cooperative Agreement.

1. Should the Grantee fail to enforce any term of this Conservation Easement and permit the Protected Property to be used or developed in a manner inconsistent with the recitals and Purpose of this Easement or for a Prohibited Use, then the United States Secretary of the Army, through his or her authorized representative, shall, at his discretion, demand transfer of this Conservation Easement to the United States or a third party qualified organization in accordance with 10 U.S.C. 2684a(d)(4) or have the affirmative rights of Grantee set forth in Section B and the rights to enforce the Easement using the procedures in **Section F** below and all authorities available under State or Federal law.
2. In accordance with **Section K** below, the Grantee shall notify the Army and obtain written approval prior to transferring any right, title or interest of this Conservation Easement, and the United States, acting through the Secretary of the Army, at his discretion shall have the right to direct transfer of the easement to the United States or designate a successor to Grantee under the conditions described in Section K.2 below.
3. If the Grantee terminates, transfers, or otherwise divests itself of any rights, title, or interest of this Conservation Easement without the prior written approval of the United States Secretary of the Army through his or her authorized representative, such transaction shall not be legally effective, and all right, title and interest in this Conservation Easement shall become vested in the United States of America.

F. THE GRANTEE'S REMEDIES

1. Notice of Violation; Corrective Action. If the Grantee determines that a violation of the terms of this Conservation Easement has occurred or is threatened, the Grantee shall give written notice to the Grantor and the Army of such violation, and demand corrective action sufficient (i) to cure such violation, and (ii) where the violation involves injury to the Protected Property resulting from any use or activity inconsistent with the Purpose of this Conservation Easement, to restore the Protected Property so injured to its condition before the violation occurred in accordance with a plan approved by Grantee.

2. Remedies. If the Grantor fails to cure any violation or threatened violation of this Conservation Easement, or cause such other corrective action to be taken as requested by the Grantee within thirty (30) days after receipt of the notice described in paragraph 1 of this section (or, under circumstances where the requested corrective action cannot reasonably be completed within the thirty (30) day period, if the Grantor fails to make good faith efforts to initiate and pursue the requested corrective action within the thirty (30) day period), the Grantee shall be entitled to bring an action or actions at law or equity in a court of competent jurisdiction in the county where the Protected Property is located, to do one or more of the following:

(i) enforce the terms of this Conservation Easement, and/or

(ii) enjoin the violation by temporary or permanent injunction, *ex parte* as necessary, and the Grantor waives any bond requirement otherwise applicable to any petition for such relief, and/or

(iii) require the restoration of the Protected Property to its condition before the violation occurred, and/or

(iv) recover any damages arising from the violation, including but not limited to punitive damages and damages for the loss of scenic, aesthetic, or environmental values, and/or

(v) report to any regulatory authorities any environmental conditions, or any potential or actual violations of environmental laws.

If such court determines that the Grantor has failed to comply with this Conservation Easement, the Grantor shall reimburse the Grantee for any reasonable costs of enforcement, including Grantee's staff time, costs of restoration, court costs, and reasonable attorneys' fees, in addition to any other payments ordered by such court. If Grantee initiates litigation and the court determines that the Grantor has complied with all the terms of the Conservation Easement and that Grantee initiated litigation in bad faith, then the Grantee shall reimburse Grantor for any reasonable costs of defending such action, including court costs and reasonable attorneys' fees.

3. Emergency Enforcement. If the Grantee, in its sole discretion, determines that circumstances require immediate action to prevent or mitigate significant damage to the Conservation Values, the Grantee may pursue its remedies under this section without prior notice to the Grantor or without waiting for the thirty (30) day period for cure to expire.

4. Forbearance. The Grantee does not waive or forfeit the right to take action as may be necessary to insure compliance with this Conservation Easement by any prior failure to act, and the Grantor hereby waives any defense of laches, estoppel or prescription with respect to any delay by the Grantee in acting to enforce any restriction or exercise any rights under this Conservation Easement.

5. Acts Beyond the Grantor's Control. Nothing herein shall be construed to entitle the Grantee to institute any enforcement proceeding against the Grantor for any change to the Protected Property due to causes beyond the Grantor's control, including, without limitation, change caused by fire, flood, storm, or other acts of God, or the unauthorized wrongful acts of third persons.

6. Scope of Relief. Grantee's rights under this Section F apply equally in the event of either actual or threatened violations of the terms of this Conservation Easement. Grantor agrees that Grantee's remedies at law for any violation of the terms of this Conservation Easement are inadequate and that Grantee shall be entitled to the injunctive relief described in Section F.2, both prohibitive and mandatory, in addition to such other relief to which Grantee may be entitled, including specific performance of the terms of the Conservation Easement, without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies. Grantee's remedies described in this Section F shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity.

7. Mediation. If a dispute arises between the parties concerning the consistency of any use or activity with the provisions or Purpose of this Conservation Easement, and if Grantor agrees not to proceed with the use or activity pending resolution of the dispute, either party may request in writing to the other that the matter be mediated. Within fifteen (15) days of the receipt of such a request, the two parties may jointly appoint a single independent third-party mediator to hear the matter. Each party shall pay an equal share of the mediator's fee, unless the parties agree otherwise. In referring any matter arising under this Conservation Easement to mediation, Grantor and Grantee agree that mediation offers an alternative to the expense and time required to resolve disputes by litigation and is therefore often preferable to litigation. Nevertheless, mediation pursuant to this Paragraph 7 shall be voluntary, and this mediation provision shall not be interpreted as precluding or limiting the parties from seeking legal or equitable remedies.

G. DEVELOPMENT RIGHTS

The Grantor hereby grants to the Grantee all the development rights that are now or hereafter allocated to, implied, reserved, or inherent in the Protected Property, and the parties agree that such rights are hereby terminated and extinguished, and may not

(by the Grantor or the Grantee or both of them) be used on or transferred to any portion of the Protected Property as it now or hereafter may be bounded or described, or to any other property adjacent or otherwise, or used for the purpose of calculating permissible lot yield of the Protected Property or any other property.

H. EXTINGUISHMENT

1. Extinguishment. If circumstances arise in the future that render the Purpose of this Conservation Easement impossible to accomplish, this Conservation Easement can only be terminated or extinguished, whether in whole or in part, by judicial proceedings in a court of competent jurisdiction. The amount of the proceeds to which Grantee shall be entitled, after the satisfaction of prior claims, from any sale, exchange, or involuntary conversion of all or any portion of the Protected Property subsequent to such termination or extinguishment, shall be the stipulated fair market value of the Conservation Easement, or proportionate part thereof, as determined in accordance with Section H.2.

2. Valuation. This Conservation Easement constitutes a real property interest immediately vested in Grantee, which for the purposes of Subsection 1 above, the parties stipulate to have a fair market value determined by multiplying (1) the fair market value of the Protected Property unencumbered by the Conservation Easement (minus any increase in value after the date of this grant attributable to improvements) by (2) [x/y, which is] the ratio of the value of the Conservation Easement at the time of this grant to the value of the Protected Property, without deduction for the value of the Conservation Easement, at the time of this grant. [The values at the time of this grant {are-or-shall be} those values used to calculate the deduction for federal income tax purposes allowable by reason of this grant, pursuant to Section 170(h) of the Internal Revenue Code. For the purposes of this paragraph, the ratio of the value of the Conservation Easement to the value of the Protected Property unencumbered by the Conservation Easement shall remain constant.]

I. CONDEMNATION

1. Condemnation. If all or any part of the Protected Property is taken by exercise of the power of eminent domain or acquired by purchase in lieu of condemnation, whether by public, corporate, or other authority, so as to terminate this Conservation Easement, in whole or in part, Grantor and Grantee shall act jointly to recover the full value of the interests in the Protected Property subject to the taking or in lieu purchase and all direct

or incidental damages resulting therefrom. All expenses reasonably incurred by Grantor and Grantee in connection with the taking or in lieu purchase shall be paid out of the amount recovered. Grantee's share of the balance of the amount recovered shall be determined by multiplying that balance by the ratio set forth in Section H.2.

2. Application of Proceeds. Grantee shall use any proceeds received under the circumstances described in this Section I in a manner consistent with its conservation purposes, which are exemplified by this grant.

J. AMENDMENT

If circumstances arise under which an amendment to or modification of this Conservation Easement would be appropriate, the Grantor and the Grantee may by mutual written agreement jointly amend this Conservation Easement, provided that no such amendment shall be made that will adversely affect the qualification of this Conservation Easement for the tax benefits available or the status of Grantee under any applicable laws, including Sections 170(h) and 501(c)(3) of the Internal Revenue Code. Any such amendment shall be consistent with the Purpose of this Conservation Easement, shall not affect its perpetual duration, and shall not result in any diminution of protection of the Conservation Values. Any such amendment shall be recorded in the official public records of _____ County, Georgia. Nothing herein shall require the Grantee to agree to any amendment.

K. ASSIGNMENT

1. Assignment Allowed. The Grantor and the Grantee recognize and agree that the benefits and obligations of this Conservation Easement are in gross and assignable only in accordance with the terms of this Section K.

2. Qualified Assignee. The Grantee may assign its rights and obligations under this Conservation Easement only after notice to and receipt of written approval from the Army, which approval will not be unreasonably withheld. Any such assignment may be made only to the Army, another governmental entity, or to a private organization, provided that any such assignment must be to an organization that is, at the time of the assignment, both (i) a "qualified organization" as that term is defined in Section 170(h) of the Internal Revenue Code (or any successor provision then applicable) and (ii) authorized to acquire and hold conservation easements under the Georgia Uniform Conservation Easement Act, O.C.G.A. §§ 44-10-1 *et. seq*.. (or any successor provision then applicable). If the Grantee is no longer capable of carrying out the purposes of the Grantee as recited herein, or if the Grantee determines it is in imminent threat of

ceasing to exist for the purposes for which it was created, Grantee shall transfer to the United States acting through the Army its rights to select a successor organization.

3. Terms of Assignment. The Grantee shall require, as a condition of any assignment of the benefits and obligations of this Conservation Easement, that the assignee organization shall agree to continue to carry out in perpetuity, under substantially the same terms as contained in this Conservation Easement, the Purpose of this Conservation Easement.

4. Notice to the Grantor. The Grantee agrees to give written notice to the Grantor of its intention to assign the benefits and obligations of this Conservation Easement at least thirty (30) days prior to the date of such assignment. The failure of the Grantee to give such notice shall not affect the validity of such assignment, impair the validity of this Conservation Easement, or limit the enforceability of this Conservation Easement in any way.

L. DISCRETIONARY CONSENT

1. Notice and Approval. The Grantor shall notify the Grantee before undertaking any activity that may reasonably be expected to have a material adverse impact on the Conservation Values. Such notice shall be in writing and shall describe the proposed activity in sufficient detail to allow the Grantee to judge the consistency of the proposed activity with the Purpose of this Conservation Easement. The Grantee may permit the proposed activity only if the Grantee determines that such activity (i) does not violate the Purpose of this Conservation Easement and (ii) either enhances or does not impair the Conservation Values. Notwithstanding the foregoing, the Grantee and the Grantor have no right or power to agree to any activity on the Protected Property that is inconsistent with the Purpose of this Conservation Easement.

2. Review Period. Whenever a consent or approval is required from either the Grantor or the Grantee, the party seeking the consent or approval shall send a written request for such consent or approval to the other party as specified in Section N.8 hereof, and such other party shall respond to the request within sixty (60) business days of its receipt. In the event that the consenting or approving party fails to respond within the sixty (60) business day period, its consent or approval shall be implied, provided, however, that no consent or approval shall be implied for any activity on the Protected Property that is inconsistent with the Purpose of this Conservation Easement.

M. THE GRANTOR'S REPRESENTATIONS AND WARRANTIES

1. Title. The Grantor covenants, represents, and warrants the following:

(i) that the Grantor is the sole owner and is lawfully seized of the Protected Property in fee simple and has good right to grant and convey this Conservation Easement, and that the Grantor will defend the same against the claims of all persons whomsoever;

(ii) that the Protected Property is free and clear of any and all encumbrances, including but not limited to a mortgage or mortgages covering all or any part of the Protected Property:

(iii) that the Grantee shall have the use of and enjoy all of the benefits derived from and arising out of this Conservation Easement; and

(iv) that there is no pending or threatened litigation in any way affecting, involving, or relating to the Protected Property.

2. Environmental Representations. The Grantor covenants, represents, and warrants that, after investigation and to the best of **his [her]** knowledge:

(i) No substance defined, listed, or otherwise classified pursuant to any federal, state, or local law, regulation, or requirement as hazardous, toxic, polluting, or otherwise contaminating to the air, water, or soil, or in any way harmful or threatening to human health or the environment exists or has been released, generated, treated, stored, used, disposed of, deposited, abandoned, or transported in, on from, or across the Protected Property.

(ii) There are not now any underground storage tanks located on the Protected Property, whether presently in service or closed, abandoned, or decommissioned, and no underground storage tanks have been removed from the Protected Property in a manner not in compliance with applicable federal, state, and local laws, regulations, and requirements.

(iii) If, at any time, there occurs, or has occurred, a release in, on, or about the Protected Property of any substance now or hereafter defined, listed, or otherwise classified pursuant to any federal, state, or local law, regulation, or requirement as hazardous, toxic, polluting, or otherwise contaminating to the air, water, or soil, or in any way harmful or threatening to human health or the environment, Grantor shall take all steps necessary to assure its containment and remediation, including any cleanup that may be

required, unless the release was caused by Grantee, in which case Grantee shall be responsible therefor.

Nothing in this Conservation Easement shall be construed as giving rise, in the absence of a judicial decree, to any right or ability to Grantee to exercise physical or managerial control over the day-to-day operations of the Protected Property, or any of Grantor's activities on the Protected Property, or otherwise to become an operator with respect to the Protected Property within the meaning of The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), and any corresponding state statute.

3. Federal, State and Local Laws. Grantor covenants, represents and warrants that the Protected Property shall at all times comply with the requirements of all Federal, State, and local laws, regulations, and requirements applicable to the Protected Property, and all regulations promulgated by any authorized body pursuant thereto.

N. GENERAL PROVISIONS

1. Costs. The Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, and maintenance of the Protected Property, including the maintenance of adequate comprehensive general liability insurance coverage. Grantor remains solely responsible for obtaining any applicable governmental permits and approvals for any construction or other activity or use permitted by this Conservation Easement, and all such construction or other activity or use shall be undertaken in accordance with all applicable federal, state, and local laws, regulations, and requirements. The Grantor shall keep the Protected Property free of any liens arising out of any work performed for, materials furnished to, or obligations incurred by the Grantor.

2. Hold Harmless. Grantor hereby releases and agrees to hold harmless, indemnify, and defend Grantee and its members, directors, officers, employees, agents, and contractors and the heirs, personal representatives, successors, and assigns of each of them (collectively "Indemnified Parties") from and against any and all liabilities, penalties, fines, charges, costs, losses, damages, expenses, causes of action, claims, demands, orders, judgments, or administrative actions, including, without limitation, reasonable attorneys' fees, arising from or in any way connected with: (i) injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Protected Property, regardless of cause, unless due solely to the negligence of any of the Indemnified Parties; (ii) the violation or alleged violation of, or other failure to comply with any state, federal, or local law, regulation, or requirement, including, without

imitation, CERCLA and the corresponding state statute, by any person other than any of the Indemnified Parties, in any way affecting, involving, or relating to the Protected Property; (iii) the presence or release in, on, from, or about the Protected Property, at any time, of any substance now or hereafter defined, listed, or otherwise classified pursuant to any federal, state, or local law, regulation, or requirement as hazardous, toxic, polluting, or otherwise contaminating to the air, water, or soil, or in any way harmful or threatening to human health or the environment, unless caused solely by any of the Indemnified Parties; and (iv) the obligations, covenants, representations, and warranties contained in Section M.

3. Taxes. Grantor shall pay before delinquency all taxes, assessments, fees, and charges of whatever description levied on or assessed against the Protected Property by competent authority (collectively "taxes"), including any taxes imposed upon, or incurred as a result of, this Conservation Easement, and shall furnish Grantee with satisfactory evidence of payment upon request.

4. Subsequent Transfers. The Grantor agrees to incorporate the terms of this Conservation Easement by reference in any deed or other legal instrument by which they divest themselves of either the fee simple title or possessory interest in all or a portion of the Protected Property. The Grantor also agrees to notify the Grantee of any such transfer. The failure of the Grantor to perform any act required by this paragraph shall not impair the validity of this Conservation Easement or limit its enforceability in any way.

5. Joint Obligation. The obligations imposed by this Conservation Easement upon Grantor shall be joint and several.

6. Successors. The covenants, terms, conditions, and restrictions of this Conservation Easement shall be binding upon and inure to the benefit of the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall continue as a servitude running in perpetuity with the Protected Property. The terms "Grantor" and "Grantee," wherever used herein, and any pronouns used in place thereof, shall include, respectively, the above-named Grantor and its personal representatives, heirs, successors, and assigns, and the above-named Grantee and its successors and assigns.

7. Merger. The Grantor and the Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interest in Protected Property.

8. Notices. Any notice, demand, request, consent, approval, or communication that either party desires or is required to give to the other under the terms of this Conservation Easement shall be in writing and either served personally or sent by registered or certified mail, postage prepaid, to the following addresses, or such other address as either party may hereafter specify by written notice to the other:

GRANTOR:

GRANTEE:
The Nature Conservancy
_____, Regional Attorney
Georgia Chapter Office
1330 West Peachtree Street
Suite 410
Atlanta, GA 30309

9. Annual Inspections. The Grantee intends to schedule annual inspections of the Protected Property to determine compliance with the terms of this Conservation Easement. In doing so, as long as Grantee believes that the Grantor has not violated the terms of this Conservation Easement, the Grantor will be provided with no less than three (3) days' notice of any such inspection, and the Grantor will have the right to accompany the Grantee on such inspection trips.

10. Re-recording. The Grantee is authorized to record or file any notices or instruments appropriate to assuring the perpetual enforceability of this Conservation Easement in the official public records of _____ County, Georgia, and the Grantor agrees to execute, acknowledge, and deliver such further instruments as may be reasonably required to assure the perpetual enforceability of this Conservation Easement.

11. Severability. If any provision of this Conservation Easement or the application thereof to any person or circumstance is found to be invalid, the remainder of the provisions of this Conservation Easement and the application of such provisions to persons or circumstances other than those as to which it is found to be invalid shall not be affected thereby.

12. Liberal Construction. Any general rule of construction to the contrary notwithstanding, this Conservation Easement shall be liberally construed in favor of the grant to effect the Purpose of this Conservation Easement. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the Purpose of this Conservation Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

13. Captions. The captions herein have been inserted solely for convenience of reference, are not a part of this Conservation Easement, and shall have no effect upon its construction or interpretation.

14. Conflict. To the extent of any inconsistency between the Report, the Forest Management Plan, and this Conservation Easement, this Conservation Easement will control.

15. Counterparts. This agreement may be executed in any number of counterparts, each of which shall be an original and all of which together shall constitute a single instrument.

16. Additional Grantors Signing.

(i) _____, **husband [wife]** of _____, joins in the execution of this indenture to evidence **his [her]** consent to the gift of this Conservation Easement, thereby releasing and waiving any rights **he [she]** might have in derogation of this Conservation Easement by virtue of **his [her]** marriage to _____.

17. Right of First Refusal. The Grantor hereby grants to the Grantee a "right of first refusal" to purchase the Protected Property, or any interest in the Protected Property, which Grantor hereafter wishes to sell. The Grantor shall notify the Grantee in writing of the Grantor's intent to accept an offer to sell the Protected Property, or any interest in it, to a third party purchaser. The Grantee shall have one-hundred twenty (120) days from receipt of such notification within which to provide the Grantee's written notice to the Grantor of the Grantee's intention to purchase the Protected Property upon the same terms and conditions as said offer. If the Grantee notifies the Grantor that the Grantee has decided not to purchase the Protected Property, or, in the event the Grantee fails to notify the Grantor, within one-hundred twenty (120) days, of its intent to purchase the Protected Property, then the Grantor may sell the Protected Property to the person named in the Grantor's notice. If the Grantor does not sell the Protected Property to said named person under the terms and conditions represented to the Grantee, then the Grantee shall have the same right of first refusal before the Grantor may accept an offer from another purchaser. This right of first refusal shall apply to any voluntary or involuntary transfer of the Protected Property to any other entity, including a devise by will or intestacy; however, this right of first refusal is not applicable to a transfer of the Grantor's property by the Grantor to the Grantor's spouse, children, or grandchildren. The parties specifically intend that this right of first refusal shall be binding upon and inure to the benefit of the parties hereto and their heirs, executors, administrators, transferees, assigns and successors. The Grantor also agrees to notify the Grantee in writing whenever the Grantor wishes to sell the Protected Property and to offer to sell the Protected Property to the Grantee. Upon receipt of such notice, the Grantee shall have the same one-hundred twenty (120) day period mentioned above to provide notice to the Grantor of the Grantee's intent to purchase. If the Grantee does not purchase the Protected Property for any reason, then the Grantor may sell the Protected Property to anyone within a one-year period. If the Grantor has not sold the Protected Property within one year, then the Grantee's right of first refusal reattaches to the Protected Property.

TO HAVE AND TO HOLD this Conservation Easement, together with all and singular the appurtenances and privileges belonging or in any way pertaining thereto, either in law or in equity, either in possession or expectancy, for the proper use and benefit of the Grantee forever.

IN WITNESS WHEREOF, the Grantor and the Grantee have executed and sealed this document the day and year first above written.

***** Signature Pages Removed*****

Appendix 5: Protection Models

There are 3 alternative protection models that can be utilized to assure long-term security and successful partnerships associated with off-Post RCW conservation. All are feasible, though each may have differing advantages and disadvantages from points of view of the Army, land trust partners (e.g. The Nature Conservancy), and landowners.

The three models are **credit banking**, **affirmative easements**, and **fee ownership by a conservation entity.**

Credit Banking. In this model, the restrictive conservation easement and the management plan necessary for RCW restoration/management are explicitly decoupled. The restrictive easement (which may be established via the ACUB Program) is necessary, but not sufficient, for ensuring RCW goals. A separate instrument or program intended to compel or promote the desired habitat management, separately funded and administered, is layered on top of the easement. This separate program would most likely take the form of a *conservation bank* or an implementation of the *recovery credit system*, both authorized by USFWS.

A conservation bank[14] (CB) is broadly analogous to the privately-owned wetland mitigation banks currently authorized by the U.S. Army Corps of Engineers under the Clean Water Act. Rather than providing offsets to comply with "no net loss" of wetlands, conservation banks under the USFWS guidance provide offsets to comply with the Endangered Species Act, in which credits may be based on species, habitat acres, or any metric authorized by USFWS as appropriate. Conservation banks require permanent conservation easements and an appropriately-funded non-wasting endowment to assure long-term management, monitoring, and enforcement. Conservation banks have been established for numerous listed species in California, and for an endangered mussel in South Carolina.

The Recovery Credit System[15] (RCS) is a more recently developed program offering somewhat more flexibility for some threatened and endangered species. For example, an endangered species whose habitat requirements may be met via short-term management actions across a shifting mosaic of private lands might benefit from the purchase of temporary or term-limited conservation leases active

[14] U.S. Fish and Wildlife Service. 2003. Guidance for the Establishment, Use, and Operation of Conservation Banks.

[15] U.S. Fish and Wildlife Service. (31 July 2008). Endangered and threatened wildlife and plants; Recovery Crediting Guidance. *Federal Register 73*(148), 44761-44772.

over sufficient acreage. Under RCS, the degree to which a particular species in a particular location might require shorter-term or longer-term habitat measures, and under what kind of administration, can be devised on a case-by-case basis. An RCS program for the RCW would almost certainly require permanent or very-long-term conservation protection, and hence would not likely differ substantially from the CB approach. An RCS program was developed around Fort Hood in Texas for the Golden-Cheeked Warbler.

A separate analysis of potential credit-trading for "sandhill habitat" acres is also under development by the American Forest Foundation and the Longleaf Alliance (Gartner and Johnson 2009). This proposal shares many of the attributes and objectives of CB and RCS, but is intended as a voluntary mechanism to assure the viability of the Gopher Tortoise, under consideration for federal listing in the eastern part of its range (including Fort Benning) but not currently listed as a threatened or endangered species there. If the tortoise were federally listed, the program may be considered by USFWS as an implementation of either the CB or RCS guidance. Consistent with CB guidance and Army preference at Fort Benning, this system would require an underlying permanent conservation easement.

All of these programs work by giving a private landowner financial incentive to sell species-credits or habitat-credits to buyers in need of offsets. These programs also include a legal driver intended to protect the permanence or required longevity of any credit sold, i.e. a landowner who has been compensated for such a credit is compelled to demonstrate the viability or functionality of the species or habitat for the prescribed timeframe. Explicit contractual requirements to create RCW habitat would be identified when the credit-banking program was established. Legal protection of the underlying conservation easement, however, is remains a real estate instrument. Credit sales to Fort Benning or other buyers generate funds which pay for establishment, management, and monitoring of RCWs and their habitat. Purchases of credits by Fort Benning would most likely be outside the REPI Program, but such purchases from conservation banks (and/or payments to authorized in-lieu-fee conservation/mitigation programs) have been authorized for military construction (MILCON) projects via 10 USC 2694c, enacted in 2008.

In this model, management is funded by the sale of credits. Given the long-term management horizons necessary on many ACUB properties, a crediting system that provides a reasonable business model for credit bankers may have to compensate them for placing habitat on a credible restoration path, rather than providing compensation only when RCW groups are in place. Alternatively, this protection model may be more appropriate for properties in Alabama with shorter path to habitat restoration.

Affirmative Easement. In this model, the conservation easement and the management actions necessary for RCW restoration/management are included in a single enforceable real estate instrument. The conservation easement would include not only specific restrictions on land-use and management, but also would require implementation of a plan for RCW habitat restoration and management. The conservation easement may also include requirements to establish and monitor RCW groups. Terms for revision of the management plan would be specified in the easement to accommodate unforeseen future situations, but the management plan would be legally enforceable and constrained to uphold conservation values identified in the easement document. One of those conservation values would describe the RCW habitat and/or groups the parcel is intended to support. Responsibility for carrying out management actions could be negotiated several different ways, each with a contingency "fallback" to protect the easement against unsuccessful management/enforcement. This concept is not unlike the current ACUB practice of requiring a "contingent right of the U.S. Army" to take the easement away from the land trust charged with monitoring and enforcement, in the event the Army finds that the land trust is not effectively protecting the interests embodied in the easement language. Likely affirmative easement scenarios include:

(1) The landowner accepts all management responsibility, and the land trust monitors management progress and effectiveness. Should the landowner fail in management, the land trust would have the option of legal enforcement proceedings, or of stepping in to perform the management itself. Should the land trust also fail in management, the Army would then have the right to exercise its contingent right under the ACUB program and step in itself. Affirmative easement obligations are enforceable via judicial action under the Uniform Conservation Easement Act, which has been adopted by both Georgia and Alabama.[16]

(2) The landowner agrees from the outset to hand off management responsibility to the land trust, or some other third party with land trust oversight, so long as that management either enhanced their use/enjoyment of the property or did not adversely impact their reserved rights under the easement. Again, should management fail under this approach, the Army

[16] The potential cost and difficulty of litigation for affirmative obligations may prove daunting for many land trusts (Joan Dwoskin, TNC Georgia staff attorney, Pers. Comm to Wade Harrison).

would have the right to exercise its contingent right under the ACUB program and step in itself to do the management.[17]

(3) The landowner agrees to allow the Army (Fort Benning personnel or agent) to perform management actions on the property in accordance with a Right of Entry agreement.[18] This Army-management scenario has been applied once for the TNC fee-ownership model (see below) and continues to be refined, with outcome potentially applicable here.

Which of these scenarios is preferable might depend on funding strategies (see next section) as well as the landowner/land trust attitudes and preferences, and hence could be negotiated on a case-by-case basis.

The appraisal of an affirmative easement would presumably include the financially discounted stream of costs necessary to restore/manage the RCW resource in perpetuity, if the landowner accepts all management responsibility as in scenario one above.. This cost would be built into the value of the easement and paid to the landowner as part of the easement transaction. As in the credit-banking scenario above, it is up to the managing landowner how to manage the funding. In this case the "fallback" mechanism that accommodates the potential for management failure, whereby the land trust or the Army steps in to do management itself, may require litigation to recover the portion of the easement payments associated with the affirmative management actions.. TNC and/or the land trust community may be able to explore ways of assuring that easement sellers place that part of the sale proceeds appraised as management cost under appropriate fiduciary management such as a non-wasting endowment.

Fee ownership by a public or non-profit conservation entity. This third model works for landowners whose mission and identity align so closely with Fort Benning's RCW conservation goals that questions of third-party management and enforcement are less critical. The Army would still likely reserve a contingent right to manage, but so long as the landholding entity exists as a conservation-oriented concern, the necessity of acting on that contingent right is unlikely. Conservation entities likely to be considered under this model are TNC or a similarly well-established conservation non-profit with land management/restoration expertise, a state agency (Georgia Department of Natural Resources, Alabama Department of Conservation and Natural Resources), or some other public agency with similar management/restoration expertise and motivation. While conservation easements are sometimes placed on lands held by non-profit

[17] While less litigious than the first scenario, this scenario is less likely to appeal to most landowners. Accepting permanent management responsibility on another party's land would also prove daunting for many land trusts or conservation non-profits (Joan Dwoskin, TNC Georgia staff attorney, Pers. Comm to Wade Harrison).

[18] This scenario is also unlikely to appeal to most landowners with conservation easements, but in situations where it is acceptable may provide the least risk of shortfalls in sustained management.

conservation entities (with easement held by another non-profit or a public agency), such an instrument is less important in this case, especially if the landowner acquires the parcel in a transaction administered under the ACUB Program. Such transactions include a deed restriction protecting the Army's contingent rights under that program, including assurance that any divestiture by the buyer is subject to terms consistent with the ACUB program (Appendix 7). When utilized to protect an ACUB parcel acquired in fee for RCW conservation, this deed restriction may require more explicit language on appropriate land use. The fee-ownership protection model was investigated and recommended in 2009 as part of the Final Addendum to the Biological Assessment for Proposed MCOE Actions at Fort Benning GA (USACE 2009). The relevant chapter is appended here as Appendix 8. In short, the Army has already determined that short-term (5-year) fee ownership and management of fee-owned ACUB properties is a reasonable strategy, whether management is conducted by the landowner (TNC or State of Georgia) or by the Army (under appropriate Right of Entry agreement). Should ACUB fee acquisition opportunities arise in Alabama under this program, more investigation is required as to the likelihood of pursuing state-owned RCW conservation properties.

In this model, as in the affirmative easement model, funding for management could be combined with purchase price via similar "appraisal of the necessary management in perpetuity", in this case implied by deed restriction. Thus far, no real estate appraisals for ACUB fee purchase transactions have included such a calculation. It seems logical, however, in the case of Off-Post RCW parcels to be purchased in fee, to perform such a calculation either as part of determining the cost of the transaction or as a separate analysis analogous to easement appraisal (an appraisal of the cost of affirmative deed restrictions).

Protection Model Summary

All three of these models (*credit banking, affirmative easement, fee-ownership*) may be accommodated in Fort Benning's Off-Post RCW Plan, providing flexibility to appeal to diverse and changing landowner attitudes, credit programs/markets, land trust capacity, public conservation funding, and availability of REPI or other Army funds for acquisition of property interests. The most favorable protection model would be identified and described during the prioritization phase of the REPI Request. While credit banking would ultimately be funded outside of the REPI process, the underlying conservation easement necessary for that model could still be funded and administered as an ACUB easement.

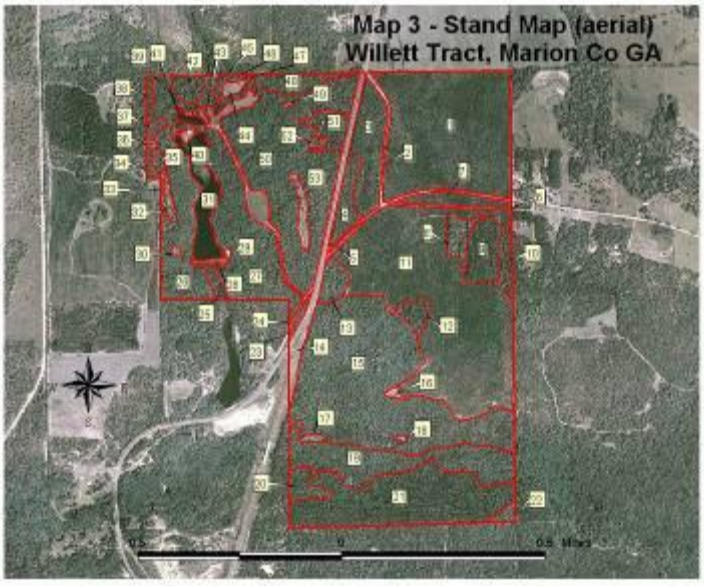
Appendix 6: Example Forest Management Plan[19]

Conservation & Forest Management Plan (FMP)
"Willett Woods" Marion Co. GA

I. Introduction

The purpose of this Conservation and Forest Management Plan (FMP) is to outline and discuss various resources on the 508.2-acre (more or less) property and ensure that the easement's conservation values are protected consistent with the requirements of the Internal Revenue Service codes. This plan has a service life of 10 years. It is to be rewritten by November 2018. Timber stands are to be re-delineated, volumes are to be re-cruised, and growth rates re-determined for the next planning horizon (2019-2028). Acreage is GIS-estimated and not based on field survey figures. The FMP was completed prior to the field survey. Acreage differences for the tract or individual stands should be minor and not significant.

This FMP was developed in consultation and partnership with the landowner, landowner's forestry consultant, and the grantees interdisciplinary partners. The FMP identifies the current situation, preferred situation, management practices, and suggests mitigation, where necessary, to reduce possible negative impacts. The FMP recognizes that sustainable consumptive uses of wildlife and natural resources are compatible with maintaining and enhancing natural diversity. The property was subdivided into individual stands (see Table 3). Basic data were collected to categorize each stand with forest type, stand condition class, acreage, Southern Pine Beetle (SPB) hazard ratings (Table 9), and suggested stand treatments for each stand (Table 10).



Stands delineated within property boundary (map 3)

[19] Tables, appendices, and several maps associated with this management plan are maintained in electronic format and not reprinted here, available upon request from The Nature Conservancy (Brant Slay, Land Protection Manager, bslay@tnc.org .)

This FMP will serve as a dynamic template; the easement itself is perpetual. Since nature is not static, the FMP may be amended in writing by mutual agreement of the Grantor and the Grantee from time to time to incorporate new and enlightened agriculture, forestry, and wildlife management practices. The essence of the FMP management direction is perpetual within areas of the conservation easement. There are approximately 508.2 acres (entire tract) subject to the conservation easement.

This tract is in close proximity to Fort Benning military reservation to the west. This tract is strategic to the Army Compatibility Use Buffer (ACUB) program. Fort Benning's ACUB plan was approved on 23 February 2006. It is a cooperative effort between the Army, TNC, US Fish & Wildlife Service, landowners, and other local stakeholders. The purpose is to buffer Fort Benning from incompatible development by acquiring land or implementing non-development easements. ACUB limits the effects of encroachment and maximizes Army lands that can be used to support the Army's mission.

II. Geology

This tract is located in the Fall Line Hills of Georgia in Marion County GA. Fall Line Hills are the contact between the Cretaceous sediments of the Coastal Plain and the older crystalline rocks of the Piedmont. The fall line hills are ancient "shorelines" that separate the Piedmont from the Coastal Plain. Streams that flow across the fall line undergo abrupt gradient changes and have rapids and shoals. The geomorphic character of streams is unique between the Piedmont and Coastal Plains.

Throughout the course of time, the sea has periodically inundated the Coastal Plain, resulting in mineral and sand deposits within the Coastal Plain province. The younger deposits of marine sands and clays have built up over time and covered the older crystalline rocks of the Piedmont. This deposition shaped the formation of the fall line or sand hills. In the fall line sand hills of this area, ridge tops are smoother and broader. This tract is a sand hills community for the most part.

III. Hydrology

The bulk of the tract drains into many un-named creeks, eventually flowing into Pine Knot Creek. The property is located in the Middle Chattahoochee-Walter F. George HUC-8 basin (03130003).

Drainages range from first order (ephemeral) up to fifth order (perennial) streams. Many of the 3rd order streams dry up or slightly pond water in holes during the summer months and during extreme drought periods. There are 27 stream segments, 25,445 feet or 4.82 miles of streams going through this tract. There are 17 segments of first order streams (9,910 feet), 4 segments of second order (4,860 feet), 4 segments of third order (5,680), 1 segment of fourth order (2,035 feet), and 1 segment of fifth order (2,960 feet).

The property generally receives 50-52" of rainfall in a "normal" year in which 50% typically falls between April through September. Evapo-transpiration accounts for approximately 37" of the annual rainfall.

While water quality can be negatively impacted by management activities, roads typically produce the majority of sediment delivered into stream courses. The majority of the road use is light ATV and small farm tractors with light road maintenance to maintain the roadway.

IV. SOILS

Soil survey information was obtained from the Natural Resources Conservation Service (NRCS) in Buena Vista GA. Soils information came from Marion & Chattahoochee Soil Survey published data issued November 1997. Soil mapping units (Table 1) were transposed from NRCS old photographs onto topographic maps and digitized using ArcView.
There are 9 separate soil mapping units present on the tract. Approximately 5% of the tract has soil types that are subject to frequent flooding. Refer to Table 1 for the descriptions of the 9 soil mapping units and the percent of tract area each represents. The bulk of the soil types are loamy sands. The property has slopes that range from 0-60%. Multiple aspects are represented, and elevations range from 335-507 feet. The highest elevation is in stand 3, and the lowest point is in the southwest of the tract near the intersection of an un-named tributary and Pine Knot Creek. The majority of the property is on slopes between 3-12%. There are many potential soil types that may be suitable habitat for the gopher tortoise (*Gopherus polyphemus*). Gopher tortoises are known to exist on the property and are state-listed as threatened. Probable habitat may occur on most soil mapping units but are absent due to lack of suitable feeding habitat. This will rapidly change with silvicultural treatments that will create a favorable ground cover condition.
Relict trillium (*Trillium reliquum*) is federally listed endangered and is known to exist in these counties and possibly on the tract in stand 19. This plant typically grows in moist, shady hardwood forest types, which occur only in stand 19. Relict trillium is adversely affected by frequent or intense growing season fire. Upland hardwood hillsides would not historically contain the plant because frequent, low intensity fires moved through these sites historically at a frequent interval. Larger, wider and moist hardwood stands typically occupy Bibb sandy loam soil types and are possible locations for the plant.

V. Threatened & Endangered Species

There is one federally listed endangered bird species, red-cockaded woodpecker (*Picoides borealis*, RCW), 2 federally listed endangered plants, fringed campion (*Silene polypetala*) and relict trillium (*Trillium reliquum*), and 1 federally listed threatened invertebrate, the purple bankclimber mussel (*Elliptoideus sloatianus*) that are known to exist in this area of Georgia.

There are 2 state listed endangered birds being the bald eagle (*Haliaeetus leucocephalus*) and RCW. There are two state listed threatened reptiles, the Barbour's map turtle (*Graptemys barbouri*) and gopher tortoise and 1 state listed threatened invertebrate, the purple bank climber mussel. There are 2 state listed threatened fish, the bluestripe shiner (*Cyprinella callitaenia*) and the high scale shiner (*Notrois hypsilepis*). There are 4 state listed endangered plants, fringed campion, relict trillium, shoals spider lily (*Hymenocallis coronaria*), and sweet pitcher plant (*Sarracenia rubra*). There are 3 state listed threatened plants; croomia (*Croomia pauciflora*), Pickering's morning glory (*Stylisma pickeringii*), and sand hill golden aster (*Pityopsis pinifolia*).

A. RED-COCKADED WOODPECKER

Red-cockaded woodpecker (RCW) nesting habitat consists of open and park-like pine stands free of midstory. RCWs require older (65 years plus) living pines to excavate nesting cavities preferring longleaf pine but will utilize suitable loblolly (*P. taeda*) or shortleaf pines (*P. echinata*) as cavity trees. This tract does contain pockets of mature longleaf pine but these stands have heavy midstories of hardwood.

RCW completed cavity (left), female RCW (right); photo not on property

No active or inactive cavity trees or "starts" have been observed or located on the property. None are expected any time in the near future due to the sparse foraging habitat of the pine stands that exist (even with hardwood removal). Lack of foraging habitat will be a limiting factor for some time. One tree in stand 42 has a "suspect" start, but this appears to the writer to be pileated woodpecker sign (in a green mature longleaf tree). Over time, with the conversion of many stands towards longleaf pine underway, it would be expected that the upland pine sites would be conducive to limited use by RCW. It is estimated that less than 80% of the tract would eventually be in upland pine management which at best would support 2 to 3 groups/clusters of RCW. The landowner may consider the possible future recruitment ramifications of RCW on the tract with regard to the U.S. Fish & Wildlife Service Safe Harbor plan as the landowner desires to restore longleaf pine to the uplands over time.

B. Relict Trillium

Relict trillium is a fleshy, low-growing (12" or less) plant with waxy dark green blotchy leaves. It is greenish-brown, purple, or occasionally yellow in color and is among the earliest of spring bloomers. The plant top dies back to its underground portion in the summer and emerges only in the spring. Trilliums grow in moist, shady hardwood forests and are adversely affected by fire. Fire use, which dries out the site by removing shade, will likely adversely affect this species. As discussed under the soils section, Bibb sandy loam soils in stand 19 are most likely to support this plant. Since the initial inventory work was performed in November 2008, no plants were observed. The best time to look is in the months of early April-mid May.

Fire has most likely removed this species from the narrow drains decades ago and it appears not to be resilient enough to re-colonize readily once it has been impacted. Thinning of the narrow and dry hardwood drains would probably not impact the species as historical fire use most likely limited the species to the wide, moist hardwood stands many years ago.

The natural disturbance regime for these moist hardwood forests would come from wind (flat wind, downbursts and tornados). It is unknown what effect wind events may have on this species with regard to reducing shade abruptly. Wind events of any scale that may impact these systems would indeed be episodic and infrequent. If an April-October wind (leaves still on and would catch the wind) laid over a significant portion of commercial timber in potential trillium habitat, the effects of salvage compared to leaving the material alone is unknown. Since this plant is so limited in its known range, no monitoring results are available to answer this question.

A systematic, planned, and thorough spring inventory of prioritized stands will be imperative over the next few years

C. ENDANGERED, FRINGED CAMPION

Fringed Campion (*Silene polypetala*) occurs in mature hardwood or hardwood/pine stands on river bluffs, small stream terraces, moist slopes and well shaded ridge crests. Threats are residential development, logging that reduces the shading effect, and spread of invasive species such as Japanese honeysuckle. Field searches will be conducted to determine the absence/presence of this species before activities that would adversely affect the plant are implemented.

D. Gopher Tortoise (Threatened State Listed)

Gopher tortoises are dry land turtles that favor dry, sandy ridges with open stands of pine and scrub oaks. Gopher tortoises feed on grasses, forbs, and other low ground cover and utilize habitat maintained with prescribed fire and timber thinning. They are easy to recognize, and training of property personnel to recognize the tortoise and the dens they make on very predictable soils (sandy ridges) can easily be accomplished.

Gopher tortoise (photo not on property)

Tortoise burrow in stand 11

Gopher tortoises dig long sloping burrows up to 30 feet long and 9 feet deep on extremely deep sands. The entrance to the den is shaped like the tortoise, arched above and flat on the bottom. Many other wildlife species including bobwhite quail take shelter in the tortoise's burrow. Protecting this species includes protecting any discovered burrow site and entry.

Upland soils on the tract are generally capable of supporting gopher tortoises. Currently on the tract, most of these soils are dominated by unsuitable vegetation and therefore support only a limited population of gopher tortoises. Several gopher tortoise burrows were observed in the pre-merchantable pine plantations, but we expect that most burrows currently on the tract will be adjacent to open areas such as wildlife openings and fields. Conversion to longleaf pine and reintroduction of frequent fire will improve gopher tortoise habitat on these soils.

E. Species of Special Concern (State listed)

Refer to the EDR for this listing of species.

VI. Prescribed Fire

The property's upland sites have some history of prescribed fire in the growing and dormant season. Many upland stands, including some hardwood forest types, will need some prescribed fire to passively burn through as well (dormant season between late December through late February). Return intervals for dormant season burns are recommended at 3 years for 24 suggested blocks and 5 years for 1 suggested block (refer to Table 7 and Map 8).

Burnout operation along dozer fireline in dormant season (not on property)

A total area of 492.7 acres lies within the control lines proposed. Block sizes range from 3.2 acres up to 71.4 acres. Most of the control line will be existing roads/trails; however, some new line (dozer standard) will need to be constructed. Additionally, some new roads/trails, wet line, and use of streams to hold fire operations on will be needed. Refer to map 8 to see the variety of burning block combinations that can be employed and where the suggested control lines should be placed.

As pine plantations are converted to longleaf or thinned, the shade tolerant understory will need to be kept down to encourage the more herbaceous and native grass component to flourish as opposed to the more common oak woody strata. Over time, a variety of species will adapt and utilize this desired future condition (RCW and gopher tortoise).

The landowner should consider the use of warm-season or growing season burning after 1-2 dormant season burns have occurred. The landowner desires to maintain and enhance the open character of this landscape with the use of prescribed fire, harvesting, and establishment of fire-dependent long-lived species (i.e. longleaf pine).

Longleaf pine is a fire-dependent species and has protective adaptations such as seedlings producing abundant, upright needles and a thick, well-insulated terminal bud that protects the bud and stem from surface fires that pass quickly.

Longleaf pine can endure complete consumption of the needles as seedlings and still survive as long as the terminal bud is protected. This species also puts down deep roots reducing moisture stresses while other pine species commit less energy to taproots. Contrary to popular belief, longleaf is not just a sandy soil species and does quite well in loams and clay soils. Longleaf litter typically is a loose, well-ventilated surface fuel bed that will produce greater rates of spread and flame height-lengths especially in association with the abundant grasses and forbs, which grow underneath their open canopy.

Dormant season backing fire in longleaf seedlings (not on property)

Longleaf pine typically will not start height growth until it has established a suitable taproot. Other adaptations include thick basal bark as saplings as well as seeds, which germinate in the fall shortly after dropping in early to mid October. This allows around 5 months for seedlings to root, grow and become established before normal green-up by competitors. Shortleaf and loblolly pine drop their seeds in late October through early December and will not germinate until spring.

Shortleaf pine is also a fire-adapted species. Adaptations include the seedling/saplings ability to re-sprout if top killed by fire or if cut. Shortleaf pine will form as seedlings; eventually reach sapling and then small pole size by outgrowing the fire effects. While the upper portions of the stem are killed with fire, the rootstock continues to get bigger.

Eventually, the stem will produce rapid height growth as a seedling sprout. Shortleaf is also tolerant to needle and crown scorch. Shortleaf pine also forms thick basal bark at a young age. Shortleaf pine has short needles, which form a compacted fuel bed in dense stands. This fuel arrangement makes for lower rates of spread, heat outputs, % of fuel consumed and reduced flame heights and flame lengths. There is very little shortleaf pine component on the tract and this species is not recommended on these sand hill systems.

Loblolly and slash pine also have fire adaptations such as thick bark and rapid height growth as seedlings and saplings. Loblolly pine ecologically was an associated species in the riparian areas/flatwoods or cooler/moister east and north aspects. Loblolly has been pushed up the hill and can grow well on many upland sites.

Loblolly pine would be unsuitable on this tract for the following reasons:

Reproduction would have to be protected from fire for up to 5 years, complicating prescribed burning operations.

1. Each pocket of reproduction, if planted, would still be invaded by neighboring loblolly seed sources and ultimately require pre-commercial thinning.
2. Each pocket of reproduction, as it matures on these eroded sites, would not remain healthy past age 30.

Establishing longleaf pine in the selected gaps or harvest areas with natural and/or artificial regeneration (planting containerized seedlings) will mesh well with the prescribed fire regime that is desired for the following reasons:

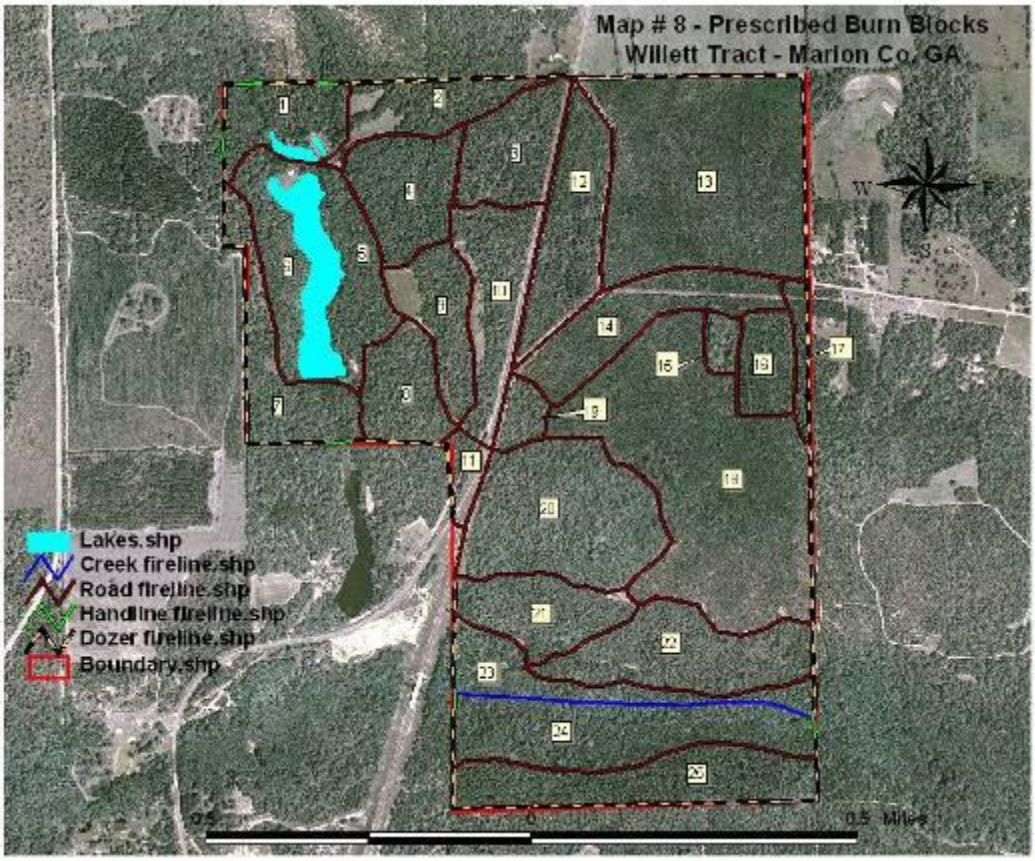
1. Each selected gap would be hand planted using containerized longleaf. The selected gaps will be planted immediately after the burning occurs.
2. The following year these seedlings would be 12 months old and should have enough foliage mass and bud protection to withstand the passage of a surface fire.
3. Some selected longleaf groups could be plowed to serve as "ring around" for quail nesting cover.
4. Each selected longleaf group may have the invading loblolly pine rogued out with fire on a 3 year rotation. Shortleaf pine seedling sprouts will be minimal and could be controlled if necessary through TSI operations.
5. Established longleaf pines will be healthy, even on these eroded upland sites numerous decades beyond what shortleaf and loblolly pine would do.
6. Future gap recruitment could be favored with natural regeneration of longleaf pine as more area is recovered.

Numerous areas across the upland pine landscape could benefit from application of growing-season burns (GSB) after 1-2 dormant season burns take place. Important considerations include:

1. Cut off GSB by mid June
2. Burn smaller blocks (50 acres or less) to minimize damage to ground-nesting birds.
3. Age of the rough; roughs over 4-5 years should be reduced first with late winter through early Spring burns
4. Cumulative drought indices such as Keetch-Byram Drought Index (KBDI)
5. Fuel moisture, temperature-relative humidity (RH)-winds
6. Fire behavior, firing methods, firing patterns (backing, flanking fire)

The majority of the upland pine landscape can be maintained with the traditional window of burning (January-February). In many areas, growing season burns will significantly reduce oak-hickory coppice after 1-2 applications of dormant season burning. This method is less costly than utilizing herbicide application and is more in line with the ecology of the various species involved.

Impacts on nesting habitat for quail, turkey, and an array of ground and shrub nesting birds are real. The benefits of recovering the habitat overall should outweigh the local impacts of loss of nests. This can be minimized by the size and locations of each GSB.



Burning requires careful planning and is weather-sensitive; only a limited window of opportunity exists. We cannot grow more burning days in the spring, as statistically there are only so many burnable days. Burnable days can only be added by considering non-traditional windows in which to burn certain sections of the property. Use of growing season burns clearly added another window, though limited in scale.

Burning for site preparation for the longleaf groups could be done between September through December or up until the time of planting the seedlings. This will not significantly change the acreage affected but provides logistical benefits later.

Burning between December-late February provides numerous opportunities to have some of the best days with regard to smoke dispersion, achieving cooler burns under RH ranges, typically from 30-45% with ambient air temperatures between 40-60 F.

Prescribed fire is a great tool and must be kept in the toolbox. Burning is a landowner's right and does benefit society, wildlife, and the environment; however it must be done in a responsible manner. It is estimated that approximately 488.7 acres should be burned on a 3-year rotation and 4.0 acres burned on a 5-year interval.

VII. Transportation System

The property is well accessed with various standard roads; refer to maps 6-6c. There are approximately 12.00 miles of existing roads/trails on the property; 0.79 miles paved road, 0.86 miles of dirt county road, and 10.35 miles of roads/trails/firelines that the landowner maintains.

Maintenance and replacement of culverts, fords, bridges, surfacing, clearing and cutback of travel way, vegetation control with herbicides, and mowing would be on-going activities. Access by the general public is restricted on the property, and additional gates in selected prescribed locations may be necessary to prevent unwanted access. The recommended planned road system is estimated at 7.23 miles (0.79 miles paved-state maintenance, 0.85 miles dirt-county maintenance, and 5.59 miles dirt roads-landowner maintenance).
The landowner is working with the county to see about relocation of a short segment of county road across stand 4 so as to obliterate/close another segment of county road running north along the east border of stands 3 & 4. This would be the only potential "new" road location and would facilitate closure of the other county road through the property.
The landowner will retain the right to access Pine Knot Creek for recreational uses.

VIII. Pest Management

It is the goal of the landowner to reduce impacts and losses caused by various pests. Pests include insects, diseases, and exotic invasive plants. Pests that are present on the property or may occur include southern pine beetle (*Dendroctonus frontalis*, SPB), Ips beetle, (*Ips* spp.) fusiform rust (causal agent: *Cronartium quercuum f. sp. fusiforme*) and annosus root rot (causal agent: *Heterobasidion annosum*).

A. Southern Pine Beetle (SPB) and Ips Engravers

The Georgia Forestry Commission and the property owner perform reconnaissance for SPB spots. As spots are detected, they are to be evaluated to determine their relative risk of expansion and a suppression tactic selected. Tactics include monitoring low risk expansion spots, cut & remove, cut & leave, and pile & burn. Due to good access, most spots, whether SPB or Ips beetles, will be handled with cut & remove (salvage). Spots in sub merchantable pines may be treated with either cut & leave or pile and burn methods.
Pine stands were hazard-rated for SPB using a numerical risk rating system developed by the Alabama Forestry Commission that considers age, site index, total basal area, and pine basal area. Ratings include very low, low, moderate, high, and very high. The highest risk rating determined by the calculations on the property generated a moderate risk. This is due to the fact most stands are not carrying high levels of basal area or are of such a young age and on a higher site index not to trigger a high risk rating. Refer to table 9. The calculation is a follows:
1.8342 (Pine BA) + 0.4085 (total BA) + 0.705 (age) + 0.88 (SI) – 206.315= score

Score	Rating
< 10	very low
11-61	low
62-167	moderate
168-219	high
220 +	very high

Despite risk ratings of very low through moderate, SPB are unpredictable and can show up just about anywhere and anytime. SPB are typically attracted to pine trees that are under stress. As SPB populations build up significantly (usually every 6-8 years), any stand, stocking, or pine species are susceptible.

Fusiform rust has affected many of the trees on the property. Shortleaf pine is considered practically immune while loblolly is most susceptible. Longleaf pine is considered less susceptible. Water oak (*Quercus nigra*) and willow oak (*Quercus phellos*) serve as the alternate hosts of the pathogen and are the source of inoculum (spores) for the infection of pines.
When commercially thinning stands, the practice will be to remove stems that have main stem rust to such a degree they are windthrow hazards. These trees can be harvested while salvage-sanitation thinning is implemented. Fusiform rust should not be of any consequence with the strategy to establish longleaf pine by both natural and artificial methods.

C. Annosus Root Rot

Annosus root rot can yield serious losses on high hazard sites. SPB can be attracted to trees that are stressed from root rot and are often responsible for improper diagnosis. Tree to tree transmission is through root contact particularly in thinned stands. Spores from the conks (fruiting bodies) attached to the bark at the root collar cause spread from one stand to another. The most important single factor in the infection of a pine stand is thinning. Most infections originate on the surface of freshly cut stumps. Plantations and natural regeneration in old fields are much more heavily damaged because of thinning at an early age and the continuity of roots that favor tree-to-tree spread of this fungus.
Visible symptoms include pitch soaked roots, terminal stringy root decay, snowy white or tan pustules (conks). A depth of 12" to clay seems to be the breaking point between high and low hazard sites; annosus root rot (ARR) has been a moderate to severe problem in areas where heavy clay is at or very near the surface. Sandy topsoil less than 12" over clay subsoil are high hazard sites.
The best prevention on high hazard sites is to conduct thinning between May-August in areas below 34 degrees North latitude. Few spores are formed during this period and higher ambient air temperatures often kill spores that are produced.
Longleaf pine seems to be less susceptible than loblolly and shortleaf pine. Other recommendations for high hazard sites include prescribed burning to keep the "rough" depth reduced (at least 6 months prior to thinning), reducing the frequency of thinning, use of borax on fresh cut stumps on disease-free sites during the thinning operations, and applying a competing fungus (*Peniophora gigantea*) during the second thinning on fresh cut stumps.

The property is quite diverse and unique therefore a variety of systems will be retained for use to manage these lands to meet the desired future condition the landowner envisions. Both even-aged and uneven-aged management may be applied.
Clearcutting, fuelwood harvesting, thinning, prepatory cuts, group selection and salvage-sanitation cuts may be utilized in selected pine and mixed PH or HP stands. Limited use of clearcutting may be imposed to suppress insect & disease, restore longleaf pine in off-site

situations, and improve habitat conditions for threatened & endangered species as well as species of interest of the landowner (deer, turkey, quail for example).
The majority of the young upland pine landscape may be managed using even-aged methods. The bulk of the mature pine stands or mixed PH-HP stands will be managed using uneven-aged group selection with natural regeneration to longleaf pine. No set rotation length is employed but off-site loblolly, loblolly-shortleaf, slash pine and selected low quality hardwood stands on upland sites are to be converted over to longleaf pine at a pace the landowner desires to see. Existing loblolly pine plantations and older natural stands may be left to grow with improvement cuts on a timely basis until they are declining and ready to be converted to longleaf. Conversions of loblolly plantations back to longleaf may be achieved by stand size clearcutting or may be achieved by fuelwood operations or commercial timber sale. Pine plantations may be thinned as early as possible when stands become operable and markets are not poor where it is not economically viable for the landowner to consider selling products. Most all existing upland stands, whether pine or hardwod, are recommended for a light improvement cut when the operability allows by either fuelwood operations or salvage-sanitation methods.
Most upland stands may be thinned on a 10 year cycle and keeping the average merchantable basal area of dominant and co dominant trees (after thinning) between 45 and 65 square feet.

X. Growing Stock Projections

Stands were delineated from recent aerial photography and stratified into groups based on similarities of age and stocking (table 3). Basal area points (5 basal area factor) were taken in each stand to secure an "average" basal area by product class to guide in making stand prescriptions (table 10) as well as estimating current growing stock levels (tables 5 & 6). Volume to basal area ratio's (VBARS) were calculated based on average tree sizes and merchantable heights of various products (table 5). Growth projections were made from measurements and tree ring data to calculate growth as a percentage for each product group (table 4). Mortality was estimated and based on observations and calculations to determine “net growth” for products. Volumes estimated will serve as the baseline "snap shot” of property conditions as of November 20, 2008. Products removed from timber sales need to be taken away on an annual basis with growing stock advanced based on the provided compounded growth rates by product.
As of November 2008, there are 202.9 acres of premerchantble stands, 43.6 acres of non-forest areas, and 261.7 acres of merchantable timber stands. It is estimated that there are 7,284 tons of merchantable timber on the property; refer to table5. This equates to 27.8 tons/merchantable acre which is low stocking. It is estimated that 215 tons of merchantable growth will occur in the first year without any additional removals. Approximately 46.7 acres is recently clearcut and not yet reforested. The non-forest land is also estimated to remain "non-forest” during this planning horizon of the FMP and will not affect growth increment.
It is estimated that 78% of the current November 2008 standing value is pine sawtimber/chip n saw and 4% of the standing value is hardwood sawtimber. The remaining estimated value is in pine pulpwood (5%) and hardwood pulpwood (13%).
The landowner reserves the right to harvest at any level in any year (or sit out any year(s)) provided the percentage of November 2008 baseline volume for each product are retained at any point during this 10-year life of the FMP:

PST – 2200 tons (80%)
CNS – 220 tons (60%)

HST – 175 tons (80%)
PPW – 550 tons (70%)
HPW – 1045 tons (33%)
It is estimated that 20% of the PST, 40% of CNS, 20% of HST, 30% of PPW and 67% of the HPW volumes as of November 2008 will need to be removed during this 10-year FMP window to meet the hardwood reduction vision the landowner has and convert many off-site stands back to longleaf.

If a catastrophic event (wind, insects, fire, etc) causes a significant modification to the growing stock, the damaged timber can be removed however the baseline volume will have to be "grown back" over time before a restarting of normal harvesting activity.

The baseline volumes are applicable to this and future planning horizons. A new cruise of merchantable volume as well as new growth rates by product classes will take place in November 2018 to determine the allowable cut for the next FMP cycle. This process will repeat every 10 years. It is anticipated that by 2018, hardwood pulpwood inventory will drop down, pine sawtimber, chip n saw and pine pulpwood inventory will build, and hardwood sawtimber will slightly build. This will be a result of stands aging and volumes taken from products such as hardwood pulpwood. A significant amount of non-merchantable hardwood will be removed by fuelwood operations to provide the needed TSI to advance the landowners desired future condition.

XI. Site Preparation, Control of Undesirable Species, & Timber Stand Improvement

Site preparation may include prescribed fire, chainsaw felling, grinding, mowing, piling, sub-soiling, tillage, shearing & raking, herbicide application or a combination of these treatments. The method of site preparation will be driven by the type of competition to control, cost, level or intensity desired, and environmental effects considerations.

Aerial application of herbicides (photo not on property)

Control of undesirable species (CUS) may be attained with growing season burns and selective herbicide application. Growing season burns have been discussed and may be small scale in nature to minimize significant impacts to both ground and shrub nesting species.

Timber stand improvement (TSI) may be attained using prescribed fire, selective herbicide application, chainsaws, hand tools, or a combination of these. There will be a need for TSI to generate favorable understory conditions for either wildlife or silvicultural objectives.

Alternative to brush control (photo not on property)

XII. REFORESTATION

Reforestation methods recommended include hand planting with containerized seedlings (longleaf) or natural seeding by shelterwood or group selection openings (longleaf). Hardwoods may be regenerated naturally from coppice as well as seed. Some enrichment plantings of hardwoods may occur by direct seeding or insertion of bare root material (oak, sycamore, poplar, ash). The majority of upland hardwood may be regenerated naturally from coppice and seedling sprouts. No loblolly, shortleaf or slash pine is to be artificially regenerated on any site during this FMP period.

XIII. MANAGEMENT DIRECTION

This section of the FMP is the heart of the plan. This will outline the various landscape conditions by category, describe the current situation, outline the preferred situation, state strategies/recommendations, and list suggested treatment mitigations. The management direction outlined for this 10-year planning horizon will not dictate future direction but the essence of this FMP may carry into the next cycle. The conservation values outlined in the recitals of the easement, which are perpetual, will not change nor can the FMP conflict with that section even if the property changes hands over time.

If this property is enlarged over time to include additional properties, the new tract additions are not subject to this FMP or the conservation easement unless mutually agreed to be added and done so in an amended legal manner. Likewise, if this property is subdivided or sold in combinations of tracts or sizes acceptable to the Grantee, those sold parcels are still encumbered with the easement and forest plan direction. THE LANDOWNER RETAINS THE RIGHT TO SUBDIVIDE THE PROPERTY INTO TWO (2) PROPERTIES. Each "subdivision" will be subject to the terms of the easement recitals and subject to the terms of the FMP.

A. OPEN AREA

1. Current Situation

There are 31.2 acres (6.14% of property) in this group; stands 2, 5, 6, 14, 16-18, 24, 28-30, 32, 36, 40, 44, 49 & 53 (table 3). There are 14.6 acres of small open wildlife openings (10 sites), 14.8 acres in right of ways for roads and powerlines (4 areas), 0.5 acres of administrative site (1 area), and 0.7 acres of open land at the lake dam (1 site). Stand 52 will most likely be converted from a non-stocked forest area to another 0.6 acre wildlife opening (refer to table 3 and map 3) or possibly be regenerated back to longleaf pine with stand 51.

Wildlife opening; stand 17

2. Preferred Situation

The landowner desires to expand by 50% of their current size, smaller existing wildlife openings (see table 10). The landowner desires to create additional wildlife openings (some linear in nature) when off-site plantations are regenerated to longleaf pine (see map 10). Landowner desires to enhance opening use for deer, turkey, and quail. The landowner desires the ability to cultivate existing open land fields in a variety of crops (peanuts, soybeans, corn, chufa, annual ryegrass, wheat, millet, sorghum). Landowner desires to erect a viewing observation platform

tower in stand 53 that may be as high as 45 feet above ground. Non-native species considered for planting to augment deer, turkey and quail habitat will be approved by TNC, and landowner does not desire to use species that have escape potential into the property.

Wildlife opening/field; stand 53

Landowner desires to participate in any state or federal cost share programs with regard to expansion of wildlife openings or plantings. Landowner reserves the right to soil test and conduct soil amending treatments to these open areas (lime, fertilizer). Landowner reserves the right to harrow, disk, plow or otherwise prepare the fields for planting with equipment. Landowner reserves the right to hunt and/or lease the property for hunting.

3. Management Strategies & Recommendations

Create additional wildlife openings by converting ground involved with fuelwood or other timber harvesting disturbances. Continue to harrow, lime, fertilize and plant fields in an array of crops of plantings beneficial to wildlife. Perform or allow predator control and trap/shoot feral hogs if they invade the property. State, county and powerline utility company continue to perform maintenance of these rights of way by mowing and or use of herbicides. Landowner may plant these ROW areas into wildlife cover or food sources with permission from utility company. Enhancement of wildlife habitat directly adjoining county or state highways is not encouraged from a public safety standpoint.

Powerline ROW; stand 6

4. Treatment Mitigation

Perform gopher tortoise burrow surveys prior to timber harvest or any clearings. Protect existing burrows from activity. Pile and burn debris from land clearing activities. Stabilize newly constructed wildlife openings as soon as practical with vegetation. Use herbicides and fertilizer at label and soil testing suggested rates.

B. UPLAND PINE

1. Current Situation

Approximately 420.3 acres or 82.70% of the property make up this "desired future condition" category. This category contains a variety of forest types and stand condition classes (Table 3). There are approximately 47.3 acres of non-stocked longleaf pine types, 5.4 acres of hardwood-pine fuelwood, 3.9 acres of mixed hardwood fuelwood, 147.1 acres of loblolly saplings, 0.8 acres of mixed hardwood saplings, 4.7 acres of loblolly-shortleaf pulpwood, 0.5 acres loblolly pulpwood, 14.4 acres of slash pine pulpwood, 0.8 acres of pine-hardwood pulpwood, 2.7 acres of longleaf chip n saw, 9.3 acres of longleaf sawtimber, 162.8 acres of pine-hardwood sawtimber, and 20.6 acres of hardwood-pine sawtimber on upland pine sites.
Stands 9 and 21 have been recently clearcut (previously sand pine plantations) but have not been site prepared nor planted in longleaf to date. The entire upland areas are best suited for longleaf and will be converted over time to longleaf at a pace that is acceptable to both Grantor and Grantee. Some of the growing stock on upland pine sites are dying due to growing season fire

effects. Some stands are in decline (loblolly, shortleaf and slash) due to their age on these sand hill sites. The pre-merchantable loblolly stands are in decline at a young age as well due to site.

Loblolly saplings in decline; southern end stand 11

The uplands that are composed of either PH or HP forest types are extremely dense with non-merchantable scrub hardwood which is limiting any ground cover or natural longleaf seedlings from becoming established. The growth rates are very low and the timber is very old (tables 3 & 4).

There are numerous stands that may be "thinnable" during this FMP period. There are numerous stands that would benefit from a fuelwood (TSI) operation.

The majority of the uplands are low risk for annosus root rot if longleaf pine is favored. SPB hazard is very low for most all stands (table 9). No active, inactive, or fresh "starts" of RCW were observed and no suitable nesting habitat was observed. One highly unlikely but suspect "starter hole" is present in the northwest corner of stand 42. The potential for foraging habitat will slowly increase in the next planning horizon for RCW as stands are "cleaned up" exposing more favorable stem area of pines and understories are kept or made open with the use of fuelwood, fire and herbicide combinations.

2. Preferred Situation

The landowner desires to create open, park-like upland stands in the 45-65 BA range with composition leaning toward long-lived, reduced risk, and reduced maintenance species such as

longleaf pine. This property has many old longleaf trees (90-130 years) in small groups or patches. Fuelwood and salvage-sanitation harvests will clean up many of these stands and all longleaf should be retained unless some reason for removal is called for (less than 50% live crown, leaning more than 20 degrees, fire damaged/girdled, anemic crown, insect damage, lightning strike). An uneven-aged distribution of size classes will slowly take shape in the next few FMP periods, but the distribution is highly skewed at this time. An abundance of seedlings are expected to come in, but it will take decades before size classes between 3-10 inches will form.

Landowner retains right to cut (or have cut) firewood from the property for his use or sale. The landowner desires to grow high quality pine poles, veneer, and sawtimber while simultaneously providing excellent habitat and hunting opportunities (deer, turkey, and quail). Landowner desires to see increases in gopher tortoise burrows and habitat use. Landowner desires to see this sand hill community be a showcase of what a managed forest can yield.

Mature longleaf; stand 45

The landowner prefers to utilize even-aged methods to achieve this type of upland structure and grow mixtures of longleaf and loblolly pine in a frequent fire landscape that will conform more to an uneven-age distribution over time.

The landowner seeks to produce periodic timber income without impacting the visual and hunting characteristics of the property. The landowner desires to control diseases and pests such as SPB, Ips, fusiform rust, annosus root rot, feral hogs, kudzu, and any other invasive species that may establish and be a threat on the property.

The landowner desires to continue to aggressively use prescribed fire and extend potential burnable days through use of early fall, late winter, spring and early summer burns as those opportunities present themselves. Landowner desires to establish and maintain firelines with either bulldozer, handline, disk line or some combination to hold prescribed burns with minimum impact. Landowner desires to conduct block burning patterns on 3 year return interval on the majority of sites.

3. Management Strategies & Recommendations

Fuelwood operation to remove the majority of rough sized hardwood pulpwood (10" DBH or less) trees and all non-merchantable hardwood understory is needed on most of these upland stands. Frequent entries of salvage-sanitation cuts may be imposed to remove trees "most likely to die" before they lose significant product value. Young stands should be thinned as soon as practical to reduce threats by SPB, enhance habitat for an array of wildlife species, and produce product value as soon as practical. Portions of young stands may require immediate conversion to longleaf by fuelwood harvesting.
Salvage-sanitation cuts may identify trees to be cut using marking paint on the bole and the stump. Thinning of young stands may be with row thinning, leave tree marking, and operator selection methods. Boundaries of timber sale cutting areas (including fuelwood sites) should be painted, flagged and/or GPS surveyed.
Pre-commercial thinning may be accomplished using a grinding type machine, chainsaws, or hand tools. Site preparation for pine regeneration may range from burn only to herbicide & burn. Herbicide may be applied with helicopter, tractor or truck mounted tanks systems, backpack sprayers, hack-n-squirt, or a combination. Site preparation for hardwood regeneration may include chainsaw felling residual stems (silvicultural clearcut), injection of some species, burning, or a combination. Boundaries should be painted or flagged for areas to be treated.

TSI in both pine and hardwood stands may include use of fire, chainsaws, tractor mounted spray systems, backpack, injection, hand tools, or a combination. Since a high percentage of SPB-Ips spots will go inactive on their own, many spots may be monitored to determine the risk of spot expansion. Cut & remove (salvage) will be the primary suppression method used with boundaries painted or flagged. Cut & leave and pile & burn methods may be infrequently used but may be when/where considered appropriate.
Additional non-traditional windows may be used to expand the burnable days and achieve certain elements of management goals. Prescribed burning may be performed in October-November for site preparation of longleaf, December through mid March for habitat improvement-fuel reduction and May-June for hardwood control (CUS).

4. Treatment Mitigation

Inspect logging activities to ensure road and site conditions are operable. Survey each site proposed for harvest operations for RCW presence. Report all suspected RCW cavity trees and make a determination whether the cavity is RCW or something else (limb scar, sapsuckers).
Inspect ground for gopher tortoise burrows prior to any ground disturbing activity.
Smooth and establish ground cover (when and where needed) disturbed areas such as landings and temporary roads. Install water bars and turnouts to meet or exceed BMP standards. Harden any necessary dry stream crossings with rip rap, gravel or temporary bridges.
Inspect site preparation, TSI, CUS, and reforestation activities to ensure compliance and effectiveness. Meet or exceed state BMP's. Streamside management zones (SMZ's) will be protected along intermittent and perennial stream courses.
Prescribed burns should have smoke screening performed to identify smoke sensitive areas and document the decision for chosen wind direction. Burn plans should be prepared by a certified burn manager with site-specific mitigation outlined (notification, signage, monitoring, patrol,

etc). Establish fire lines on suitable locations, water bar after use, and establish ground cover if needed as soon as practical. Cross drainages and streams at right angles and restore crossings to prevent sediment from running into the drains.

C. UPLAND HARDWOOD

1. Current Situation

There are approximately 18.8 acres (3.70% of property) in upland hardwood types on the property; stands 8, 22, 39 & 48 (table 3). Approximately 1.2 acres are red oak-white oak-hickory (RWH) pulpwood, 4.0 acres RWH sawtimber and 13.6 acres hardwood-pine sawtimber.

Some selected portions of stands 39 and 48 are on upland longleaf pine sites and may be converted to longleaf during a future FMP period if the landowner desires to see more longleaf pine on suitable upland sites. These stands are low priority for group selection conversions for this FMP period.
Portions of these stands may receive a fuelwood operation harvest to open up the mid and understory. Stand 8 is to be burned on a 5-year return interval, dormant season only. Each of these stands are discussed for specific treatment (table 10) for this FMP period. Many of these stands are "groomable" towards oak savannas that can be maintained with dormant season prescribed burning and encourage warm-season native grass incursion with frequent low intensity burning and removal of the midstory favoring only larger individuals in the over story. Refer to the recommended prescribed fire areas (map 8) that propose locations of control lines and burn block design (table 7). Many of these hardwood stands will be inside the proposed burn blocks and should receive dormant season fire either backing or flanking into the wind when the fine fuel moistures are between 8-11% to minimize the effects on the oak-hickory component. The majority of these sites have historically been prescribed burned in conjunction with upland pine types and should not be purposefully excluded.

2. Preferred Situation

The landowner desires to retain most of these stands for tract diversity, wildlife habitat, scenic variation, and protection of soil-water resources and may retain these stands. Most of these stands are predominately even-aged. These stands are relatively young and healthy and should be easily maintained for many decades before imposing regeneration actions (uneven-aged harvest using group selection and even-aged with shelterwood or clearcut).
The landowner desires to allow prescribed fire to move through these stands in a backing or flanking pattern. The landowner desires to thin parts of these stands to create open savanna like conditions or merely alter species and size composition. Fuelwood or SST operations may be made on a 10 year cycle.

3. Management Strategies & Recommendations

On selected stands, landowner desires to create open savanna like conditions that can be maintained with dormant season fire, harvesting and/or use of herbicides.

Upland oak "savannah" maintained with fire (not on property)

4. Treatment Mitigation

Harvesting will be done during the drier periods to minimize both road and site impacts. State BMP's will be met or exceeded. Disturbed areas may be smoothed and revegetated where needed, as soon as practical. Any pine sawtimber sized tree marked for salvage/sanitation removal from these hardwood areas will be checked for past or present use by RCW by the person doing the marking.
Any site planned for ground disturbing activities should be first examined for any gopher tortoise burrows. Any of these stands that exist on priority soils for relict trillium should be surveyed in early spring to determine the presence or absence of the plant before harvesting. The moister portions of these upland sites are the only potential locations. Firing patterns should be made in a manner, which will generate a low intensity backing fire. On the broader, upland sites, firing patterns can be flanking or strip-head. Herbicides will be used in accordance with label direction.

D. HARDWOOD STRINGERS & DRAINS

1. Current Situation

There are no stands on the property that come under this classification. Most of the "drains" have very small watershed areas and are "DRY". Any trees on drainage or stream banks (whether first through fifth order) will be retained for bank integrity.

2. Preferred Situation

Not applicable.

3. Management Strategies & Recommendations

Not applicable.

4. Treatment Mitigation

Not applicable.

E. BOTTOMLAND HARDWOOD

1. Current Situation

There are approximately 24.9 acres (4.90% of property) in bottomland hardwood. The only stand in this group is stand 19 which is a hardwood-pine sawtimber stand. This stand has mixtures of slash, longleaf, and loblolly pine along with tupelo gum, brush species and limited sweetgum. This site is extremely wet and no silvicultural activities are recommended other than allowing fire to be in the stand. Pine Knot Creek is in the center of the stand and flows to the west. This group is found on Bibb sandy loam mapping unit which frequently floods.

2. Preferred Situation

The landowner desires to leave this stand "as is" for this FMP period. The landowner desires to allow fire to move through this stand in a low intensity manner when the stand is burned. The landowner desires to control some select pockets of dense shrub patches with handtools and herbicide hack-n-squirt methods. The landowner desires to be able to access Pine Knot Creek with walking trails and be able to float the stream with a canoe. Some bank vegetation that is over hanging will be removed with handtools and any debris that is blocking passage of the stream may need to be cut out.

Landowner desires to install bird and some duck boxes. Landowner desires to be able to engage in light recreational use such as placement of picnic tables and walking trails through this stand. No harvesting is expected at any time on this stand during this FMP period.

3. Management Strategies & Recommendations

As a general rule, the use of prescribed fire is discouraged in this stand however no fire lines will be purposely constructed to exclude fire from working along the interface of upland and bottomland except along the property lines where a combination of dozer and hand lines will be placed.

4. Treatment Mitigation

As prescribed burns are conducted, apply firing techniques to encourage low intensity backing fire to move within this stand.

Fires should not move into these sites very far and should be of low intensity to minimize basal scarring of hardwoods and potential impacts to trillium. Selected portions of these stands considered for regeneration will need a survey in early spring for relict trillium presence. Use non-soil active herbicides for the hack-n-squirt treatment.

F. NATURAL AREAS

1. Current Situation

There are approximately 30 acres (5.9% of property) considered natural area. Stand 25 is a "swamp" below the main lake (Pond 3) and is a narrow stand on a wetland site. The other area is the forested bottomland corridor associated with the Pine Knot Creek. These natural areas create unique habitat for an array of plant and wildlife species.

2. Preferred Situation

The landowner desires to maintain these locations "as is". Landowner desires the right to install nesting boxes and perform maintenance on structures. No direct management activities with regard to harvesting or TSI are proposed this FMP cycle. Fire will not purposely be excluded from these sites unless existing control lines make separation easy without constructing additional fire lines.

Wetland swamp; stand 25

3. Management Strategies & Recommendations

Continue with the prescribed fire landscape application.

4. Treatment Mitigation

There is no planned timber harvesting or site disturbing activities planned.

G. WATER AREA

1. Current Situation

There are 11.6 acres (2.28% of property) in this group all being open water areas excluding Pine Knot Creek. There are no waterholes on the property at the present time however the landowner desires to install several and once established, they will become part of this group.

2. Preferred Situation

The landowner desires to attract waterfowl and other open-water-dependent species. Landowner desires to improve the aesthetic and recreational use potential of these sites with regard to fish and waterfowl and place additional nesting structures and maintain structures already in place. The landowner desires to maintain the water quality and clarity subject to maintaining an adequate phytoplankton bloom. The landowner desires to perform necessary weed control in such waterways on an as needed basis. The landowner desires the ability to install small upland waterholes in strategic locations. Landowner desires the right to construct an additional lake site in stand 15. Landowner desires right to conduct dam/spillway and shoreline maintenance of encroaching vegetation with fire, handtools, and approved herbicides.

Small lake; stand 41

3. Management Strategies & Recommendations

Create additional waterholes (0.1 acres each) on upland sites. Improve the fisheries resources on the water areas by fertilization, installation and maintenance of structures. Conduct balance checks to ensure proper sizes and types of desirable fish. Mitigate known point sources of sediment that may cause a reduction in water quality and clarity. Maintain and construct additional walkways and blinds for wildlife viewing and hunting opportunity enhancement. Conduct weed control as necessary with aquatic herbicides if plant growth gets out of hand.

4. Treatment Mitigation

Stabilize newly constructed waterholes to minimize exposed soil until they fill up. Perform erosion control and road stabilization at known problem points where sediment may enter stream courses that feed into the lakes. Apply fertilizers and herbicides according to label rates. If a new lake is constructed, it will be done in accordance with all laws and regulation with on-site compensatory mitigation opportunities or purchased stream credits if the Corp of Engineers permits the lake site.

XIV. 10-Year Treatment Schedule

Refer to Table 10. Recommended and foreseeable work activities include and are not limited to fire line construction/maintenance, understory prescribed burning, timber harvesting (thinning, fuelwood operations, clearcutting, salvage-sanitation), timber stand improvement with herbicides, chemical site preparation, tree planting, wildlife opening/field maintenance and new opening construction, road maintenance, road/trail construction, facility construction, facility maintenance, fisheries improvements, waterhole construction, and boundary line maintenance. The FMP is dynamic and subsequent 10-year plans will be developed that will meet the spirit and intent of the management direction. The FMP is amendable by mutual agreement between Grantor and Grantee. Requests and proposed changes cannot be unreasonably withheld. The recitals of the conservation easement trump the FMP only if the FMP proposes direction contrary to the conservation values.
Landowner desires to retain right to aggregate and sell carbon credits. Landowner reserves the right to sell ground water. If the opportunity presents itself, although low in probability, landowner reserves the right to access and sell oil and gas resources provided the footprint of the surface disturbance is less than 5 acres and impacts can be mitigated (power underground, trunk line underground and in acceptable locations) and not impair any of the stated conservation values.

XV. References Used

Managing Wildlife on private lands in Alabama and the Southeast, Alabama Wildlife Federation, Greg and Debbie Yarrow, 1999.
Threatened and Endangered Species of Alabama, A Guide to Forestry Activities, US Fish & Wildlife Service, Champion International and Canal Wood Corporation, 1995.
Soil Survey Information, NRCS, Marion Co. GA
The Reptiles and Amphibians of Alabama, AL. Agri. Exp. Sta, AU AL. Mount, R. 1975.

XVI. TABLES

XVII. Maps

XVIII. Appendices

Appendix 7: TNC ACUB Deed Restriction for acquisition of fee simple interest

(Above Space Reserved for Recorder's Use)

After Recording, Please Return To:

The Nature Conservancy
1330 West Peachtree Road, Suite 410
Atlanta, GA 30309
Attn: Joan T. Dwoskin, Esq.

NOTE TO CLERK: PLEASE CROSS-REFERENCE THIS NOTICE OF RESTRICTIONS WITH THAT CERTAIN LIMITED WARRANTY DEED RECORDED IN DEED BOOK 189, PAGE 247 OF THE MARION COUNTY RECORDS.

STATE OF GEORGIA
COUNTY OF _____

NOTICE OF RESTRICTIONS

The Nature Conservancy, a non-profit District of Columbia corporation (the "Conservancy") acquired on August 4, 2009, real property located in Marion County, Georgia, more particularly described in the Limited Warranty Deed recorded in Deed Book 189, Page 247 of the Marion County records (the "Property"). The Conservancy purchased the Property subject to the purposes, terms and obligations of the unrecorded Cooperative Agreement between the Conservancy and U.S. Army Research Development and Engineering Command on behalf of Fort Benning (as amended from time to time, the "Cooperative Agreement").

The Conservancy executes and records this Notice in accordance with the Cooperative Agreement to acknowledge it owns and holds the Property subject to the restrictions and agreements described on Exhibit "A" attached hereto and made a part hereof (the "Conservancy Restrictions").

The Conservancy hereby covenants, agrees and acknowledges, by its execution and recordation of this Notice, that the Conservancy holds title to the Property subject to the Conservancy Restrictions.

IN WITNESS WHEREOF, the Conservancy has executed this Notice and affixed its seal this ____ day of _____, 2010.

Signed, sealed and delivered
in the presence of:

THE NATURE CONSERVANCY,
a District of Columbia non-profit corporation

_____
Unofficial Witness

_____
Notary Public

By: _____
Name: _____
My Commission Expires: Title: _____

_____ [CORPORATE SEAL]

[NOTARIAL SEAL]

The third party rights granted by The Nature Conservancy, a District of Columbia non-profit corporation, the Grantee hereunder, to the U.S. ARMY on behalf of the UNITED STATES as set forth in **Exhibit "A"** attached to and made a part of this Notice are hereby acknowledged and accepted on behalf of the UNITED STATES, acting by and through the Chief, Real Estate Division, US Army Corps of Engineers, Savannah District.

Signed, sealed and delivered in
the presence of:

By: _____
Ralph J. Werthmann, Chief Real Estate Division Savannah District, US Army Corps of Engineers

_____
Unofficial Witness

As Its: Authorized Agency Official

_____
Notary Public

My Commission Expires:

_____

[NOTARY SEAL]

EXHIBIT "A"

CONSERVANCY RESTRICTIONS

The Conservancy purchased the Property subject to the purposes, terms and obligations of the Cooperative Agreement (as defined in the above Notice of Restrictions) and the Conservancy shall hold and maintain the Property consistent with the purposes, terms and obligations set forth in the Cooperative Agreement.

United States Army Contingent Rights: Should the Conservancy permit the Property to be used or developed in a manner inconsistent with the Cooperative Agreement, the Conservancy shall transfer to the United States Army (the "Army") upon the request of the Secretary of the Army, in accordance with and under the conditions specified in 10 USCS Section 2684a(d)(4), fee interest in the real estate acquired hereunder sufficient to ensure that the Property is not developed and used in a manner inconsistent with the purposes of the Cooperative Agreement.

The Conservancy may not convey any interest in the Property without the prior written approval of the Army; provided however, with the prior approval of the Army, the Conservancy may sell the Property subject to a retained Conservation Easement (to be monitored and enforced by the Conservancy) that: (a) requires the Property to be held and managed consistent with the purposes of the Cooperative Agreement, (b) requires the Army's prior written consent to transfer the Conservation Easement, and (c) includes the contingent right of the Army to monitor and enforce the Conservation Easement if the Conservancy, its grantee, successor in interest or assigns fails to protect the Property in accordance with the terms of the Conservation Easement. The Conservation Easement shall authorize the Secretary of the Army to demand the transfer of such Conservation Easement to the Army or a designated third party eligible entity should the holder of the Conservation Easement fail to manage and maintain the Conservation Easement for purposes consistent with the Cooperative Agreement or fail to carry out its duties to monitor and enforce the Conservation Easement.

Notwithstanding anything contained herein to the contrary, upon the delivery of the deed subject to the retained Conservation Easement, the interests of the Army shall be limited to those interests set forth in the Conservation Easement and all other rights that the Army had to the Property prior to the reservation of the Conservation Easement, including the right to demand transfer of the fee title, shall terminate.

Appendix 8: ACUB Program Description (taken from MCOE BA (DA 2009))
PROPOSED ACCELERATION OF ARMY COMPATIBLE USE BUFFER (ACUB) PROGRAM, FORT BENNING, GEORGIA

2.2.1. PURPOSE

This section describes current Army plans to promote RCW recovery in the region and provides the related legal authorities for off-post conservation actions in light of the proposed MCOE projects and actions. This additional information is intended to supplement the ACUB program proposals and discussions in the Final Biological Assessment for Proposed Maneuver Center of Excellence Actions at Fort Benning, Georgia. See in particular MCOE Biological Assessment Sections 8.10.2 and 9.10. and note that the Army proposes in the MCOE Biological Assessment to develop a plan for off-post conservation actions for RCW recovery in consultation with USFWS within one year of completion of formal consultation on the proposed MCOE action. Acceleration of the ACUB program actions at Fort Benning is central to achieving offpost conservation actions for RCW recovery in the near-term and longer term. This section will address the following specific topics: Fort Benning's ACUB program background; near-term ACUB proposals; longer-term ACUB plans; ACUB funding goals; and legal authorizations for ACUB and off-post conservation measures.

2.2.2. BACKGROUND

The Fort Benning RCW population is designated as a Primary Recovery Population for the Sandhill's Recovery Unit (USFWS 2003), and Fort Benning has an extensive RCW management program that includes RCW monitoring and habitat management. To meet BRAC 2005, Transformation, and Grow the Army requirements and continue to meet its national defense mission, Fort Benning needs to accommodate additional construction of facilities, including ranges and maneuver areas, and increased military training activities. Fort Benning intends to pursue conservation measures to promote RCW recovery by collaborating with other governmental and private entities for RCW recovery on a regional basis. Near-term actions, i.e. those actions that Fort Benning assesses are reas nably achievable within the next 5 years, are proposed as a proactive step for RCW conservation and recovery with a goal to reach longer-term arrangements. Existing authorities, such as those related to the AC B program, provide an opportunity for near-term actions during the timeframe needed to coordinate and establish longer-term compensation measures such as conservation banks or a recovery credit system. Georgia also has existing authorizations for conservation properties that Fort Benning intends to pursue.

2.2.3. STATUS OF FORT BENNING'S ACUB PROGRAM

2.2.3.1. **The ACUB Plan**

In 2006, Fort Benning developed an ACUB Plan with The Nature Conservancy (TNC), and TNC currently is Fort Benning's primary ACUB partner. The Chattahoochee Valley Land Trust (CVLT) began work with TNC as a "sub-grant" partner in 2008. The ACUB Plan outlines general "focus areas" or priority zones adjacent to, or near, Fort Benning and identifies the type of incompatibility or resources related to that general area. Offpost RCW habitat and management areas were identified; these areas may also benefit other species including the gopher tortoise (*Gopherus polyphemus*) (GT) and provide development and noise buffers. These focus areas are guidelines and are subject to updating as needed.

2.2.3.2. **Fort Benning Cooperative Agreement with TNC**

The ACUB Cooperative Agreement (CA) with TNC (DA 2006) was finalized in September 2006. The US Army Research Development and Engineering Command (RDECOM) signed the CA on behalf of Fort Benning. Per the CA, Fort Benning is the primary Army representative for routine coordination and approval of TNC's proposed ACUB acquisitions. The ACUB program has focused so far on preventing incompatible development and encouraging general habitat conservation near Fort Benning, rather than establishing RCW habitat and management off-Post. Per the CA at paragraph 2.1: "The primary objective of the CA is to avoid incompatible land use development and avoid or limit restrictions to training." TNC has acquired conservation easements as well as fee title to properties to meet this objective.

2.2.3.3. **Fort Benning/ TNC management agreement (Cooperative Agreement to Address Fire Management and Ecological Restoration, dated November 2008)**

The Fort Benning and TNC ACUB CA agreement allows Fort Benning personnel and resources to supplement TNC's efforts for natural resource management on TNC-owned ACUB properties, which includes RCW and habitat management. An appropriate real estate authorization, a right of entry, was also obtained. Similar agreements have not been pursued with other landowners near Post as part of the ACUB program or otherwise by Fort Benning.

2.2.3.4. **General description of acquisitions to date**

2.2.3.4.1. **Easements**

To date, TNC has obtained easements either through donation or purchase. The terms of these easements focus on restricting development and protecting certain habitats rather than obligating specific management activities. Initial indications are that some of those private landowners who have entered their properties into non-development easements would be willing to modify that easement to include mandatory RCW habitat management if they are appropriately compensated and if they are not liable for management obligations that could be deemed unreasonable. This would involve negotiations with multiple private landowners and associated easement revisions and funding. Therefore, Fort Benning does not propose, as a nearterm measure, to pursue modifications of existing easements for RCW habitat establishment/management. Instead, such easement modifications likely will be considered as a long-term conservation measure because that may be the most effective measure to establish RCW habitat and ultimately RCW breeding groups on private lands which TNC does not acquire in fee simple.

2.2.3.4.2. **Fee title**

TNC has purchased approximately 2,800 acres of property whose upland portions are considered appropriate for RCW habitat establishment/management and TNC plans to increase that total to over 3,000 by the end of 2009. According to TNC representatives, TNC will purchase a parcel in fee simple when the opportunity arises with the intent to resell within one to 3 years. Per the CA, when TNC sells the property it owns in fee simple, TNC will establish a conservation easement on the property and either hold the conservation easement or find a suitable "holder". Per the Georgia Uniform Conservation Easement Act (Official Code of Georgia Annotated (OCGA) 40-

10-1 et. seq.), the holder must be a governmental entity or a charitable organization with the purpose of protecting natural resources or similar values.
Thus far, none of the ACUB parcels that TNC owns has been actively marketed.

2.2.3.5. **Current management of TNC-owned ACUB properties**
TNC currently manages the properties for multiple natural resources and prepares a management plan for each parcel consistent with RCW habitat goals, with actions including, but not limited to:
• create appropriate fire breaks and conduct prescribed burning activities at suitable locations, during suitable seasons and at suitable intervals; i.e. 2-5 years;
• vegetation management, including invasive species control, using techniques such as mechanical removal and/or herbicide application; and
• harvesting or other removal of off-site trees and planting of longleaf pine. Fort Benning personnel and resources were utilized upon TNC request in 2008 in order to assist with accomplishing tasks in the work plans on a limited basis.

2.2.4. NEAR-TERM ACUB PROPOSALS
Near-term actions are considered RCW conservation actions that can reasonably be accomplished within the next 5 years. The TNC-owned ACUB properties provide an opportunity to jump-start establishment of RCW habitat in suitable areas near Fort Benning, rather than waiting until the longer-term proposals are finalized and implemented, which could take several years. Some actions may be necessary to accommodate this near-term ACUB proposal, such as revisions of existing ACUB agreements. The actions identified to date are presented below. The near-term ACUB proposal is intended as a first step in leading to longerterm arrangements for perpetual management of RCWs and habitat in the region.

2.2.4.1. **Intensive cooperative management of ACUB properties that TNC owns in fee simple**
Rather than reselling their ACUB properties with easements restricting development, TNC is willing to consider either transferring ownership of the parcels to the State of Georgia or retaining TNC ownership of those parcels for the near term. Ownership by either Georgia or TNC will facilitate near-term actions to establish RCW habitat off-Post. This primarily includes ACUB parcels adjacent to, or near, the Fort Benning eastern and north-eastern boundaries. The preferable option according to initial discussions with the TNC is Georgia ownership, which would allow the leveraging of State programs that provide suitable land use designations for conservation (see below). Per prior discussions with Georgia representatives, the State is willing to participate if the Army will fund, at a minimum, the management activities required for RCW habitat. As an option, Fort Benning may propose conducting the RCW habitat management using Army personnel and resources. Alternatively, TNC would consider owning the property near-term if the Army will fund the RCW habitat management activities or conduct the RCW habitat management using Army personnel and resources. Much of the ground work has been established with TNC, although both the ACUB CA and the agreement to assist in management of TNC-owned properties will likely require revision in order to continue TNC ownership. Consideration was given to revising existing ACUB easements that TNC has obtained from landowners in order to include RCW habitat management obligations, but this was rejected

as a near-term option for several reasons. It would be difficult to reach agreement with the landowners for the appropriate revisions to those easements in the near-term. Also, dealing with numerous landowners and enforcing the RCW habitat land management obligations would present logistical challenges. For these and other reasons, revising existing ACUB related easements was not considered viable as a near-term option, but will likely be pursued as a longterm action. The Army intends to provide personnel and resources for establishment and management of RCW habitat on upland portions of ACUB properties owned by TNC or transferred to Georgia ownership. The ACUB properties are approximately 3,300 acres, of which 2,800 acres are potentially suitable RCW habitat. Alternatively, the Army may provide funding for appropriate RCW habitat actions on those ACUB properties. Both scenarios will provide approximately 5 years of RCW habitat establishment/management that otherwise would not be likely to occur while the longer-term proposals for in perpetuity RCW habitat and management off-Post are planned and implemented.

2.2.4.1.1. **Actions and agreements if TNC retains ownership**

• Revisions to the ACUB CA with TNC would include a change in emphasis in order to add a priority goal to Fort Benning's ACUB program to establish RCW habitat and conservation management in the region. This type of revision to the CA may be prudent regardless of whether or not these proposed near-term RCW conservation actions are adopted.
• Revisions to Fort Benning's agreement to assist in natural resource management on TNC-owned ACUB properties will also be necessary, in part to ease the inclusion of several parcels in the agreement, as well as to address liability issues more clearly.
• TNC has concerns about the additional and unplanned costs associated with ownership over several years, such as property taxes, access/security issues and routine maintenance of roads, boundaries, gates, etc. TNC may be unwilling to continue ownership unless the Army can fund those costs associated with TNC's on-going ownership in order to facilitate regional RCW habitat and management.
• Local TNC representatives are willing to pursue continued ownership of the parcels. TNC agreement may be indicated by a letter of intent or similar document while the details are worked out over the next few months.

2.2.4.1.2. **Actions and agreements if TNC-owned ACUB property is transferred to Georgia**

• If Georgia owns the property and agrees to RCW habitat establishment/management in the near-term, Fort Benning will pursue agreements or programs in order to facilitate assisting in such RCW conservation actions, including potentially adding Georgia as an ACUB partner or encouraging TNC to add Georgia as a "sub-grant" partner.
• Georgia will have management and funding concerns very similar to those identified above for continued TNC ownership of the properties, including wanting the Army to fund or perform RCW habitat management actions.
• Coordination with the land-owner (Georgia or TNC), the USFWS and Fort Benning is needed to ensure an appropriate plan/standard for RCW habitat actions in the near-term.

2.2.4.2. **Continuing the current cooperative management of ACUB properties that TNC owns in fee simple**

Even if the proposal discussed immediately above for intensive cooperative management of ACUB properties that TNC owns in fee simple is found to be unfeasible, Fort Benning proposes

as a near-term measure to continue the recently-established program for providing personnel and resources to assist in natural resource management of TNC-owned properties. The main difference is that under this proposal there is no guarantee that TNC will retain ownership of the property or transfer ownership to Georgia for at least 5 years. TNC property transfers to private entities will make it less likely that Fort Benning will be able to accomplish or fund RCW habitat management on those properties in the near-term because the associated conservation easement terms and funding mechanisms may not have been worked out sufficiently. Revisions to Fort Benning's agreement to assist in natural resource management on TNC owned ACUB properties may be beneficial, in part to ease the inclusion of several parcels in the agreement.

2.2.5. LONG-TERM ACUB POTENTIAL ACTIONS

2.2.5.1. **Long-term Fort Benning ACUB goals and progress**

The Fort Benning ACUB was originally conceived as a 3-pronged effort (encroachment buffer, an eastern GT corridor and a western RCW corridor, with much overlap and additional conservation objectives accruing), using a mixture of conservation easements and fee-acquisition "parks and preserves." Scope and extent over a 10-year period were largely speculative, but included estimates of over 40,000 acres protected, including a 1-to-3 mile buffer of some 10 percent (%) of the Installation boundary, an overlapping, but more distant assemblage of Fall Line Sandhill habitat to the east on which Fort Benning's gopher tortoise population could be replicated; and a speculative RCW-habitat corridor in Alabama intended to reach existing RCW habitat 30 miles to the west. Intensive field investigation and GIS analyses have been undertaken, and more importantly, the local/regional real estate market has been carefully monitored for opportunities.

As a result, major progress has occurred along Fort Benning's northeastern boundary and points east and has been dominated by fee-acquisition of undeveloped commercial timberland parcels (both corporate and small-private). Due to limited partner funding and capacity, the "parks and preserves" strategy has not yet materialized although Georgia DNR has expressed significant interest in creating wildlife management areas on ACUB properties if state funding and appropriate parcel configurations materialize. Instead the fee-acquisition program has been characterized as a "conservation buyer program" in which lands are purchased by TNC, owned for one to 3 years for initial ecological management and restoration, then marketed to conservation buyers with an encumbering conservation easement that extinguishes development rights and protects any habitat values in perpetuity. In addition, a traditional conservation easement program has been implemented and is gaining traction. An 1100-acre easement protecting floodplain and wetland habitat, relict trillium (*Trillium reliquum*) and Fall Line hills was donated to TNC in 2007. In 2008, 2 additional easements were crafted on an additional 700 acres owned by 2 landowners, and should close in March 2009. All these easements are on the east side of Fort Benning, and several more landowners are expressing significant interest. While no protection projects are currently in progress on the west side of Fort Benning, this program could be ramped up if restoration and protection of off-post RCW habitat were deemed an important short-term goal. RCW goals are appropriate on the east side as well, but will necessarily be a longer-term project. On the other hand the west-side strategy may have more connectivity challenges to existing occupied RCW habitat on Fort Benning.

2.2.5.2. **Potential long-term benefits from ACUB-related efforts**

The long-term benefits of establishing RCW habitat on lands TNC currently owns or is reasonably foreseeable to obtain are difficult to quantify, but real. Limitations of modeling efforts, such as not taking into account RCW translocation, hinder the estimation over time of the benefits of management of the ACUB properties for RCWs (e.g., the Walters model, MCOE Biological Assessment). Figure 2-5 depicts the potential long-term benefits of the ACUB properties to the east of Fort Benning that TNC is pursuing or investigating. Possible recruitment clusters are identified by location as well as an estimate of range of years.

Establishment of RCW habitat and ultimately RCWs on ACUB properties to the east is expected to provide additional habitat in the long-term that can reduce concerns about habitat fragmentation as well as other potential adverse impacts identified in the MCOE Biological Assessment (USACE 2008).

2.2.6. FUNDING

Army Environmental Command (AEC) and Readiness and Environmental Protection Initiative (REPI) program managers have identified approximately $ 5 million per year in funding through 2013, which could protect 10,000 to 20,000 acres beyond current totals.

2.2.6.1. **Legal authorities that support ACUB proposals and other off-post conservation measures ACUB Authority**

2.2.6.1.1. **Agreements to limit encroachments and other constraints on military training, testing and operations (10 United State Code (U.S.C.) § 2684a)**

In recognition of the adverse impacts posed to military operations from incompatible development and use of land surrounding military installations, Congress provided comprehensive authority to address encroachment in the National Defense Authorization Act for Fiscal Year 2003. Section 2811(a) of that Act, now codified at 10 U.S.C. § 2684a, empowers each military department to enter into agreements with eligible entities to work with landowners in the vicinity of a military installation in order to avoid incompatible development of their lands or to avoid the loss or degradation of sensitive natural resources in a manner that could adversely affect the accomplishment of the installation's mission (*See* 10 U.S.C. § 2684a (a)). Eligible entities include state and local governments, as well as any private non-governmental organization established for the conservation of land and natural resources (e.g., land trusts) (*Id.*t § 2684a(b)). The statute requires each agreement to provide for the eligible entity's acquisition of interests in real property and the Army's sharing of the acquisition costs (*Id.* at § 2684a(d)). In addition, the statute expressly authorizes the expenditure of operational funds such as "Operations and Maintenance, Army," and the Army's acceptance of an eligible entity's real estate transactional work, if it meets standards and practices substantially similar to those employed by the federal government (*Id.* at §§ 2684a(d)(7) and 2684a(g)). Real property acquisitions, whether by a restrictive easement or fee title, are to be acquired and held by the eligible entity, not directly by the Army, and may only be acquired from willing sellers (*Id.* at § 2684a(d)(1)-(2)). In order to protect the Army's investment in each acquisition, the statute requires each agreement to reserve the right for the Secretary of the military department to demand transfer of "all or a portion of the interest acquired under the agreement, or a lesser interest therein (*Id.* at § 2684a(d)(5)). The Secretary would only exercise this protective right to ensure that the property at issue is not developed for purposes incompatible with those under

which it was obtained, namely incompatible development or the prevention of loss of sensitive natural resources. *See Id."*

2.2.6.2. **Other Federal Authorities**

2.2.6.2.1. **Sikes Act (16 U.S.C. § 670c-1)**

Section 103a(a) of the Sikes Act Improvement Amendments includes language added by Congress in the Fiscal Year 2009 National Defense Authorization Act. Prior to fiscal year 2009, the Army was limited by language which only permitted the Secretary of a military department to enter into cooperative agreements with States, local governments, nongovernmental organizations and individuals in order to provide for the maintenance and improvement of natural resources on, or to benefit natural and historic research on, Department of Defense installations (*Id.* at § 670c-1(a)(1)). Congress has now expanded this authority and now expressly authorizes "the maintenance and improvement of natural resources off Department of Defense installations if the purpose of the cooperative agreement is to directly relieve or eliminate current or anticipated challenges that could restrict, impede, other otherwise interfere, whether directly or indirectly, with current or anticipated military activities (*Id.* at § 670c- 1(a)(2))."

2.2.6.2.2. **Participation in Conservation Banking Programs (10 U.S.C. §2694c)**

Section 311 of the Fiscal Year 2009 National Defense Authorization Act amended 10 U.S.C. § 2694b by adding § 2694c, which expressly authorizes the Secretary of a military department to make payments to a conservation banking program or 'in-lieu-fee' mitigation sponsor when it is determined that either (1) military testing, operations, training or other military activity or (2) military construction may or will result in an adverse impact to one or more species protected (or pending protection) under any applicable provision of law, or habitat for such species. *Id.* at §§ 2694c(a) and 2694c(b)(1) & (2).

2.2.6.3. **Georgia State Authorities**

2.2.6.3.1. **Georgia Land Conservation Law**

Georgia has established a flexible framework to protect and enhance the state's valuable natural resources (OGCA 12-6A-1 et. seq.). The law promotes partnerships and funding options for land conservation, including "Protections of … areas that serve as natural habitat and corridors for native plant and animal species" (OCGA 12-6A-2(5)(E)). Permanently protected land include: land owned by Georgia and dedicated as a heritage preserve (see OCGA 12-6-240 et. seq); land owned by state or local governments and subject to conservation easement, contractual protection arrangement, or a permanent restrictive covenant; but owned by any person or entity subject to a conservation easement ensuring management or land permanently legally protected by any other method that ensures conservation land management/uses. The law authorizes the Georgia Land Conservation Council to use trust fund for loans or grants to cities, counties and nongovernmental entities for acquisition of conservation land or Conservation Easements.

• Allows the Department to accept and administer property acquired or make other permissible agreements for ownership and operation of the property.

• Local and state agencies can enter into partnerships with tax-exempt organizations in order to assist with the development of land conservation project proposals, funding and property management.

• Nongovernmental entities must submit co-applications with the local government.

2.2.6.3.2. **Georgia Forest Heritage Trust Act of 2004**

The purpose of this act is to preserve forest lands by acquisition of fee simple title or other real estate interest. The State Forestry Commission, acquires forest heritage areas, approves dedication of forest heritage preserves and supervises management and use of preserves. Forest heritage preserves are held by Georgia in trust for public benefit and managed for the "best and most important" use(s). The use of a preserve can only be changed via specific procedures, which involves a petition to the State Forestry Commission stating that "an imperative and unavoidable necessity for such other use exists," and holding of a public hearing and General Assembly approval.

2.2.6.3.3. **Georgia Uniform Conservation Easement Act**

Georgia adopted the Uniform Conservation Easement Act at OCGA 40-10-1 in 1992. The Act authorizes and promotes the use of conservation easements "to retain or protect natural, scenic or open space values; assure availability for agricultural, forest, recreational or open space use; protect natural resources; maintain or enhance air or water quality; and preserve the historic, architectural and archeological or cultural aspects of real property."

The Act allows the holder of the conservation easement to be either a governmental body that can hold real property interests or a qualified charitable organization. The enforcer can be the easement holder or a third-party; third-party enforcer would be and authorized entity such as a government agency or charitable organization which does not hold the easement. The Act specifies that a conservation easement is valid even though "…[i]t imposes affirmative obligations upon the owner of an interest in the burdened property or upon the holder….."

2.2.7. CONCLUSION

The additional information and proposals submitted in this section provide more details, especially for near-term proposals and legal authorizations in order to utilize the ACUB program to establish RCW habitat and ultimately RCWs off-post. Fort Benning plans to assist in natural resource management, including establishment of RCW habitat, on approximately 3300 acres of TNC-owned ACUB properties in the near-term while working toward long-term solutions. Fort Benning therefore proposes to include approximately 2,800 acres as potentially suitable habitat for RCWs as part of its baseline acreage for RCW recovery. These efforts for management of RCWs and habitat off-post are expected to provide benefits in the long-term toward reaching RCW recovery while allowing Fort Benning to continue to meet its military mission now and in the future.

APPENDIX 2

Analysis of the Number of Red-cockaded Woodpecker Clusters Required to Achieve 350 Potential Breeding Groups

Introduction:

As noted in the RCW Recovery Plan (Plan): "Population sizes identified in recovery criteria are measured in the number of potential breeding groups" [hereafter, PBGs]. "A traditional measure of population size has been the number of active clusters. Potential breeding groups is a better measure of population status, because this is the basis of population dynamics in this species and number of active clusters can include varying proportions of solitary males and captured clusters. Estimates of all three parameters – number of active clusters, proportion of solitary males, and proportion of captured clusters – are required to support estimates of PBGs."

"To assist in the transition between these two measures, we have provided a range of numbers of active clusters considered the likely equivalents of the required number of PBGs. Estimated number of active clusters is likely to be at least 1.1 times the number of PBGs, but is unlikely to be more than 1.4 times this number. Thus an estimated 400 to 500 active clusters will be necessary to contain 350 PBGs, depending on proportions of solitary males and captured clusters and also on the estimated sampling error of the sampling scheme." Note that 1.1 times 350 equals 385 not 400 and that 1.4 times 350 is 490. Being appropriately conservative, the recovery team rounded these figures up by 15 and 10 clusters, respectively. **Note**: The Ft. Benning population goal is 351 PBGs.

Since approval of the Plan in 2003, 3 more primary core populations have reached recovery, Ft. Bragg, Francis Marion National Forest (FMNF), and Eglin Air Force Base (EAFB). Additionally, both Ft. Stewart and Ft. Benning have significantly increased their population sizes during this time period. The Apalachicola Ranger District (Apalachicola) has been recovered for decades (~500 active clusters) and provides a very long-term and large data set to help determine the number of total (suitable/managed) and active clusters required to achieve 350 PBGs.

Background:

Currently, based on previous calculations, it was assumed that Ft. Benning would require 421 territories to harbor 351 PBGs. The purpose of this analysis is to update the numbers of territories and active clusters required for Ft. Benning to reach recovery based on current Ft. Benning data supported by similar data from all recovered primary core and one other large population (Ft. Stewart). It is known that as RCW populations expand toward their "carrying capacity" (based on a territory per 150 acres on Ft. Benning) the percentages of unoccupied (i.e., inactive) clusters, captured clusters and clusters occupied by solitary birds decrease. This relationship, i.e., low percentages of non-PBG territories at "carrying capacity", appears to hold true regardless of population size if habitat is suitable, including availability of suitable cavities. However, populations undergoing expansion, particularly rapid growth, may have rather large percentages of solitary male groups. With a basic understanding of today's RCW populations

and their management, the reason for the low percentage of non-PBG territories at property carry capacity becomes apparent.

Today, all RCW populations occur on isolated habitat islands ranging in size from <2,000 to over 250,000 acres. Based on forest type and current habitat conditions, these islands can and do support RCW populations of various sizes. Via strategic and effective population and habitat management, expansion of these populations, regardless of their size, has become routine, predictable and successful. Even the smallest populations (~10 territories) can be and are being expanded and maintained as stable with focused management (Letcher et al. 1998, and Costa and Daniels 2004). Indeed numerous (n=6) new populations have been reintroduced into suitable habitat and are similarly stable and/or expanding. At carrying capacity (RCW group per 70 to 300 acres depending on habitat) and with normal annual recruitment, it appears uncommon for suitable territories, in any population of ~10 groups or larger, to remain unoccupied or in a solitary bird status for any significant length of time, e.g., beyond two dispersal seasons. With normal levels of annual recruitment, suitable unoccupied natural (old trees) or artificial (recruitment clusters) nesting habitat and breeding vacancies are quickly filled. This is not surprising even in small populations given that offspring have few options to find suitable habitat off-property.

The relatively high observed subadult "mortality" rates (i.e., birds not seen again in the study area/population during their first potential breeding season) previously documented in RCWs (see Walters et al. 1988) likely reflects that annual natality (recruitment) typically exceeds mortality within most populations. Therefore, "surplus" birds are destined to "float" or disperse (from the property), thereby exposing themselves to risks of predation and exposure. Additionally, if the capacity of the property/habitat to support RCWs (either naturally via old trees or artificially via recruitment clusters) is limited, the opportunities for so-called surplus birds to pioneer or occupy recruitment clusters is also limited and again their options are to float or disperse, increasing the probability of mortality. However, when nesting habitat is available it is typically quickly occupied which is why today so many populations are rapidly increasing. These landscape, habitat and ecological realities all support the concept that under normal circumstances a sufficient pool of subadults is annually available to either support population expansion or maintain population stability in populations at carrying capacity if suitable habitat is available.

Using Recruitment Clusters for Future Population Goal Calculations:

In determining the number of total territories required at recovery to achieve their designated PBG goal, some populations have incorrectly used their current number of recruitment clusters in their calculations. There is a problem with this procedure that results in misleading information and ultimately incorrect analyses. **Note**: the information presented in this analysis does not use these erroneous data sets. At carrying capacity there will be no recruitment clusters once all territories are occupied. Therefore, using the number of them in a calculation today to represent a "normal" percentage of inactive clusters in a future "recovered" condition is inappropriate. Today, many populations have numerous recruitment clusters on their property; e.g., in some cases a number equal to10% or even more of their number of active clusters. Using these in the "recovery" goal calculation (i.e. number of territories required for x number of PBGs) today

results in a seriously inflated over-estimate of the number of "inactive" clusters that will occur in a population at its future carry capacity. In other words, the percentage of "inactive" clusters in today's populations is significantly higher than the percentage that would be expected at carrying capacity because today's populations are undergoing an aggressive population expansion program (i.e., recruitment clusters), resulting in many "inactive" clusters. At carrying capacity there will be no such program and most territories will be and will remain occupied. Not surprising, the Apalachicola, the largest RCW population is a perfect example of the reality that there will be few inactive clusters in recovered populations. Many other current populations, including those listed in Table 1, support this fact.

Table 1: RCW population demographics (2011) for all primary core currently recovered and selected other populations

Population	Sample[1] (%IC)	#AC	#PBGs (%/AC)	#SM (%/AC)	#Capt (%/AC)	PBG/Sample
Apalachicola	108 (3%)	105	101 (96)	1 (1)	3 (3)	.94
Eglin AFB	309 (15%)	263	237 (90)	9 (3)	17 (6)	.77
Ft. Benning	350 (2%)	342	333 (97)	7 (2)	2 (1)	.95
Ft. Bragg	95 (1%)	94	86 (91)	3 (3)	5 (5)	.91
Ft. Stewart	378 (11%)	338	317 (94)	4 (1)	17 (5)	.84
FMNF[2]	497 (12%)	438	425 (97)	13 (3)	0 (0)	.86
Averages	**(7%)**		**(94%)**	**(2%)**	**(3%)**	**.88**

IC = inactive clusters
AC = active clusters
PBGs = potential breeding groups
SM = solitary males (some could be females)
Capt = captured clusters

[1]Sample – Apalachicola, Eglin AFB and Ft. Bragg provided data from their long-term "permanent" sample. Ft. Benning and Ft. Stewart data basically represents a total population census, while FMNF expanded their sample to reflect the entire population. Note that "Sample" includes all clusters, both active and inactive (IC) and that the number of inactive clusters (Sample - #AC= IC) represents a very low percentage, ranging from 1% (Ft. Bragg) to 15% (FMNF).

[2]FMNF is still "recovering" from the effects of Hurricane Hugo (1989), with greater than 1/3 of the RCW territories being at or below the Standard for Managed Stability foraging guidelines.

Summarizing the data in Table 1 shows that on average, at any given time in recovered and large populations approximately 7% of territories will be unoccupied, 2% will be occupied by solitary males, 3% will be captured and 88% will be occupied by PBGs. Therefore, based on the averages, to achieve a population goal of 350 PBGs, 398 "managed" or suitable territories would be required. However, based on Ft. Benning specific data, only 390 managed clusters would be required because 90%, not 88% (the average of the 6 populations), of managed clusters harbor PBGs.

Table 2 provides additional summary information including data on the number of active clusters required to achieve 350 PBGs. Based on the 6-population analysis, an average of 372 active clusters would be required to maintain 350 PBGs. Note that on Ft. Benning only 370 active clusters would be required to support 351 PBGs because 95%, not 94% (the average of the 6 populations) of active clusters harbor PBGs.

There is no reason to believe (except for catastrophic events and lack of habitat management) or data to support the idea that when a population achieves its carrying capacity regardless of its size, but especially for large (>250 territories) populations, that a significant percentage of territories will be unoccupied. Based on the data examined for this paper the average percent of inactive territories was 7% with a range of 1 to 15% (Table 1). Again, based on the discussion above (see **Background**) the reasons for this are intuitive and driven by the species ecology and the current configuration of remaining RCW habitats throughout the southeast. That is, populations are isolated islands that have achieved or will reach their RCW carrying capacity and then annually maintain that density. Of course, some small percentage (current data suggests on average it will ~7% or less; see Table 1) of territories will likely become unoccupied annually due to local stochastic events, e.g., loss of cavity trees or predation. However, even in small populations or subpopulations, assuming normal recruitment, suitable territories would be expected to be quickly reoccupied.

Recommendation:

Based on a Ft. Benning-specific analysis of 5 years of cluster occupancy and group composition data, Ft. Benning proposes to change the number of managed and active clusters required to achieve its population goal of 351 PBGs. The 6-population analysis of similar data for other large and recovered populations presented in this paper strongly supports Ft. Benning's proposed changes. Ft. Benning will manage 390 clusters and maintain at least 370 active clusters to assure that their population goal of 351 PBGs is achieved and maintained.

Table 2: Number of total clusters (TC = active and inactive) and active clusters (AC) required to achieve 350 PBGs

Population	PBG/TC[1]	#TC=350 PBGs	PBG/AC[2]	#AC=350 PBGs
Apalachicola RD	.94	372	.96	365
Eglin AFB	.77	455	.90	389
Ft. Benning	.95	368	.97	361
Ft. Bragg	.91	385	.91	385
Ft. Stewart	.84	417	.94	372
FMNF	.86	407	.97	361
Averages	**.88**	**401[3]**	**.94**	**372**

[1]PBG/TC = PBG/Sample column from Table 1
[2]PBG/AC = #PBGs (%/AC) column from Table 1

[3]Note that 350/.88 = 398 not 401; the difference is a rounding error.

Summary:

Understanding the relationships between suitable available habitat, population size, species ecology, and population dynamics (PBGs, active clusters, solitary bird territories, and captured clusters) clarifies and explains why as populations get very large (>250 groups) and in particular reach their property carrying capacity regardless of size, the percentages of unoccupied territories, captured clusters and solitary bird groups are small and, on average, equal ~12%, ranging from 5 to 24% of the territories (Table 1). Additionally, based on these new data presented here for numerous and varying size populations, the estimated number of active clusters necessary to support a specified number of PBGs is typically going to be on the low side of the range of 1.1 to 1.4 times the number of PBGs, or even lower as illustrated by the analyses in this paper. This relationship currently holds true for some of the largest and all currently recovered primary core populations.

Prepared by Ralph Costa
RCWO, LLC
2/10/13

APPENDIX 3

A-20 Wildfire Suppression Plan

Background:

Under the Base Realignment and Closure (BRAC) of 2005, the Armor Center and School currently at Fort Knox, Kentucky will be transitioned to Fort Benning, Georgia. Changes in range configurations, facilities construction, Soldier census, and training activity associated with this BRAC action may potentially impact habitats and populations of the endangered red-cockaded woodpecker (RCW) on Fort Benning. Currently, under the U.S Fish and Wildlife Service (USFWS) RCW Recovery Plan, the Fort Benning RCW population is designated a "Primary Core Population," which is the highest level of importance under the Recovery Plan. Fort Benning recently completed formal consultation with the USFWS to evaluate potential effects for Maneuver Center of Excellence (MCOE) actions on the Installation's RCW population. In the resulting MCOE Biological Opinion (BO) dated 29 May 2009, the USFWS identified as "Terms and Conditions" (TC9) the following requirement:

"Within six months of completion of consultation, collaborate with the Service to develop a plan for wildfire response in order to provide accountability for decisions made to let burn. The plan would be specific to the A-20 impact area and the clusters that will be counted toward recovery."

The wildfire suppression plan presented below was developed to meet the "terms and conditions" (TC9) requirements of the MCOE BO. Implementation of this wildfire suppression plan is contingent on USFWS review and approval.

The A-20 impact area has been frequently burned by military munitions for over 60 years. As a result of these frequent fires, the forest in this area is considered some of the most pristine on Fort Benning. Frequent fire has maintained the fire dependent ecosystem and an open park-like appearance throughout A-20, which provides excellent habitat for the RCW. For many years, most of this area has been unmanaged by humans except for the frequent fires caused from military training. From ground and aerial surveys conducted in the summer of 2009, most of the trees in A-20 appear to be healthy and longleaf pine is regenerating successfully. The forest in the A-20 impact area is perpetuating itself and has adapted to the frequent presence of fire.

The Land Management Branch (LMB), Directorate of Public Works (DPW) is responsible for all prescribed burning and wildfire suppression activities on Fort Benning. LMB personnel with assistance from Conservation Branch (CB) personnel will provide the prescribed burning, wildfire detection and suppression activities for the A-20 impact area. The A-20 impact area is riddled with Unexploded Ordnance (UXO), making it unsafe to actively extinguish a wildfire. As a result, wildfire intensity within the A-20 impact area will be controlled by fuels management.

MANAGING FUEL LOADS

Maintaining low fuel loads is key to having low to moderate intensity fires that will not present a threat to RCW cavity trees and foraging habitat. Actively monitoring fuel loads within the A-20 impact area will aid in determining the intensity of wildfires and thus the benefit or detriment of the fire on RCW habitat. For example, wildfires that occur in one to two year fuel accumulations are less intense than wildfires that occur in three or more year fuel accumulations. Monitoring fuel loads can be accomplished by physical observations during scheduled visits to the area for RCW monitoring, by viewing and documenting burned areas from the air during the annual over flight of the A-20 impact area, and by using remote sensing to record frequency and location of burned areas.

Fuel loads in the A-20 impact area will be monitored and managed by recording the frequency and location of areas burned. All wildfires in the A-20 impact area will be delineated and tracked in a Geographical Information System (GIS) using remote sensing imagery available from United States Geological Survey (USGS). Wildfire occurrence and location within the A-20 impact area will be identified, delineated, and recorded in GIS by approximate date. USGS satellite imagery is available approximately every 16 days and will allow for frequent wildfire monitoring if significant cloud cover is minimal or not present in the imagery. This method of wildfire monitoring has proven very effective at other locations throughout the Southeast. The LMB GIS Forester has received training at the Tall Timbers Research Station in Tallahassee, FL, on how to utilize remote sensing to track wildfire location and occurrence. Figures 1, 2, and 3 below show areas that have been recently burned in the A-20 impact area and how they are delineated in GIS.

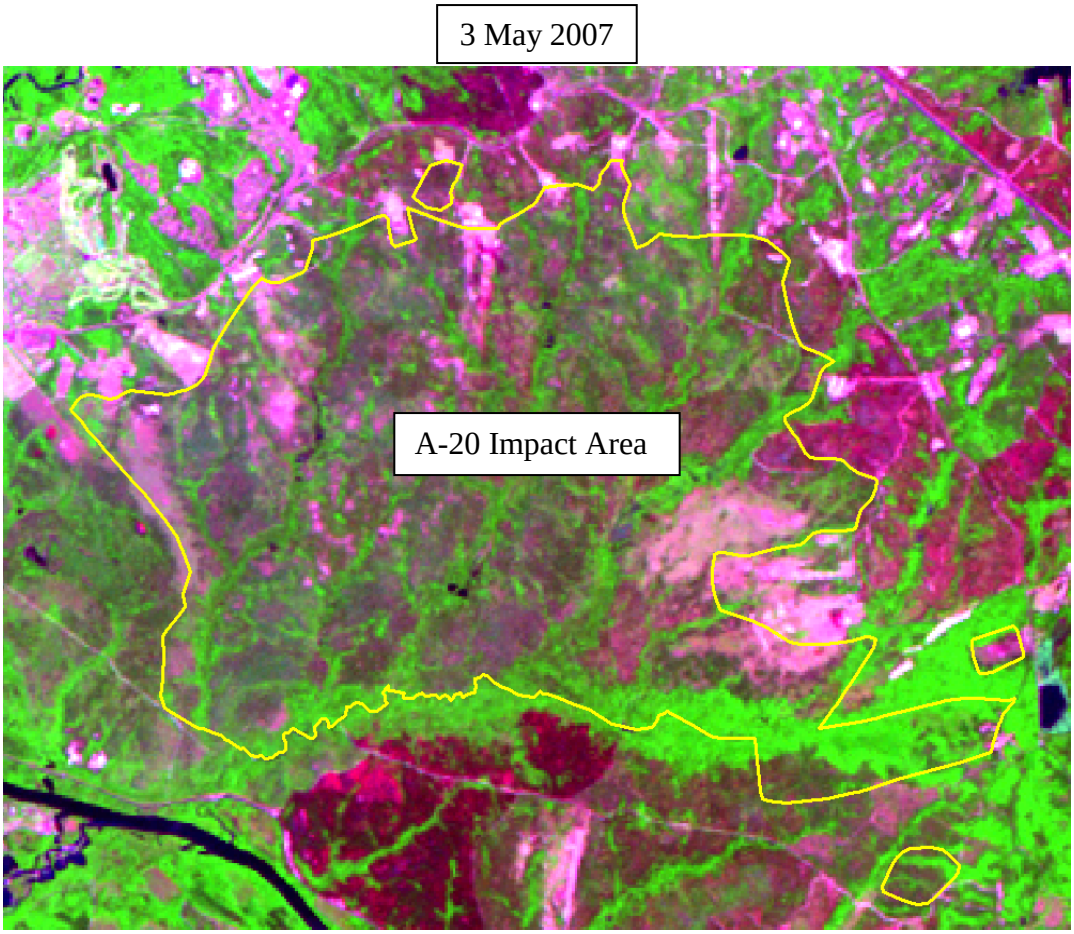


Figure 1: USGS satellite imagery A-20 Impact Area with USGS satellite imagery with no current burned areas visible.

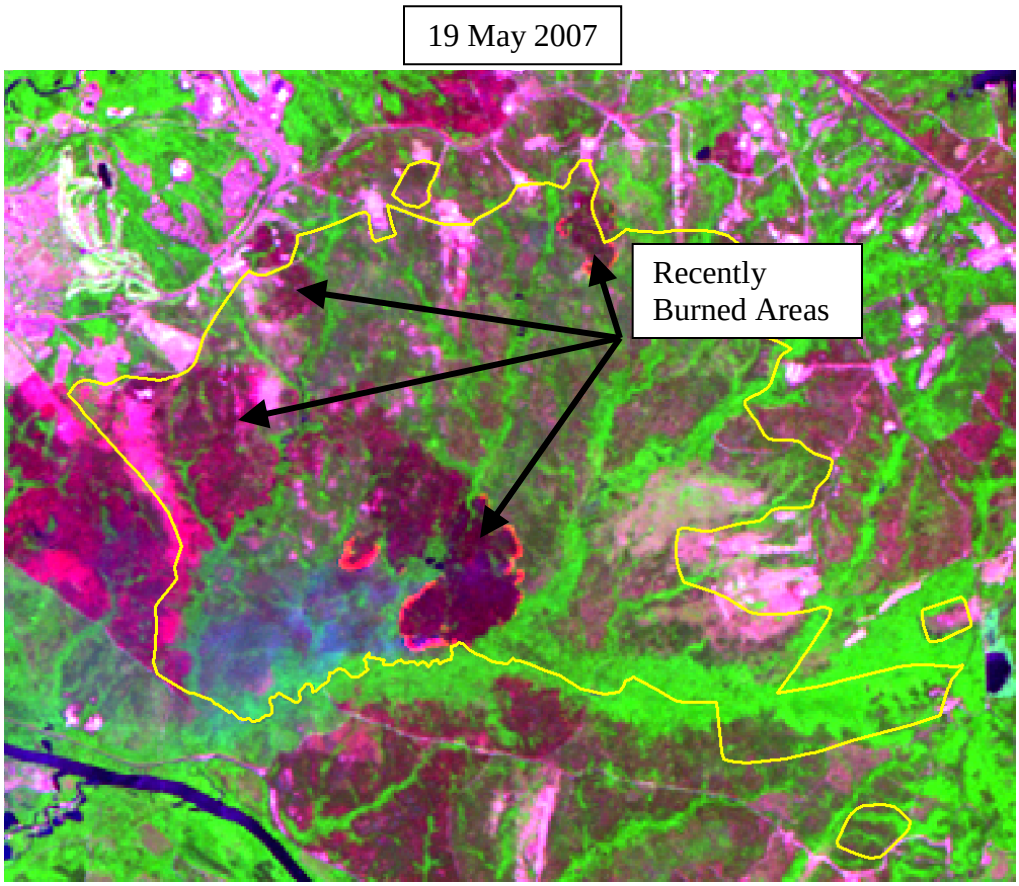


Figure 2: USGS satellite imagery of recently

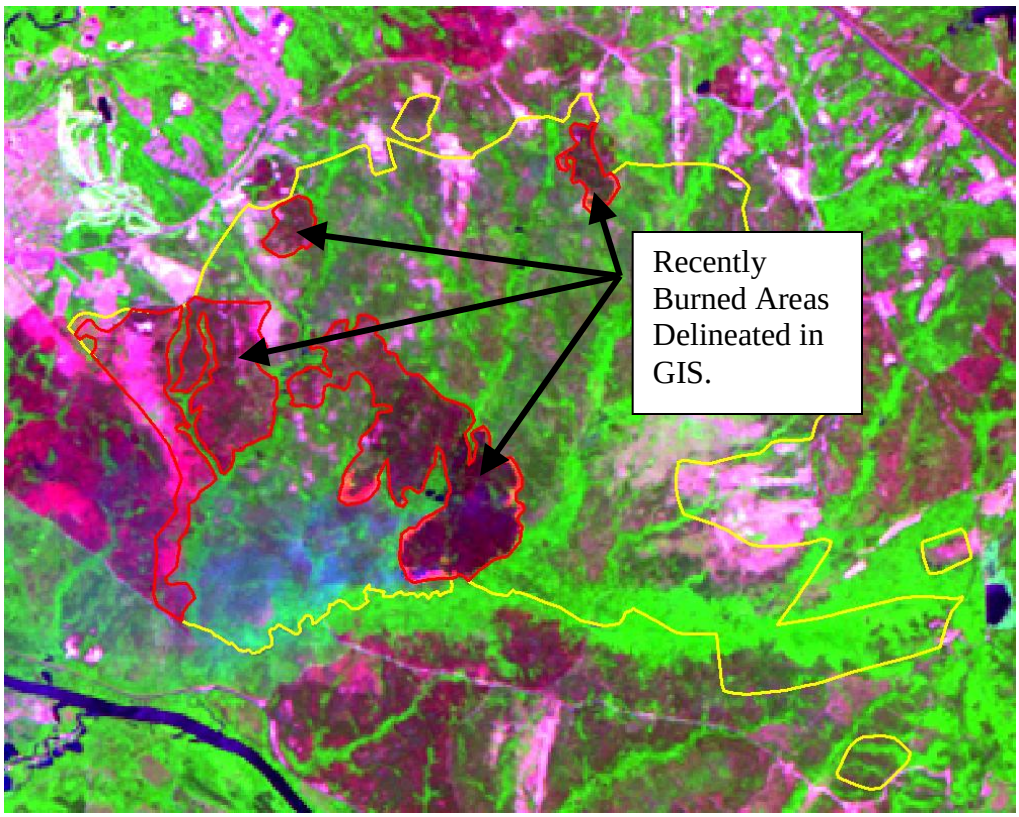


Figure3: Recently burned areas delineated and captured in GIS.

If fire frequency is not maintained every two years in the pine upland areas of the A-20 impact area, a prescribed burn will be conducted in the following six months to maintain a low fuel load composition. If prescribed burns are required, they will be ignited from "safe areas" such as the interior road network that is being constructed for A-20 RCW monitoring activities. These road networks will be cleared of unexploded ordnance and will be maintained for safe travel. Assuring that frequent fire intervals continue to occur and maintain the fire dependent ecosystem of the A-20 impact will also guarantee the protection of all RCW cavity trees from frequent fires whether caused by military training or prescribed burning actions.

MONITORING AND SUPPRESSION OF WILDFIRES

Due to the large quantities of unexploded ordinance within the A-20 impact area, direct firefighting techniques such as brush trucks with water, tractors for firebreaks, and direct hand methods of attack cannot be accomplished without placing firefighting personnel in extreme danger. Therefore, prescribed burning from a designated "safe area" is the only available safe method of attack for a wildfire in the A-20 impact area.

All military training units are required to report wildfires ignited by training events in the A-20 impact area to Range Control. Range Control then notifies LMB of the wildfire and its approximate location. Fire tower operators also report wildfires and dispatch the appropriate personnel to the fire. If upon assessment, it is determined that the intensity of the wildfire may threaten RCW cavity trees or smoke sensitive areas may be affected by smoke, then a prescribed burn will be executed from a "safe area" within the impact area. Lighting a prescribed backfire from maintained A-20 boundary firebreaks and interior roads, will extinguish the wildfire by removing fuel from areas of concern within the impact area and reduce the smoke impact to smoke sensitive areas outside of the impact area.

If it is determined by LMB personnel that a prescribed burn must be used to extinguish a wildfire in the A-20 impact area, then Range control will be contacted to place all affected training ranges on check fire so that LMB personnel can enter the impact area. Before entering the A-20 impact area, LMB personnel will plan the route and all actions. Range Control will provide a Range Safety Patrol to assess emergency access and the requirement of explosive ordnance disposal (EOD) presence. Proper planning will minimize the time needed in the A-20 impact area, danger to personnel, and the impact on military training affected by the check fire. All access into the A-20 impact area by LMB and CB personnel for wildfire suppression activities will be in accordance with the Fort Benning Environmental Access Plan.

COORDINATION WITH USFWS

Fort Benning will include available wildfire information in the monthly briefings (required per MCOE BO Term and Condition 10) as well as in accordance with the A-20 Cluster Management Plan (required per the MCOE BO Reasonable and Prudent Alternative).

Any revisions to this plan will be submitted to the USFWS for concurrence prior to implementation.

APPENDIX 4

Red-cockaded Woodpecker Monitoring and Management Plan For The Fort Benning Digital Multi-Purpose Range Complex
(*Partial Fulfillment to Fish and Wildlife Service Log Number # 03-0584*)

Introduction and Background

On July 22 2004, the US Fish and Wildlife Service (Service or USFWS) issued a Biological Opinion (BO) to Fort Benning Army Installation based on the construction and operation of a Digital Multi-Purpose Range Complex (DMPRC). Included in the BO were six Reasonable and Prudent Measures (RPM), which generally defines the measures necessary and appropriate to minimize the impacts of Incidental Take.

Specific to the construction and operation of the Fort Benning DMPRC, the RPMs were issued to minimize the impacts to the federally endangered red-cockaded woodpecker (RCW) (*Seven RCW groups were identified as vulnerable to being incidental taken due to the project*). The RPMs are implemented through the mechanism titled Terms and Conditions (TC). The items/tasks defined under TCs are non-discretionary. Under this section, seven action items were outlined for Fort Benning managers. One of the items listed calls on Fort Benning managers to create a Monitoring and Management Plan (MMP) that should:

- Be a joint effort between the Conservation Branch, Range Division and the Army Corps of Engineers construction Project Manager,
- Show adequate monitoring and habitat management of the seven groups submitted for incidental take in the Biological Assessment (BA) submitted by Fort Benning,
- Be delivered within 90 days of the BO signature date, and
- Only be implement after approval from the Service.

Red-cockaded Woodpecker Monitoring and Management Plan (*RCW/DMPRC Neighborhood*)

A. Monitoring Overview

Red-cockaded woodpecker monitoring will be conducted in three phases: Phase I - pre-construction, Phase II – construction, and Phase 3 – post construction and training. Phase I will be conducted over a period of two to four months; Phase II will be approximately two years and Phase III will be approximately five years.

Prior to monitoring, RCW foraging habitat within the foraging partitions of the seven groups identified as vulnerable will be inventoried and stratified. The seven RCW group codes are D3-02, D13-02, D14-04, D15-01, K22-02, K22-03 and J6-01. These groups are within ½ mile of the DMPRC footprint and will be referred as the Tier I groups.

Foraging range and habitat use will be gathered by field staff during all three DMPRC phases for the Tier I groups. Demography, dispersal and spatial distribution of the seven groups will be monitored during these phases. In the event that any of the seven groups go inactive,

monitoring efforts for that group(s) will be reduced to only inspecting cluster activity status. Efforts would resume to full monitoring if reactivated. If cluster degradation occurs (i.e. impacts from DMPRC activities, going from a PBG to a single bird site, clearing timber below the MSS, etc) cluster shifts, intratranslocation, and/or range modifications will be negotiated with the USFWS. Notification of impact will be given to the USFWS within 24 hours after detection.

For those RCW groups within the Fort Benning DMPRC/RCW "neighborhood" (i.e., Tier II), defined in the BA as those groups/clusters within 3 miles of the DMPRC range footprint, demography, dispersal and spatial distribution will also be monitored. Currently, this region has 66 groups (excludes Tier I groups). The neighborhood also includes a small portion of the action area that goes beyond the neighborhood buffer but is within the DMPRC surface danger zone (see BA maps).

The forested landscape surrounding the range footprint will have a baseline inventory and then, monitored after each disturbance (fire, thinning, etc). During Phase III, as live fire exercises are initiated, monitoring will intensify to observe any physical damage that may be occurring to surrounding timber (including potential sediment loading to RCW cavity trees). Accessibility within the action area will also be documented. Details on tracking accessibility can be viewed in the formal Access Plan. Finally, statistical analysis will be used to determine if foraging range, habitat use, demography, spatial distribution and dispersals, differ significantly between project phases.

B. Habitat Monitoring (*data collection forms attached*)

1. Habitat description data will be collected by sampling inside randomly distributed, fixed (0.2-acre) circular plots with a radius of 53 ft within stratified RCW habitat.

2. Overstory tree species composition, age and basal area (BA) data will be used from both FALCON and Land Management Branch stand inventories for delineation of these habitat strata. If the two data sources show significant discrepancy in accuracy, habitat delineations will be adjusted based on field observations.

3. Plot sample size per stratum will be established using estimated overstory BA (from resources listed above), estimated variances of sampling overstory BA, allowable error, confidence level, degree of sampling effort and number of available staff.

4. All sampling plots will be georeferenced at the plot center using GPS and ArcGIS. All sampling plots will be photographed during each sampling effort to visually document change in habitat structure, composition and physical damage (baseline during Phase I and biannually during Phases II and III).

5. Understory sampling will be conducted using the point intercept transect method along the north/south plot radius to determine percent groundcover, species composition and height. Sampling points will be 1-meter apart. Understory sampling may be increased along the north/south diameter of sampling plots (i.e., 16 sample points to 32 sample points) if under sampling is detected. Understory will be split into categories such as

grasses, woody stems, nongrass/herbaceous groundcover, legumes etc. Additionally, fuel type and loads will be inventoried within sampling plots.

6. Over and midstory density (i.e., stem count/area) diameter at breast height (DBH) and height will be measured within the 0.2-acre sampling plot.

7. Tree crown condition indicators will be measured in the 0.2-acre sampling plots. Measurements will be taken from dominant and co-dominant overstory pines. Crown condition indicators may include needle sparseness, crown dieback and extent of cone presence (*data collected as binomial response - presence/absence*).

8. Main stem condition indicators will be inventoried from overstory dominant and co-dominant pines. Main stem condition will be indicated by the presence of insect infestation (e.g., pitch tubes, sawdust at base of stem, etc) disease (e.g., fusiform canker, etc) and visually observable physical damage (*data collected as binomial response - presence/absence*).

C. Foraging Range and Habitat Use

1. All Tier I birds will be identified by leg band combinations and followed to determine foraging range. Group locations will be georeferenced using GPS. Maps showing foraging locations will be created using ArcGIS. Final foraging ranges will be mapped in ArcGIS using minimum convex polygons (MCP). The MCP will be compared to determine differences between foraging ranges during the project phases.

2. The extent of habitat use per group will be determined by documenting how often groups forage within delineated habitat types per follow. From this data, habitat preference analysis (chi-squared goodness of fit test comparing habitat used to habitat available) will be used after each project phase.

3. Significant relationships between habitat description data, foraging ranges and habitat use will be examined using correlation and/or linear regression analysis.

D. Demographics, Dispersal and Spatial Distribution (Neighborhood Analysis)

1. Tier I and II groups (adults and nestlings) will be banded for group composition and reproductive success annually (including weights). Techniques for gathering this data are standardized throughout all RCW populations. Relationships between demographic information and habitat description data for each project phase will be conducted using either correlation and/or linear regression analysis. Paired t-test (parametric) or Wilcoxon rank sum test (nonparametric) may be used to determine significant differences between demographic data project phases.

2. Dispersal distances and spatial distribution patterns of groups in Tiers I and II will be examined after each phase to determine if pre and post patterns within the neighborhood are disrupted by the DMPRC II and III treatments.

E. Impact on Vegetation

1. Parallel line transects will be used along the range footprint and inside the tree line to visually identifying physical damage. Observed damage will be documented (written and photographic) and georeferenced using a GPS unit for changes in size or for new damage. Damages will be reported to USFWS as stated in item A. Monitoring Overview.

F. Cluster management

1. Habitat monitoring described in item B above will also be established within the 66 clusters described as the project neighborhood. Currant stand characteristics will be described as in item B. Habitat Monitoring. Data will be correlated with our progression toward reaching the Desired Future Condition (DFC) described in the 2004 RCW Recovery Plan. Suitable cavities will be maintained at required levels as per the 2004 RCW Recovery Guidelines. Cluster prescriptions for each cluster will be developed to not only include monitoring protocols to detect habitat changes, but also strategies such as cluster shifts, chemical treatments, specific burns, underplanting, closing off cavities, etc.

Red-cockaded Woodpecker Monitoring and Management Plan (*A20 Impact Area*)

A. Monitoring Overview

1. The minimum habitat, monitoring, and group status requirements for seven manageable clusters in the A20 Impact area (if to be included towards the Installations population goals) include: at the time clusters are located, there must be a PBG or one will be established; if possible, the group should be within 1.25 miles of at least five clusters that are either within or outside of A20 and should be fairly aggregated.

2. At least five acres of RCW habitat that encompasses all cavity trees for a group will undergo unexploded ordnance (UXO) clearance in order for the clusters to be managed and monitored safely.

3. Group status will be monitored once per year (up to four 1-day visits) during the peak of RCW breeding season (May/June). Visits will occur at dawn to record the number of birds in each group. All cavities will be checked for nesting and/or suitability using peepers. If the group status checks reveal that a group is cavity deficient, artificial cavities will be installed to sustain a level of at least four suitable cavities within the cluster.

4. All habitat and demographic information will be included in an annual report.

APPENDIX 5

Red-cockaded Woodpecker Habitat Impact Assessment Plan

A habitat monitoring strategy for red-cockaded woodpecker (RCW) clusters on Fort Benning Military Installation (Ft. Benning), Georgia, impacted by the Oscar Complex Ranges from Transformation/Base Realignment and Closure (BRAC) and Maneuver Center of Excellence (MCOE) actions.

I. INTRODUCTION

The RCW Habitat Impact Assessment Plan addresses procedures designed to assess and monitor the potential impacts to down-range RCW clusters and habitat resulting from small arms munitions. Specifically, this plan will assess the effectiveness of full and partial earthen toe berms constructed to protect RCW habitat, as well as confirming the projected limits of munitions damage to down-range habitat from non-bermed Oscar Complex ranges.

II. PURPOSE

This document will satisfy the requirement by the U.S. Fish and Wildlife Service (USFWS) for a 'Habitat Impact Assessment Plan (Bermed vs. Non-Bermed)' specified in the August 20, 2007 Transformation/Base Realignment and Closure Biological Opinion (BRAC BO). This requirement specifies the monitoring of RCW habitat situated down range of 8 small arms ranges located in the new Oscar Complex on Ft. Benning that were authorized under the 2007 BRAC BO. This document will also incorporate monitoring and habitat impact assessments for the additional 7 small arms ranges in the Oscar Range Complex that were authorized under the May 29, 2009 Maneuver Center Of Excellence (MCOE BO). Of these 7 small arms ranges, 3 were new projects associated with MCOE actions and 4 were BRAC projects that were reanalyzed under MCOE actions due to changes in the range footprint, location, and/or scope (Table 1).

This plan and its implementation will meet the following non-discretionary requirements specified in the 'Terms and Conditions' associated with the following RPM in the 2007 BRAC BO:

I. RPMs to minimize the extent of take:

> *(1) At a minimum, construct berms for the proposed Transformation/BRAC Oscar Complex Ranges MRF5 (2009 project), FM1 (2007 project), and Z1 (2008 project). Habitat monitoring protocols will be applied to assess the effectiveness of the berms protecting RCWs and their habitat.*

TERMS AND CONDITIONS

> *(1) [associated with RPM 1] – The 'Habitat Impact Assessment Plan (Bermed vs. Non-Bermed)' will be developed to monitor, at a minimum, the new Oscar Area Ranges (Z1, FM1 and MRF5) by way of implementing the habitat monitoring protocols previously*

designed for the Digital Multipurpose Range Complex, July 22, 2004, Biological Opinion. This berm plan should be completed well in advance of any training actions.

Additionally, consistent with the RPMs outlined in the 2009 MCOE BO, this plan and its implementation will also meet the following non-discretionary requirements presented in the 'Terms and Conditions' for MCOE actions:

TERMS AND CONDITIONS

(6.) Associated with habitat monitoring, Section 9.4, USACE, 2008. The Habitat Impact Assessment Plan should be completed by July 2009, and prepared in coordination, and with the approval of, the Service.

(8.) Associated with berming of small arms ranges, Section 9.7, 2008. Reports on the effectiveness of small arms range berms that are constructed to minimize the effects of the action and are partially placed to protect RCWs and their habitat, will be developed in collaboration with on-site Service personnel. The reports should include, but are not limited to;

i.) If Ft. Benning staff discovers munitions damage in RCW clusters and/or foraging habitat as a result from firing on any small arms range, the Service will be notified within 24 hours of discovery,

ii.) Habitat monitoring reports for small arms ranges will be submitted to the Service at the end of each week during the breeding season and monthly otherwise.

III. BERMED VS. NON-BERMED DETERMINATION FOR OSCAR COMPLEX RANGES

As BRAC and MCOE small arms range designs reach 65% to 100% completion, the Fort Benning Range Division (FBRD) conducts extensive Line of Sight (LOS) analyses to determine the maximum extent of forested areas likely to be impacted by down-range munitions (Appendix 1). The forested area located down range of the range footprint that is projected to be impacted from small arms munitions is referred to as the 'beaten area'. By examining the location and extent of the predicted beaten areas in relation to RCW cavity trees/clusters/habitat (and other environmental considerations) with Geographical Information System (GIS) data, the Fort Benning Conservation Branch (FBCB) and FBRD are able to evaluate the need and overall environmental value for construction of a full or partial berm on each of the 15 Oscar Complex Ranges (Figure 1).

Since the preparation of the BRAC Biological Assessment (BRAC BA), Ft. Benning has improved the methodology used to calculate the beaten areas created from down-range munitions impacts. These improvements can be attributed to; the delivery of Light, Imaging, Detection and Ranging (LIDAR) system remote sensing data with 1-foot contour resolution, an improved Range Manager Tool-Kit (Automated Surface Danger Zone Plotting), and 3-dimensional LOS analyses capabilities. A detailed description of the methodology used in the LOS analyses can be found in the FBRD Beaten Zone Memorandum (Appendix 1).

In June 2008, the Ft. Benning requested $8.1 million for environmental berm construction at the toe of each small arms range based on a 'worse case' scenario estimation of:

a.) The assumption that all ranges that were currently at less than 65% design, or earlier LOS analyses conducted on ranges that were based on pre-65% design data, would require a full berm across the range toe. Note: At the 65% design phase and design stages thereafter, the project is less susceptible to minor design changes that could slightly alter the range configuration, i.e. firing line and target positions and elevations, which would greatly affect the LOS analysis and the projected beaten area.
b.) The maximum volume of fill material would be required to construct all of the berms.
c.) The higher end of the average per cubic yard cost of fill material (the basic unit used to derive cost estimations from volume estimations) would be required, by the time the actual construction took place.

As of July 2009, all but one Oscar Complex range, PN 65034 (FM3), had LOS analyses completed based on either 100% design data, or 65% design data (or later) that had no alterations that would affect beaten area projections. As range design data progressed into the latter or final stages of development, which provided the ability to make more accurate cost estimations based on 'real time' design data, the Army appropriated $2.4 million of funding to support environmental berm construction for all Oscar Complex small arms ranges that were projected to have significant down-range impacts to RCW habitat. Based on the LOS analyses, the significant impacts (projected) considered included the following:

a.) RCW habitat in range-impacted clusters which, if minimized, add to the RCW's ability to recover.
b.) Habitat that can be used for future allocation to an additional cluster/partition that could count towards Ft. Benning's RCW population recovery goal.
c.) Habitat that can provide connectivity to stands that met the above criteria.
d.) Potential impacts to RCW clusters/cavity trees located down range and beyond the projected beaten area that were not anticipated.
e.) Habitat that can potentially (currently or at some point in the future) support budding or pioneering (natural RCW cluster formation) from nearby RCW clusters. Cluster formation adjacent to areas that become designated beaten areas in the absence of a berm, have the potential to create conflict with existing range operations (e.g. RCW cluster A17-14a and M06-06b).

IV. RESULTS OF BERM EVALUATIONS FOR THE OSCAR COMPLEX RANGES

Following the Army's proactive approach of minimizing and reducing down-range munitions damage to RCW habitat to the greatest extent possible, the Ft. Benning explored the possibility of constructing toe berms on all or most of the new Oscar Complex ranges (BRAC & MCOE) where feasible.

1. The FBCB and FBRD determined that full, environmental toe berms are needed for:

a.) Zero Range 2 (Z2 - PN 65036) (Figure 2).
b.) Zero Range 4 (Z4 - PN 65038) (Figure 3).

c.) Modified Record Fire Range 1 (MRF1 - PN 65043) (Figure 4).
d.) Modified Record Fire Range 2 (MRF2 - PN 65044) (Figure 5).
e.) Fire and Movement Range 1 (FM1 - PN 65032) (Figure 6).

2. The FBCB and FBRD determined that strategically placed partial, environmental toe berms are needed for:

a.) Modified Record Fire Range 4 (MRF4 - PN 65046) (Figure 7).
b.) Modified Record Fire Range 7 (MRF7 - PN 65049) (Figure 8).
c.) Modified Record Fire Range 5 (MRF5 - PN 65047) (Figure 9).
d.) Fire and Movement Range 2 (FM2 - PN 65033) (Figure 10).

Although construction of a full berm on Modified Record Fire Range 5 (MRF5) was identified in the 2007 BRAC BO, the updated LOS analysis projected an appreciable reduction of significant impacts to RCW foraging habitat with the construction of 2 partial berms. Additionally, construction of a full berm as identified in the BRAC BO would have resulted in additional impacts to wetlands located near the center of the range toe (Figure 9). Therefore it was determined that the best overall environmental value would be realized through the addition of a partial berm to the left and right flanks of the range toe. The net savings from the MRF5 construction minimization (reduction of berm and wetland mitigation costs) will allow for additional construction of Oscar Complex Range berms not specified in the 2007 BRAC BO and provide additional protection of more RCW habitat located down range.

Construction of a full berm on Fire and Movement Range 2 (FM2) would have also caused impacts to the wetlands situated on the left side of the range toe (Figure 10). In order to avoid these wetland impacts, it was determined that this range would have a berm covering approximately 70% of the range toe.

3. The FBCB and FBRD have not determined if a full environmental toe berm is needed for:

a.) Fire and Movement Range 3 (FM3 - PN 65034) (Figure 11).

Fire and Movement Range 3 (FM3) is currently at the 65% design stage, however the LOS analysis has not been completed by FBRD. Although a full berm has been included in the current design as a line item bid option for this range, a determination to construct a berm is pending completion of the LOS analysis (Figure 11).

4. The FBCB and FBRD determined that environmental toe berms are not necessary and will not be constructed for the following ranges:

a.) Zero Range 1 (Z1 - PN 65035) (Figure 12).
b.) Zero Range 3 (Z3 - PN 65037) (Figure 13).
c.) Zero Range 5 (Z5 - PN 65039) (Figure 14).
d.) Modified Record Fire Range 3 (MRF3 - PN 65045) (Figure 15).
e.) Modified Record Fire Range 6 (MRF6 - PN 65048) (Figure 16).

Although construction of a full berm on Zero Range 1 (Z1) was identified in the 2007 BRAC BO, the updated LOS analysis conducted since the writing of that BO significantly reduced the projected beaten area due to an adequate backstop provided by existing natural topography (Figure 12). In addition to Z1, the LOS analyses for Zero Range 3 (Z3) and Zero Range 5 (Z5) projected that almost no RCW habitat would be impacted (Figures 13 and 14) from range munitions. The final design configuration of all 3 of these ranges, which attempted to minimize and reduce all environmental impacts, determined that berm construction would cause additional impacts to wetlands as a direct result of the berm footprint. The net savings from the Z1, Z3, and Z5 construction minimization (reduction of berm and wetland mitigation costs) will allow for construction of additional Oscar Complex Range berms not specified in the 2007 BRAC BO, and provide additional protection of more RCW habitat down range.

The projected beaten area for Modified Record Fire Range 3 (MRF3) (Figure 15) does not impact any known RCW cluster or associated foraging habitat and is almost entirely within the area analyzed/authorized in the BRAC BA/BO. Although the projected beaten area for Modified Record Fire Range 6 (MRF6) is within the foraging partition of inactive RCW cluster O06-01 (Figure 16), it was determined that all affected habitat will be non-contiguous post-construction (MRF4 and MRF6) and is not contiguous to any other current or potential clusters. Based on information available during the design of the FY08 Oscar Ranges, berms were not included in MRF3 or MRF 6; however, the FBCB is reconsidering the possibility of adding full or partial berms to one or both of these ranges if additional funding becomes available. This decision is a proactive approach towards mitigating the potential conflict future budding or pioneering (natural RCW cluster formation) from nearby RCW clusters into or near habitat designated as the beaten area in the absence of a berm, can have on training operations of small arms ranges (e.g. A17-14a and M06-06b).

V. CLARIFICATION OF RPMs AND PROPOSED MODIFICATIONS TO MONITORING

Since the preparation of the BRAC BA/BO, detailed LOS analyses were conducted by the FBRD using more advanced stages or completed range designs, from which to evaluate or re-evaluate the need for constructing environmental berms (Appendix 1). The first RPM from the 2007 BRAC BO specific to the Oscar Complex Ranges states:

I. RPMs to minimize the extent of take:

> *(1) At a minimum, construct berms for the proposed Transformation/BRAC Oscar Complex Ranges MRF5 (2009 project), FM1 (2007 project), and Z1 (2008 project). Habitat monitoring protocols will be applied to assess the effectiveness of the berms protecting RCWs and their habitat.*

The Army aggressively pursued all possible minimization efforts for reducing down-range impacts to RCW habitat located in the Oscar Range Complex. Of the 15 small arms ranges to be constructed in the Oscar Range Complex, 6 have full berms included in the range designs (the determination of FM3 is pending completion of the LOS analysis) and 4 have partial berms included in the range designs. Collectively, the total number of Oscar Complex ranges that have

environmental berms designed and are currently being constructed, has exceeded the minimum requirements specified in this RPM.

As stated previously, construction of a full berm on Modified Record Fire Range 5 (MRF5) would cause additional impacts to wetlands located near the center of the range toe and the projected RCW habitat that would be protected is minimal (Figure 15). Since the final projected beaten area presently does not fall within any active or inactive RCW foraging partition, Fort Benning instead proposes that a partial berm should be added to both the left and right flanks of the range toe.

Fire and Movement Range 1, (FM1) (Figure 6), has a full berm in the final range design and is currently under construction.

Zero Range 5 (Z5) is a project analyzed under the BRAC BA/BO and reanalyzed under MCOE actions. Using the updated range design data, the LOS analysis projected that the beaten areas would be relatively small due to existing natural topography. Although a small portion of the range footprint and the projected beaten area are within the foraging partition of RCW Cluster O05-03R, the affected down-range RCW foraging habitat is projected to be minimal (Figure 14). In addition, based upon the final design configuration of this range, the berm footprint would have caused additional impacts to wetlands. Therefore, Fort Benning proposes that construction of a berm on this range is not necessary.

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> *(1) [associated with RPM 1] – The 'Habitat Impact Assessment Plan (Bermed vs. Non-Bermed)' will be developed to monitor, at a minimum, the new Oscar Area Ranges (Z1, FM1 and MRF5) by way of implementing the habitat monitoring protocols previously designed for the Digital Multipurpose Range Complex, July 22, 2004, Biological Opinion. This berm plan should be completed well in advance of any training actions.*

Since the preparation of the BRAC BA/BO, FBCB conducted extensive monitoring efforts of recently discovered, down-range impacts to RCW habitat involving small arms range munitions affecting RCW clusters A17-14a and M06-06b. These monitoring efforts have provided the FBCB with recent on-the-ground experience and valuable insight regarding the many challenges associated with monitoring and early detection of down-range impacts to RCW habitat resulting from small arms munitions. Some of these challenges include:

1. The ability to detect impacts involving small quantities or very infrequent/incidental bullet strikes (relative to the large volume of munitions fired on any given small arms range) is extremely difficult, as well as labor and time intensive. Whereas the ability to detect impacts involving larger quantities or frequent/sustained bullet strikes is much easier to detect, as well as less labor and time intensive.

2. There is no known monitoring technique to accurately quantify small arms munitions impacts over very large areas. As the distance increases from the source of origin, the difficulty in quantifying bullet impacts to trees, as well as detection, also increases.

3. There is no efficient method to differentiate or age bullet impacts occurring from day to day training events without marking or painting over each individual bullet strike on a tree, which often occur on small limbs in the canopy of the tree. Marking, or some other impact recording system, would allow quantification of impacts between individual training events or after some corrective action has been taken on which to gauge the overall effectiveness of any mitigation effort.

4. There is no current monitoring technique to correlate some level of frequency or quantity of bullet strikes to an individual tree or to a given area, to some measurable or quantifiable level of pine mortality or degradation of habitat. For example, it's clearly evident through recent, extensive evaluations of individual trees within the RCW cluster and foraging habitat of the budded cluster M06-06b (2007) from RCW cluster M06-06a, that some level of incidental small arms munitions impacts has occurred in the area as early as 1999, without any identifiable pine mortality that can be directly attributed to bullet strikes. Although this budded cluster has undergone routine breeding season monitoring since 2007 (non-banded cluster), bullet strikes were not noticed in this cluster by RCW technicians until January 2009.

5. Down-range access of a single small arms range to conduct any form of monitoring usually requires the closure of multiple facilities as a result of direct fire and surface danger zone (SDZ) hazards associated with adjacent or nearby ranges. Therefore, the level of down-range access required to conduct intensive habitat monitoring provided in the 2008 Transformation/BRAC Access Plan has inherent limitations, without further compromising the military training mission. Especially when considering the effective range of small arms munitions can exceed 3.0 miles, the potential area of effect is extensive.

Given these challenges and recent lessons learned in monitoring/detection of small arms munitions impacts to RCW habitat, Ft. Benning proposes the use of habitat monitoring protocols that facilitate down-range surveys covering larger areas with limited access.

VI. PROPOSED OSCAR RANGE COMPLEX MONITORING PROTOCOL

The primary objective of this monitoring plan is to assess the effectiveness of bermed vs. non-bermed ranges and to confirm the limits of projected impacts. Fort Benning suggests that it is beneficial to implement only those habitat monitoring protocols that survey frequently enough to detect potential down-range impacts from small arms munitions over large areas of RCW habitat and clusters. The monitoring protocols must also be accomplished predominantly during regularly scheduled maintenance times on all ranges following the 2008 Transformation/BRAC Access Plan. This would, and if warranted, allow for a timely response to take corrective actions.

1. Daily tracking of use of all 15 small arms ranges located in the Oscar Range Complex will be included in the weekly/monthly reports specified in the 2009 MCOE BO. Data collected for each individual range will include:

a.) Total number of personnel using the range.

b.) Type of weapon(s) used.
c.) Total number of rounds fired for each ammunition type.

2. Establishment of photo-points at the range toe of all 15 small arms ranges. Annual photo documentation of down-range habitat condition, pre- and post-operational status of all ranges, will assist in the long-term assessment of berm effectiveness at preventing or measuring habitat degradation.

3. Establishment of photo-points within RCW clusters O05-02, O05-03R, O06-01, O06-03R, and O06-04R. Annual photo documentation of cluster condition, pre- and post-operational status of all ranges, will assist in the long-term assessment of berm effectiveness at preventing degradation of RCW clusters.

4. Following standard transect survey techniques for RCW cavity tree surveys, FBCB will validate that all berms (full and partial) are effective at preventing negative effects to RCW cavity trees and foraging habitat within the active cluster O05-03R. This cluster is the only remaining active RCW cluster within the Oscar Range Complex that currently counts towards Ft. Benning's population goal.

a.) The monitoring focus will be the 5 small arms ranges, that are within the 0.5 mile foraging partition of active RCW cluster O05-03R, that currently have projected beaten areas (Z1 and MRF7), or had projected beaten areas prior to the addition of a full berm (Z2, MRF1, and FM1).
b.) Validation means documenting that berms were effectively designed and constructed to prevent frequent, sustained bullet impacts from small arms munitions beyond the berm footprint. In addition, validation that infrequent, bullet strikes resulting from human error or ricochets are within the projected beaten areas and/or the areas assessed as 100% habitat removals in the BRAC and MCOE biological opinions. Finally, validation includes confirming that the beaten areas determined by the LOS analyses for Z1 and the non-bermed portion of MRF7 are within the predicted limits.
c.) In collaboration with the USFWS, frequency of monitoring will be intensive at first as each range becomes operational; monitoring can/will decrease over time if bullet strikes are not detected behind the bermed areas, beyond the projected beaten areas, or beyond the areas analyzed as 100% removal.

    1. Each of the 5 ranges will be monitored weekly for the first month after the range becomes operational. If no bullet impacts are detected as described above, monitoring for each range will be reduced to monthly surveys.
    2. If no bullet impacts are detected during monthly surveys for 3 months, monitoring will be reduced to quarterly surveys.
    3. If no bullet impacts are detected during quarterly surveys for 3 quarters, monitoring will be reduced to annual surveys.
    4. If no bullet impacts are detected, monitoring will be reduced to annual surveys for 4 years, for a total of 5 years after training operations have been initiated.
    5. If at anytime bullet impacts are detected within any RCW clusters/foraging habitat, outside the FBRD LOS projected beaten areas or beyond the areas

analyzed as 100% habitat removal, the FBCB will notify the USFWS within 24 hours of discovery and collaborate with the Garrison Commander on a course of action.

6. All other bullet impacts detected within designated beaten areas or within areas analyzed as 100% habitat removals will be included in the required weekly/monthly reports.

d.) During the final stages of range construction when instrumentation and testing operations are conducted, FBCB in collaboration with FBRD, will conduct preliminary monitoring validations of LOS analyses for each individual range.

e.) FBCB and FBRD will collaborate during the initial operations stage of each range for conducting on-site observations of actual live-fire training. Some elements of a berm's effectiveness can be validated by simple observations of areas behind the firing line during live-fire training without any disruptions to military training. Some examples include: spotting of the targets (are pop-up targets being hit), visible signs where rounds strike the ground or on the berm itself (puffs of dirt either left, right, high or low) and tracer round trajectories. If none of these signatures are observed, watching vegetation/trees down-range of the shooting lane being observed through spotting scopes may/will also provide valuable information.

5. In collaboration with the US Army Engineer Research and Development Center (ERDC), Ft. Benning will pursue development and implementation of an acoustical detection system within the next 2 years, to accurately quantify small arms munitions overshots and ricochets passing over berms. FBCB is currently working with the ERDC to initiate testing of this system in September 2009 (Appendix 2).

Another acoustic detection device that has/will be explored further for evaluating berm effectiveness is the Soldier Wearable Acoustic Targeting System (SWATS). Although designed for detection of enemy sniper fire, this system has the potential to assist Ft. Benning in verifying and quantifying overshoots and ricochets that errantly pass over a protective berm.

If development and implementation of either of these electronic detection systems can be realized sooner, Ft. Benning will consult with the USFWS for approval to incorporate this system into the monitoring protocols described above; or the acoustical detection system may replace one or more of the data collection techniques discussed above. Since training operations on all Oscar Complex Ranges are tentatively scheduled to begin around January 2011, Fort Benning anticipates there is great potential for implementing this technology for detecting, and quantifying, munitions impacts on trees.

6. All active and inactive RCW clusters within the Oscar Range Complex have been incorporated into the Ft. Benning 2007 RCW Demographic Monitoring Plan. Inspections for bullet impacts will be incorporated into all routine RCW monitoring and cluster inspections in the Oscar Range Complex to ensure that bullet strikes are not occurring within clusters as the LOS analyses projected.

VII. SUMMARY

Throughout the design and development process of all small arms ranges in the Oscar Range Complex, Ft. Benning attempted to minimize and reduce as many environmental impacts as possible. Extensive LOS analyses were conducted; strategic placement and configuration of range locations were emphasized; and environmental berms will be constructed above and beyond the minimum required in the BRAC BO to, protect RCW clusters and their habitat. This Habitat Impact Assessment Plan serves as the basis for validating these minimization efforts and will evaluate the overall effectiveness. Ft. Benning will continue to collaborate with the USFWS throughout the monitoring process and will coordinate the procedure for weekly reporting requirements during the RCW breeding season (April – June), monthly otherwise, prior to live-fire training operations at the Oscar Range Complex.

REFERENCES

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US Fish & Wildlife Service BRAC/Transformation Biological Opinion dated 20 August 2007.

US Fish & Wildlife Service MCOE Biological Opinion dated 29 May 2009.

Table 1. Oscar Complex Ranges

Range	Berm	Project #	BA/BO	Project Date
1. FM1	Full	PN 65032	Transf/BRAC	2008 Project
2. MRF2	Full	PN 65044	Transf/BRAC	2008 Project
3. MRF3	No*	PN 65045	Transf/BRAC	2008 Project
4. MRF4	Partial	PN 65046	Transf/BRAC	2008 Project
5. MRF6	No*	PN 65048	Transf/BRAC	2008 Project
6. MRF5	Partial	PN 65047	Transf/BRAC	2009 Project
7. Z3	No	PN 65037	Transf/BRAC	2009 Project
8. Z4	Full	PN 65038	Transf/BRAC	2009 Project
1. Z1	No	PN 65035	MCOE – Reanalyzed	2009 Project
2. Z2	Full	PN 65036	MCOE – Reanalyzed	2009 Project
3. Z5	No	PN 65039	MCOE – Reanalyzed	2009 Project
4. FM3	Full**	PN 65034	MCOE – Reanalyzed	2010 Project
5. FM2	Partial	PN 65033	MCOE – new	2009 Project
6. MRF1	Full	PN 65043	MCOE – new	2009 Project
7. MRF7	Partial	PN 65049	MCOE – new	2009 Project

* Pending availability of funding (potential addition of a full or partial berm).
** Line of Sight (LOS) analysis not yet completed.
Reanalyzed = Project originally proposed under 2007 BRAC BO but reanalyzed under 2009 MCOE BO.

APPENDIX 1. BEATEN ZONE MEMORANDUM

PURPOSE: To establish documentation on the methods used to obtain "beaten zone" data for the BRAC- Transformation Environmental Impact Study (EIS) and the MCOE EIS.

GENERAL: There is no exact science to obtain beaten zone data before that zone is created by firing on a range. In order to gauge the true effects of munitions on the environment, the munitions are fired under varying conditions until the true effects are seen. Any beaten zone data that is required prior to this is calculated using the best technical methods available at the time. The beaten zone is estimated based on several factors. The proposed location of the range project, the type and quantity of munitions planned to be fired, and the type vegetation and surrounding terrain are some of the factors. This data is subject to change as the process of designing the range is refined. Based on inability to depict the "true" surface danger zone or "beaten zone" without knowing exact locations of firing points and targets at the time of the BRAC-Transformation EIS, the best technology available was used to create "worst case" scenarios for the proposed range projects. This data was provided to the Environmental Management Division (EMD) to be used in development of a Biological Assessment (BA) for the new range projects, and factored into the final EIS.

SCOPE: The best technical method available to create the beaten zone data for the BRAC-Transformation EIS was as follows:

1. The standard SDZ for the specific type of range was used based on data from DA PAM 385-63 (Range Safety) in relation to a range 'footprint'.
2. Because an SDZ does not represent the beaten area, the scale has been reduced, and areas outside the anticipated beaten area such as the ricochet area and/or area "A" are omitted. The method used to determine this reduced "beaten zone" is generally described in AR 385-63, Range Safety,19 May 2003. That method is used to assist in planning of range function, layout, design and most importantly serves as the basis for development of Surface Danger Zones which provide minimally safe containment of all rounds, possible ricochets and fragmentation .
3. Once these areas were removed from the SDZ, the distance that a given projectile would travel was factored in to determine how far the beaten zone would extend down range. The method used to calculate this data comes from a study done at Fort A.P. Hill, Va. The study is titled "Down Range Land Condition Study" by Jason Applegate and was conducted in May 2005.

These three factors have been used as the best available technology when ranges have not been designed and no munitions have been fired.

During the MCOE EIS, the method described above was used to calculate beaten zones for range projects that are new or were not looked at during the BRAC-Transformation EIS. This process, with additional capabilities resulting from delivery of 1-foot contour resolution; improved Range Manger Tool-Kit (Automated SDZ Plotting) tools; 3-dimensional line of sight capability are now the best available technology for projects not yet designed. Some projects that were looked at during the BRAC-Transformation EIS require a second look due to slight relocation or minor

scope changes. These projects are at or near 100% design. With better technologies and GIS capabilities, we can create a more accurate estimates of the beaten zone. For range projects that fit this category the following method is used to create the beaten zone:

1. The Computer Aided Design (CAD) file (that depicts the relationship of the firing positions to the targets on the range, and all support structures) is inserted onto the Geographical Information System (GIS) data of the range footprint.
2. Using the completed range picture in GIS, a line of site (LOS) analysis is conducted from each firing point to each target on that range.
3. The down range land condition range factors (described in #3 above) is applied, unless there is a berm or natural backstop that will keep the projectile from going down range, and a more technically correct depiction of a beaten area is developed.

Based on the utility tools available, the procedure described above will result in a more accurate beaten zone estimate.

CLOSING: Variations in beaten zone data between projects in the BRAC-Transformation EIS and the MCOE EIS are the result of the availability of the best information at the time the data is requested. The calculations used to obtain beaten zone data for both EIS's remains the same unless the range project is at or near design completion. Once design data becomes available, more accurate beaten zone data can be created and forwarded to EMD.

Frederick E. Weekley Jr.
Range Officer
Fort Benning, Georgia

SDZ Downrange Distance Calculations: % based on munitions:

9mm; AT4 Trainer / X=1600m
Beaten Area: 20%
Adjusted X=320m

.38cal / X=1806m
Beaten Area: 20%
Adjusted X=372m

5.56; Ball / X=3437m
Beaten Area:
Adjusted X=700m

7.62; Ball M80 / X=4100m
Beaten Area: 38%
Adjusted X=1558m

25mm; TP-T M793 / X=4792m
Beaten Area: 38%
Adjusted X=1821m

40mm; TP / X=2095m
Beaten Area: 50%
Adjusted X=1047m

.50cal; AP_M2 / X=6100m
Beaten Area: 50%
Adjusted X=3050m

.50cal; Ball / X=6500m
Beaten Area: 50%
Adjusted X=3250m

.50cal; SLAP-T M962 / X=9778m
Beaten Area: 50%
Adjusted X=4889m

120mm; M831 / X=6589m
Beaten Area: 50%
Adjusted X=3295m

120mm; M865 / X=7234m
Beaten Area: 50%
Adjusted X=3617m

APPENDIX 2. FORT BENNING ACOUSTIC OVERSHOT DETECTION TEST PLAN – DRAFT PROPOSAL 7-30-09

Fort Benning POC: Mr. Tim Marston (706-544-7069)
U.S. Army CERL POC: Tim Hayden (217-373-5859) and David Delaney (217-373-6744).

Background/Procedures

This test plan details the procedures that will be used to test if acoustics provides a viable method for detecting potential weapons overshot at small arms military ranges. All noise measurements will be carried out in accordance with applicable Army and American National Standards Institute (ANSI) procedures and standards. The project will be executed in compliance with applicable Fort Benning range and safety procedures and regulations. Sound equipment would be placed in the field prior to testing during regular morning non-firing periods. Equipment will not need to be retrieved until the following morning. Testing would not place any restrictions on regular range operations.

Validation of acoustic detection of target overshot at ranges will be accomplished by recording small arms weapon fire under controlled conditions. It is important that these initial validation tests be

performed under controlled conditions to minimize any confounding variables. The experimental measurements will be carried out by U.S. Army Construction Engineering Research Laboratory personnel, who will supply required personnel and instrumentation for data acquisition. Fort Benning is requested to supply weapons and ammo as described below, as well as a person to fire the weapons as required by applicable regulations.

Experiments

Rion DA-20 four channel Digital Data Recorders will be used to record weapons fire and the exact time and date at which test firing occurs. Bruel & Kjaer (B&K) Type 4149 condenser microphones measuring 1.3 cm, with 7.5 cm wind screens, will be attached to B&K Model 2639 preamplifiers. Each microphone will be mounted 1-m above the ground and 1-m from any tree trunks for testing purposes. A 1-KHz 94dB calibration signal (20 micro-pascals [20 μPa] from a B&K sound level calibrating system will be recorded before and after each recording. This signal provides a reference for sound levels and spectra when data are later analyzed at U.S. Army Construction Engineering Research Laboratory.

Two experimental setups will be used to obtain two types of data (i.e., single shot and multiple round bursts). In both cases, the noise sources (i.e., M-16 and M249 SAW) will be located on the floor of the range along the firing line. The sound recording equipment will be placed on a flat level region well away from reflecting surfaces in three different locations relative to the firing line: a) one microphone will be placed just behind the firing line to record the number of bullets fired (number of single bullets or bursts), duration, and timing of all weapons fire; b) 4 microphones will be placed just downrange of the last target on the range within the first line of trees. This setup will offer protection to equipment, while also providing information on the amount of target overshot that is occurring. These 4 microphones would have a square configuration with 4 meter spacing between microphones. Microphones would be placed perpendicular and parallel with the firing line to gauge bullet velocity and trajectory in proximity to microphone positions; and c) 5 microphone setups would be placed within the Red-cockaded woodpecker cluster that is located approximately 0.5 miles north of the Malone 5 Range. One microphone would be placed at each of the 4 cardinal directions along the outer edge of the cluster, while one microphone would be placed near the center of the cluster. All experimental testing should be completed within 1 hour.

Experiment #1. Muzzle blast noise, projectile bow shock (sonic boom) noise, and noise from bullets striking vegetation are of interest. This experiment will be carried out using an M-16 rifle as described below. The M-16 would be fired in single fire only mode during this experiment. A series of 6 single shots will be fired from the weapon at intervals of a few seconds between shots under three different firing scenarios: 1) fire at the most distant range target; 2) fire high to miss the most distant range target, but hit vegetation just behind the target; 3) fire high to miss the most distant range target, but allow for a trajectory where bullets will clear the tallest vegetation directly behind the range. Request that at least one tracker round be fired during all three firing scenarios.

Experiment #2. Muzzle blast noise, projectile bow shock (sonic boom) noise, and noise from bullets striking vegetation are of interest. This experiment will be carried out using M240 and an M249 machine guns as described below. The weapons will be fired in multiple round bursts (4-8 rounds if possible) only during this experiment. A series of 6 multiple shot bursts will be fired from each weapon at intervals of a few seconds between shots under three different firing scenarios: 1) fire at the most distant range target; 2) fire high to miss the most distant range target, but hit vegetation just behind the target; 3) fire high to miss the most distant range target, but allow for a trajectory where bullets will clear the tallest vegetation

directly behind the range. Request that at least one tracker round be fired during each short burst fired across all three firing scenarios.

Fort Benning Role

It is requested that Fort Benning supply the following:

For experiment #1.

One M-16 with a lightweight ground mount
Approximately one hundred (100) rounds of ammo
and about 30 tracer rounds

Personnel required to fire the weapon in accordance with Fort Benning regulations.

Experiment #2.

One M249 SAW with a lightweight ground mount
Approximately three hundred (300) rounds of ammo
and about 50 tracer rounds

One M240 with a lightweight ground mount
Approximately three hundred (300) rounds of ammo
and about 50 tracer rounds

Personnel required to fire the weapons in accordance with Fort Benning regulations.

Prepared by David Delaney with input from Drs. Larry Pater, and Michael White
USACERL, Champaign, IL.

FIGURE 1. OSCAR RANGE COMPLEX

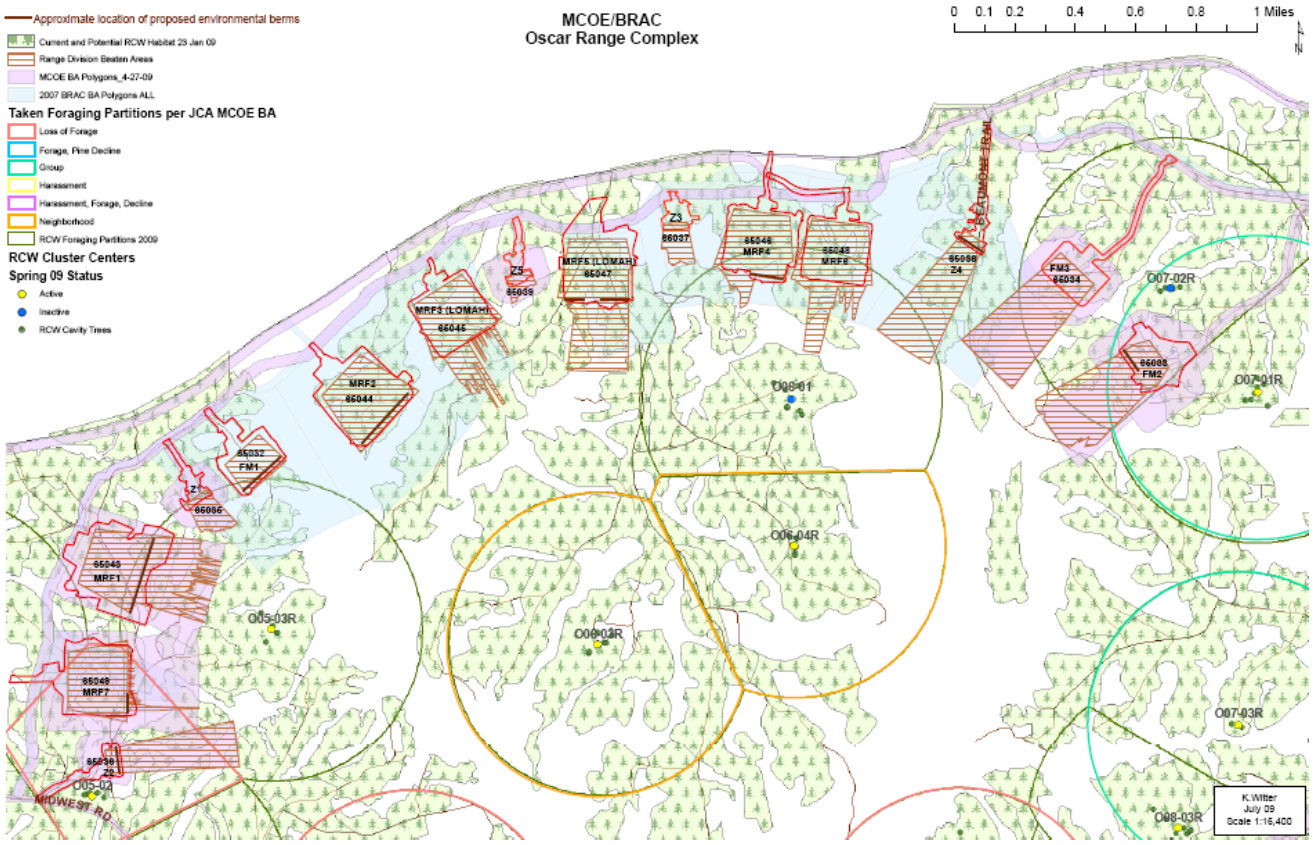


FIGURE 2. Zero Range 2 (Z2) PN 65036 - OSCAR RANGE COMPLEX

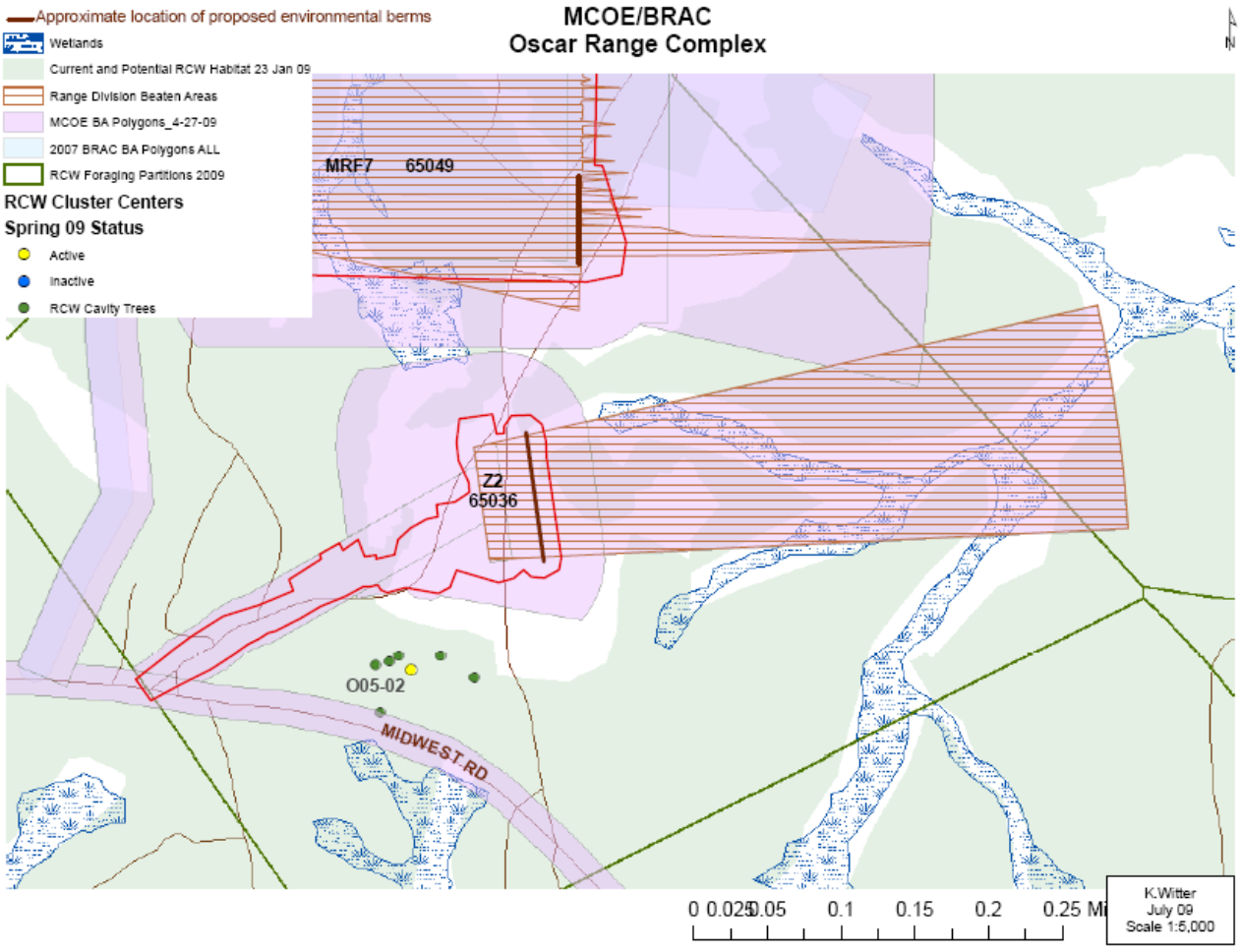


FIGURE 3. Zero Range 4 (Z4) PN 65038 - OSCAR RANGE COMPLEX

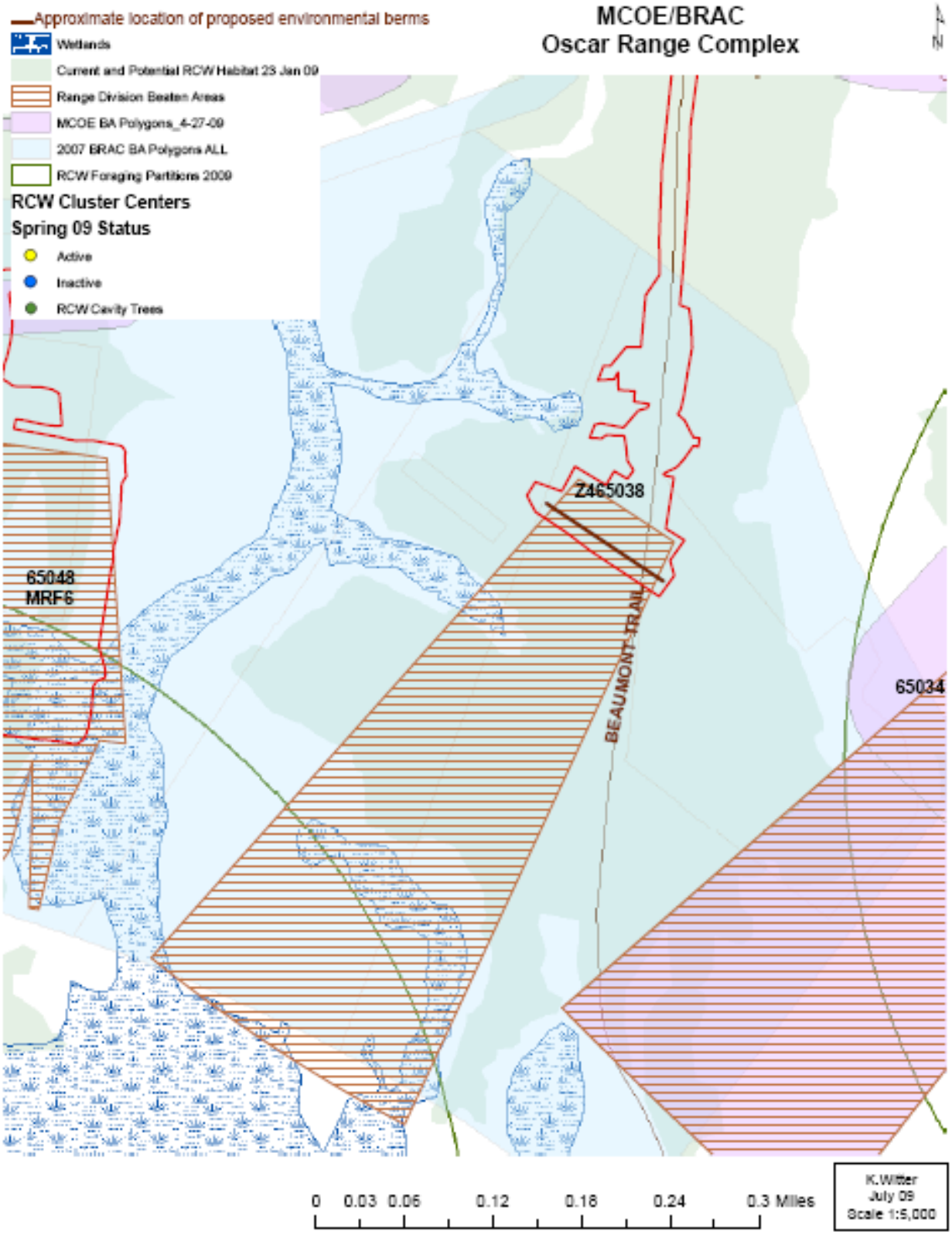


FIGURE 4. Modified Record Fire Range 1 (MRF1) PN 65043 - OSCAR RANGE COMPLEX

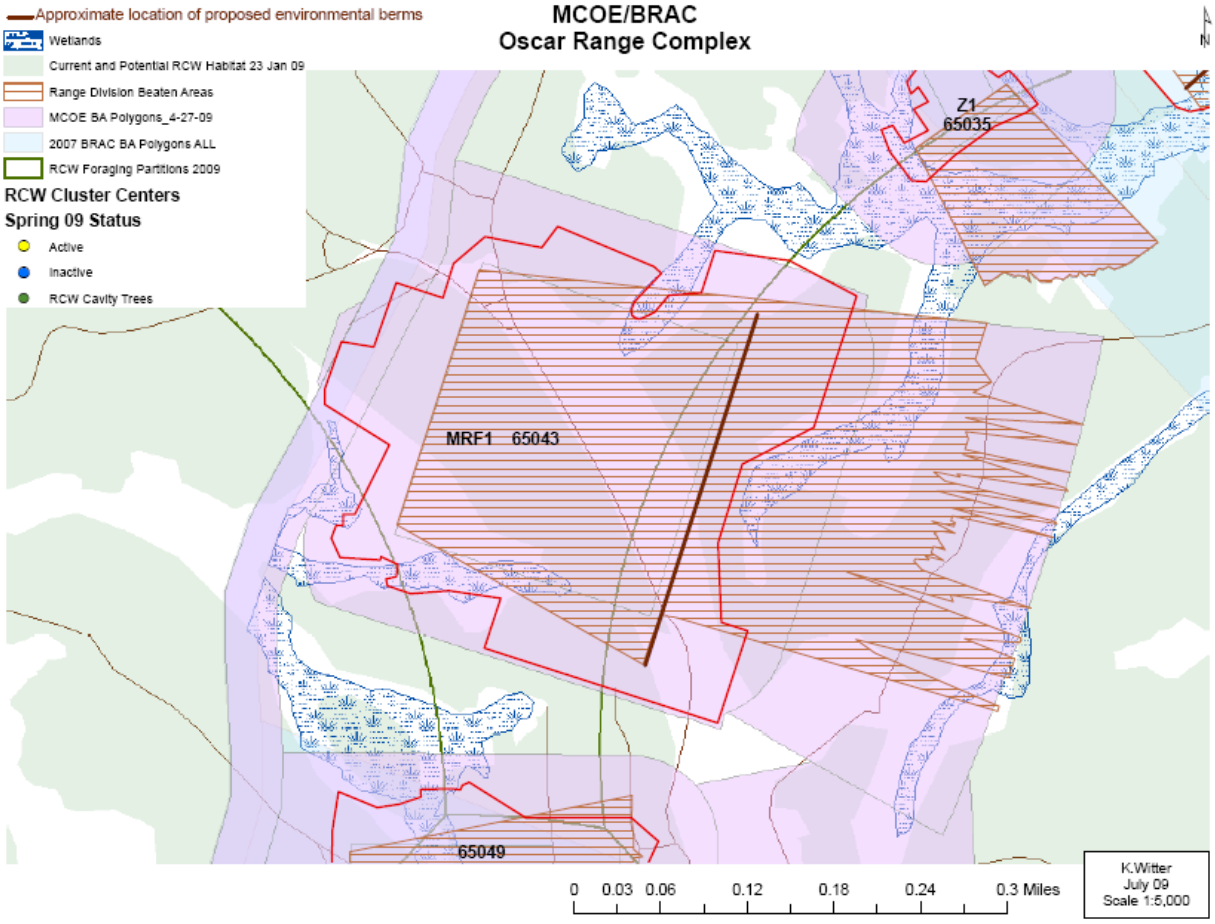


FIGURE 5. Modified Record Fire Range 2 (MRF2) PN 65044 - OSCAR RANGE COMPLEX

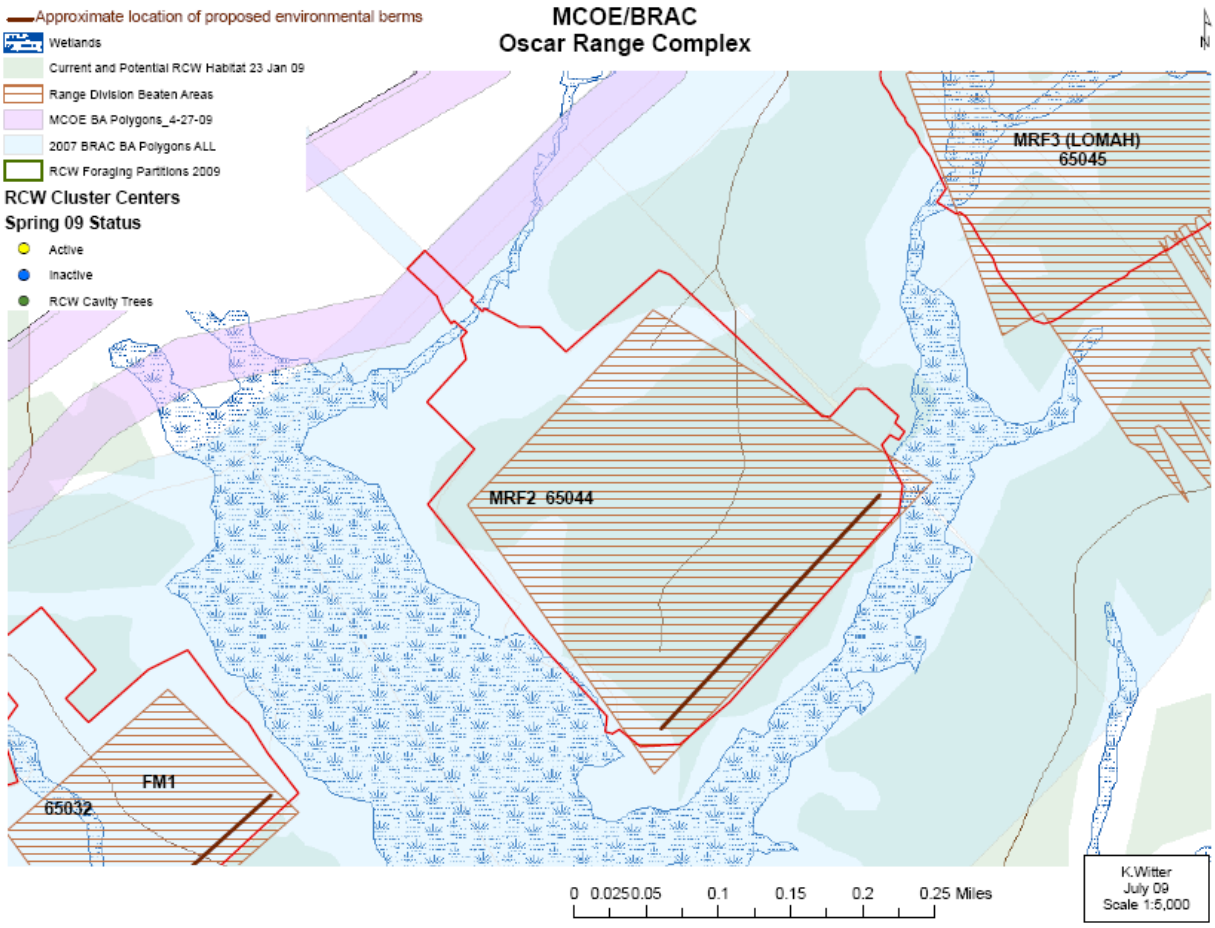


FIGURE 6. Fire and Movement Range 1 (FM1) PN 65032 - OSCAR RANGE COMPLEX

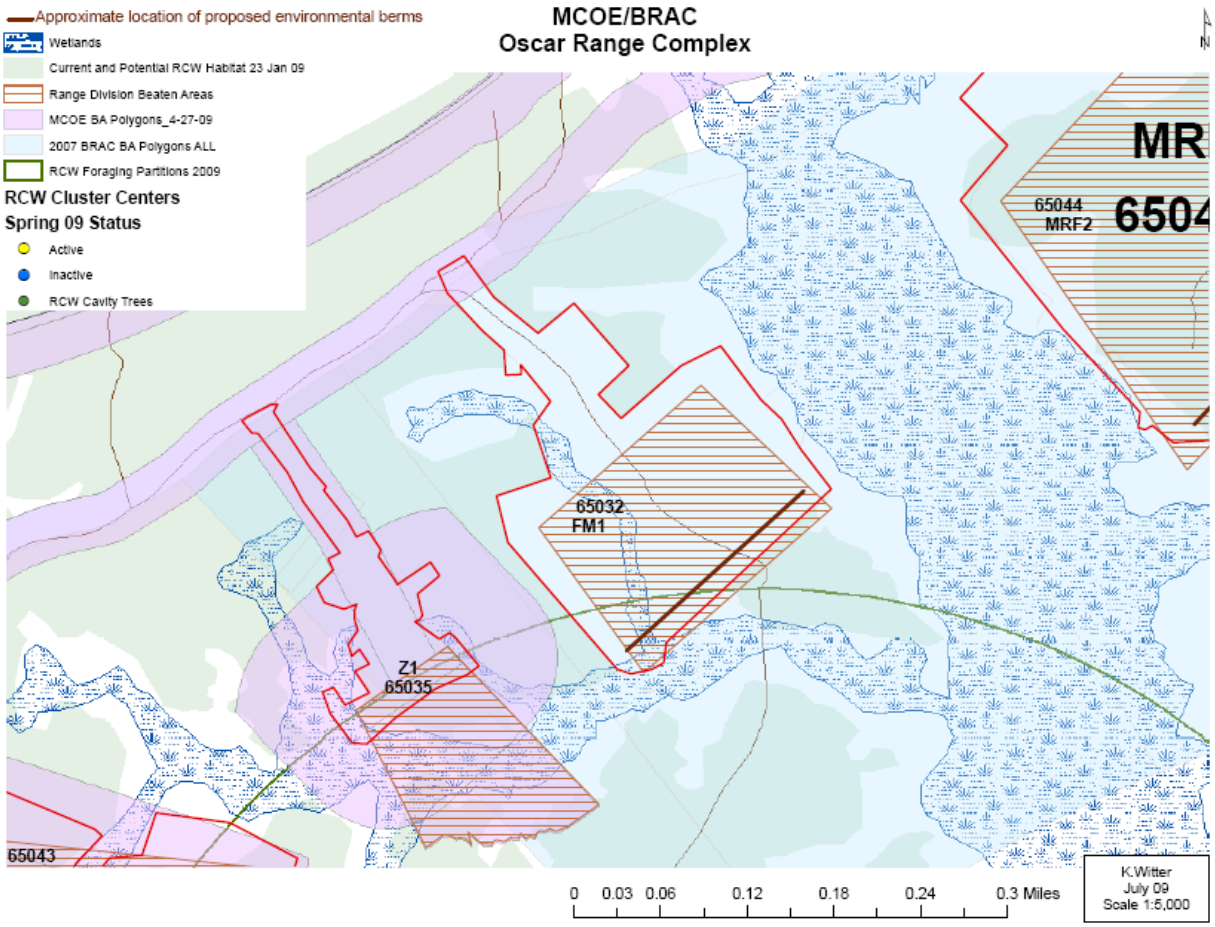


FIGURE 7. Modified Record Fire Range 4 (MRF4) PN 65046 - OSCAR RANGE COMPLEX

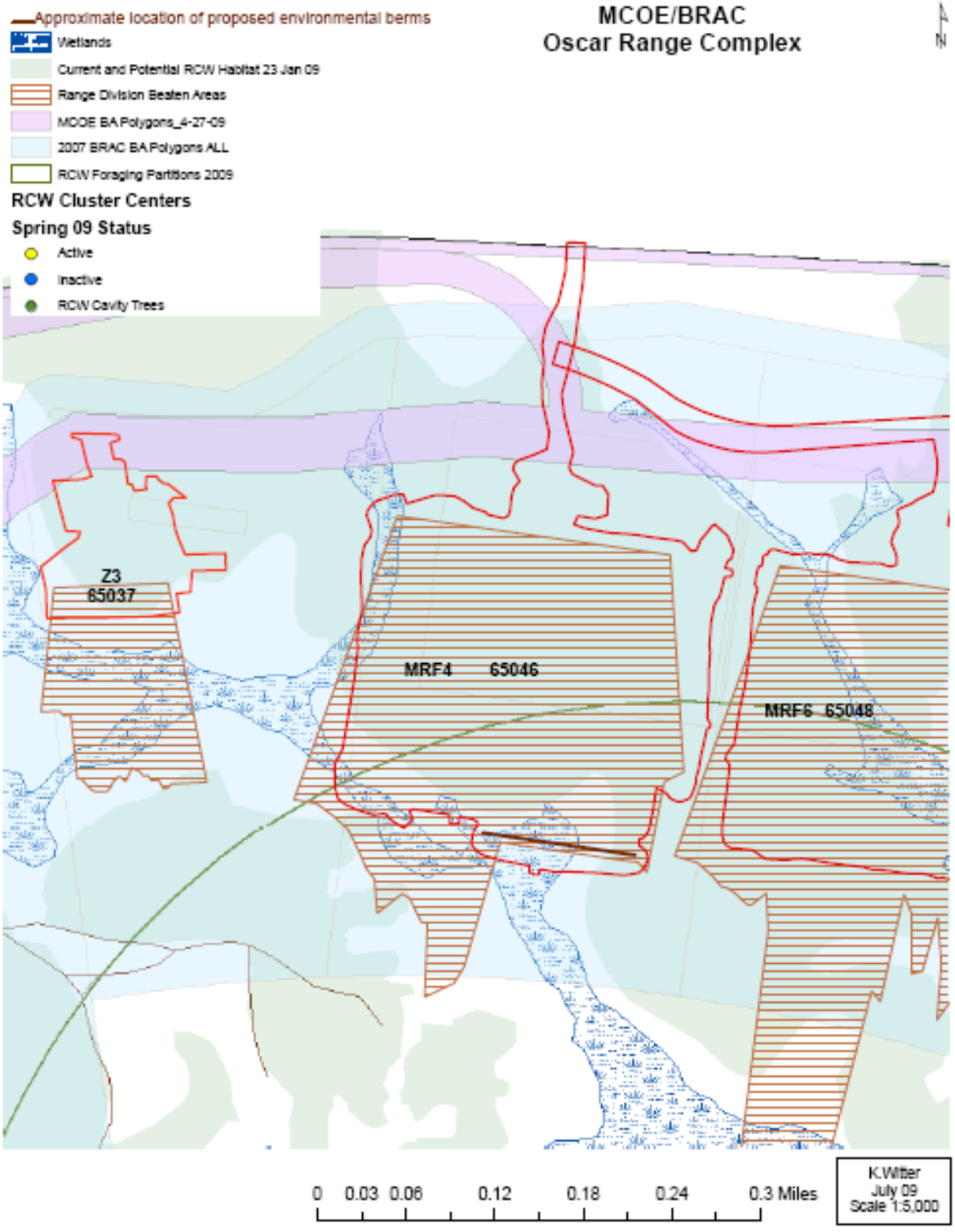


FIGURE 8. Modified Record Fire Range 7 (MRF7) PN 65049 - OSCAR RANGE COMPLEX

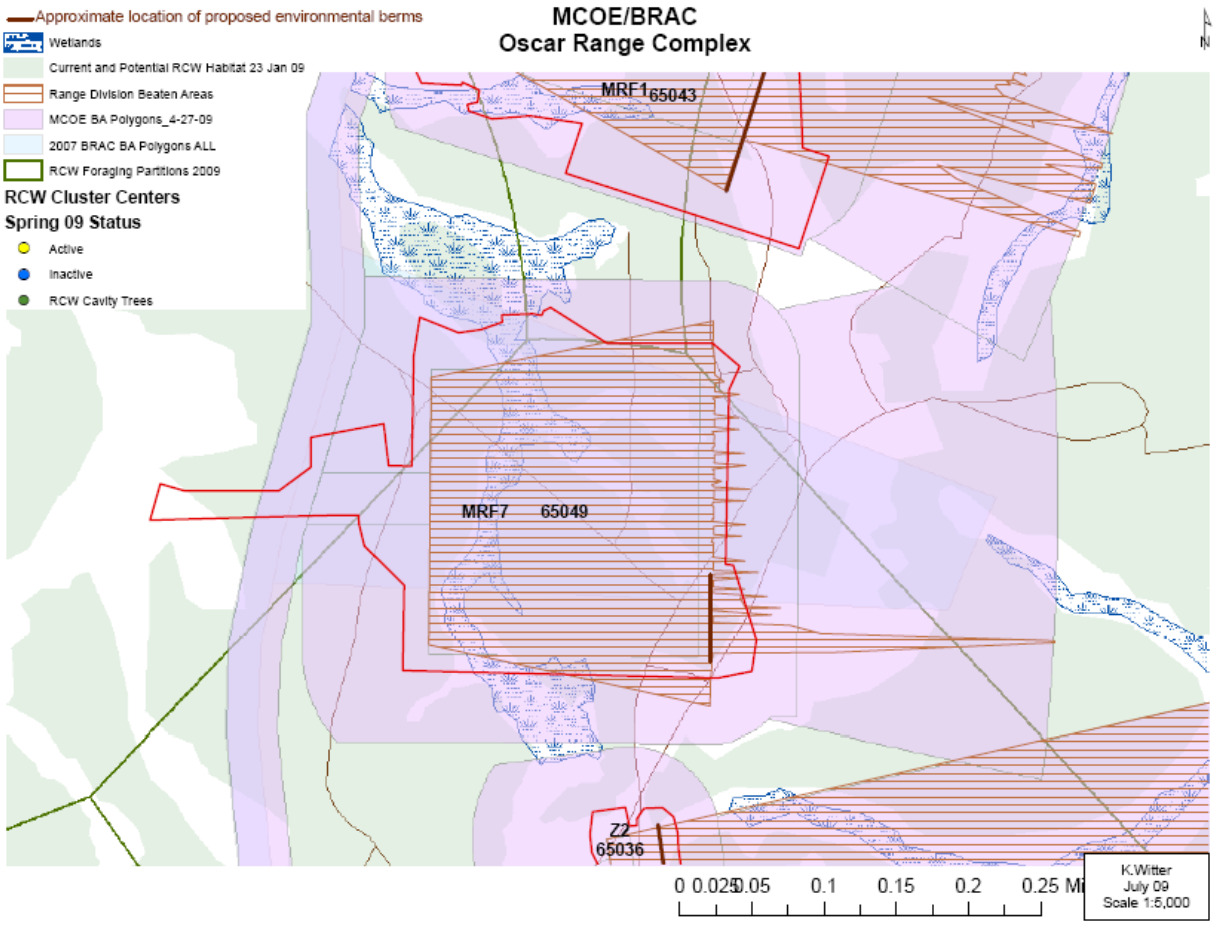


FIGURE 9. Modified Record Fire Range 5 (MRF5) PN 65047 - OSCAR RANGE COMPLEX

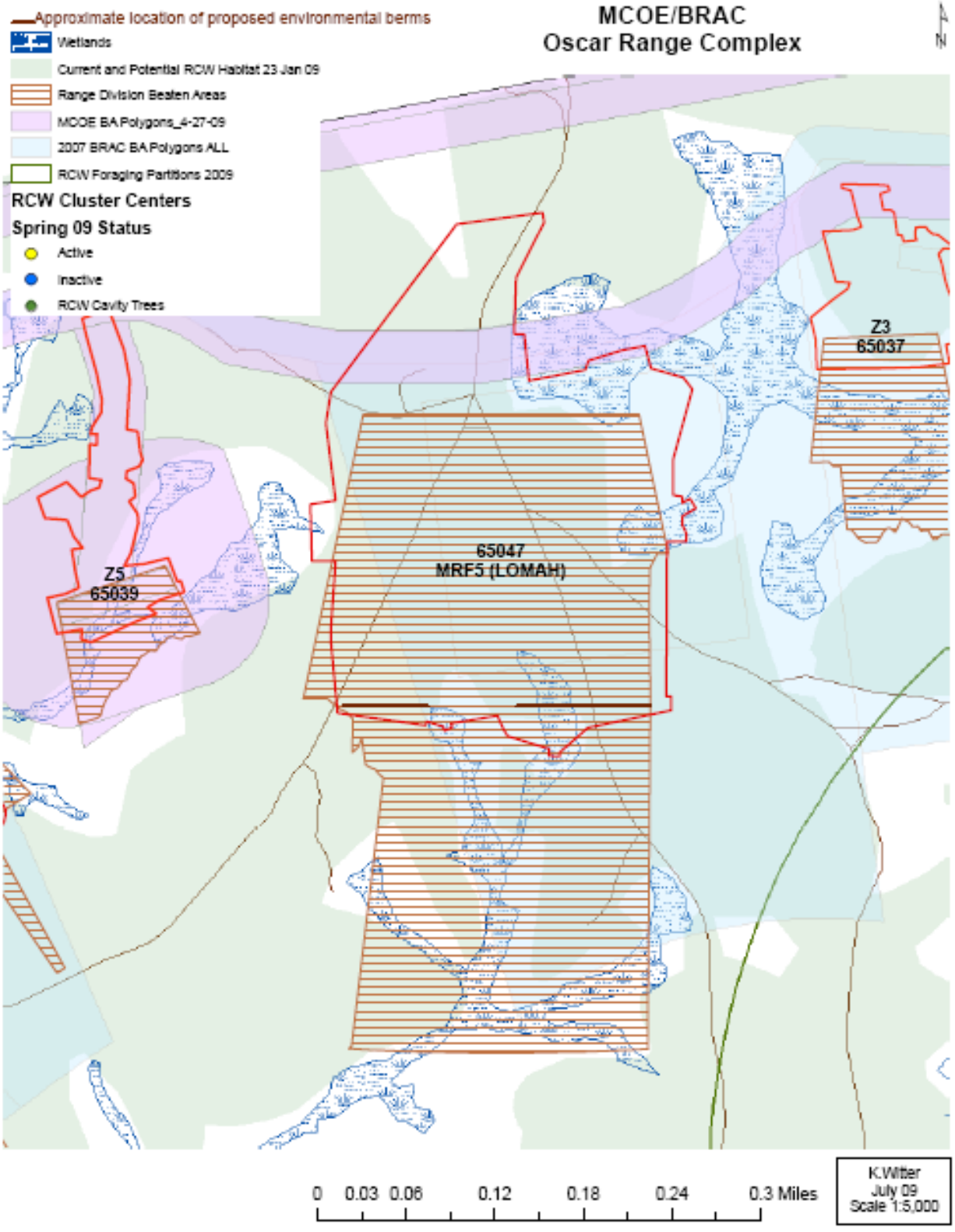


FIGURE 10. Fire and Movement Range 2 (FM2) PN 65033 - OSCAR RANGE COMPLEX

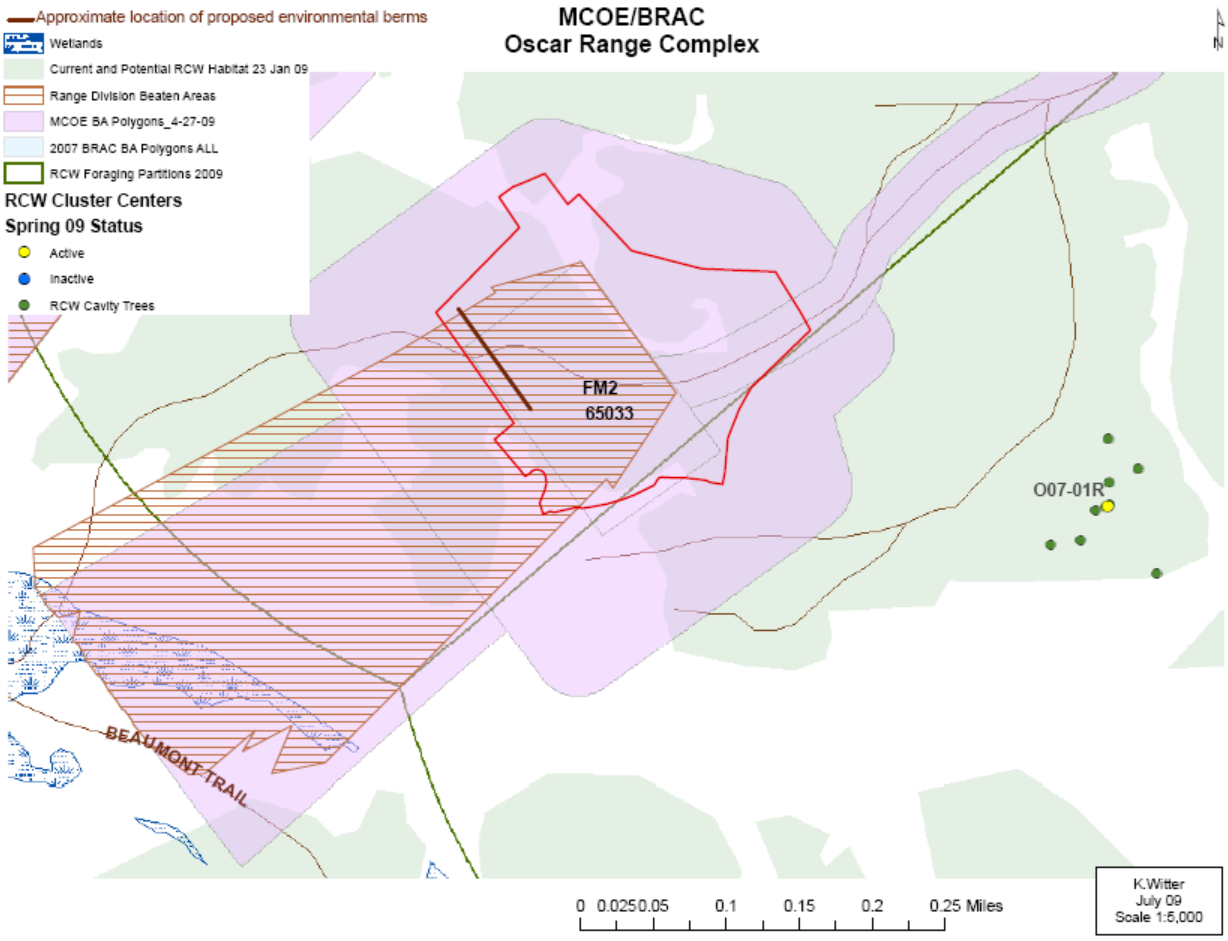


FIGURE 11. Fire and Movement Range 3 (FM3) PN 65034 - OSCAR RANGE COMPLEX

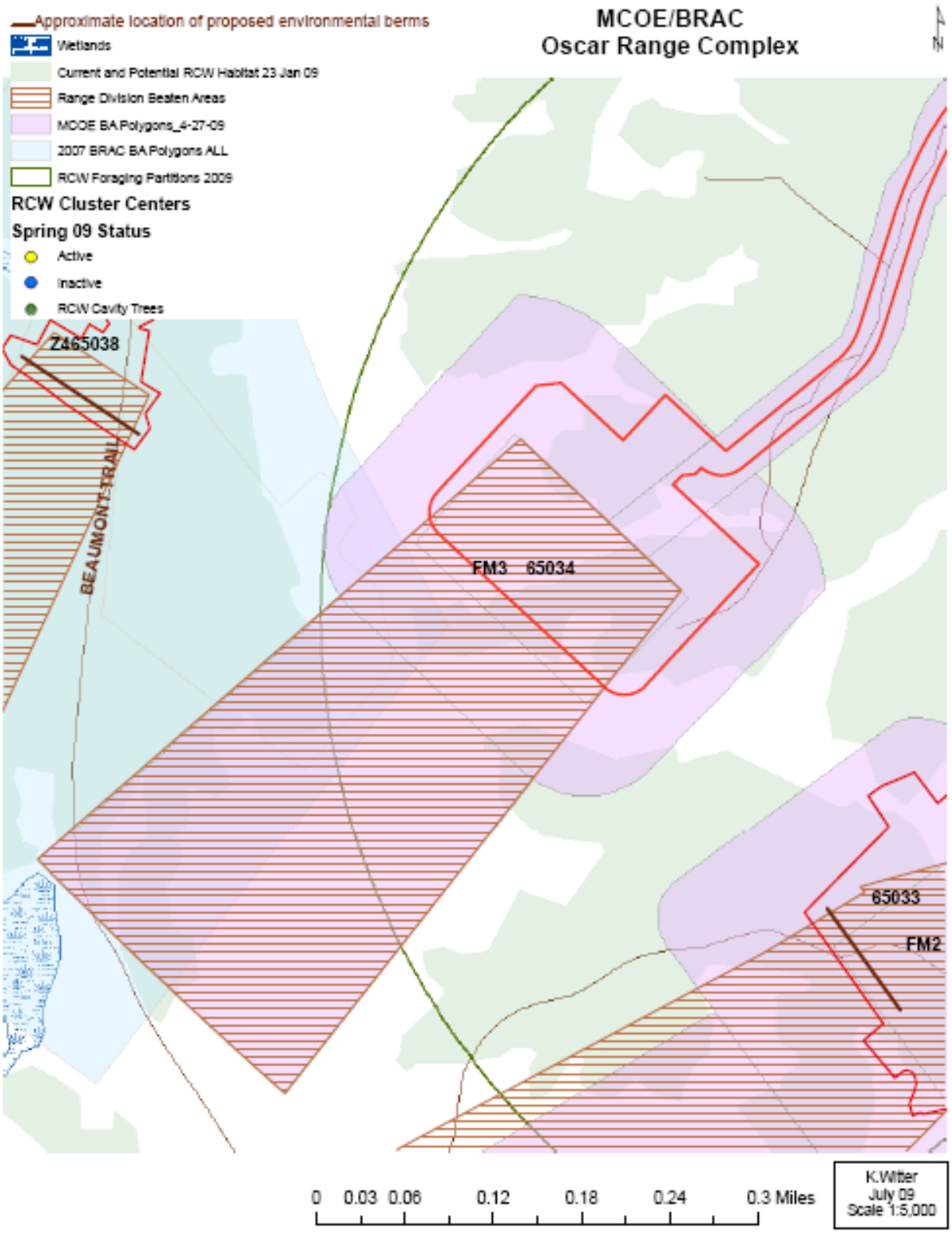


FIGURE 12. Zero Range 1 (Z1) PN 65035 - OSCAR RANGE COMPLEX

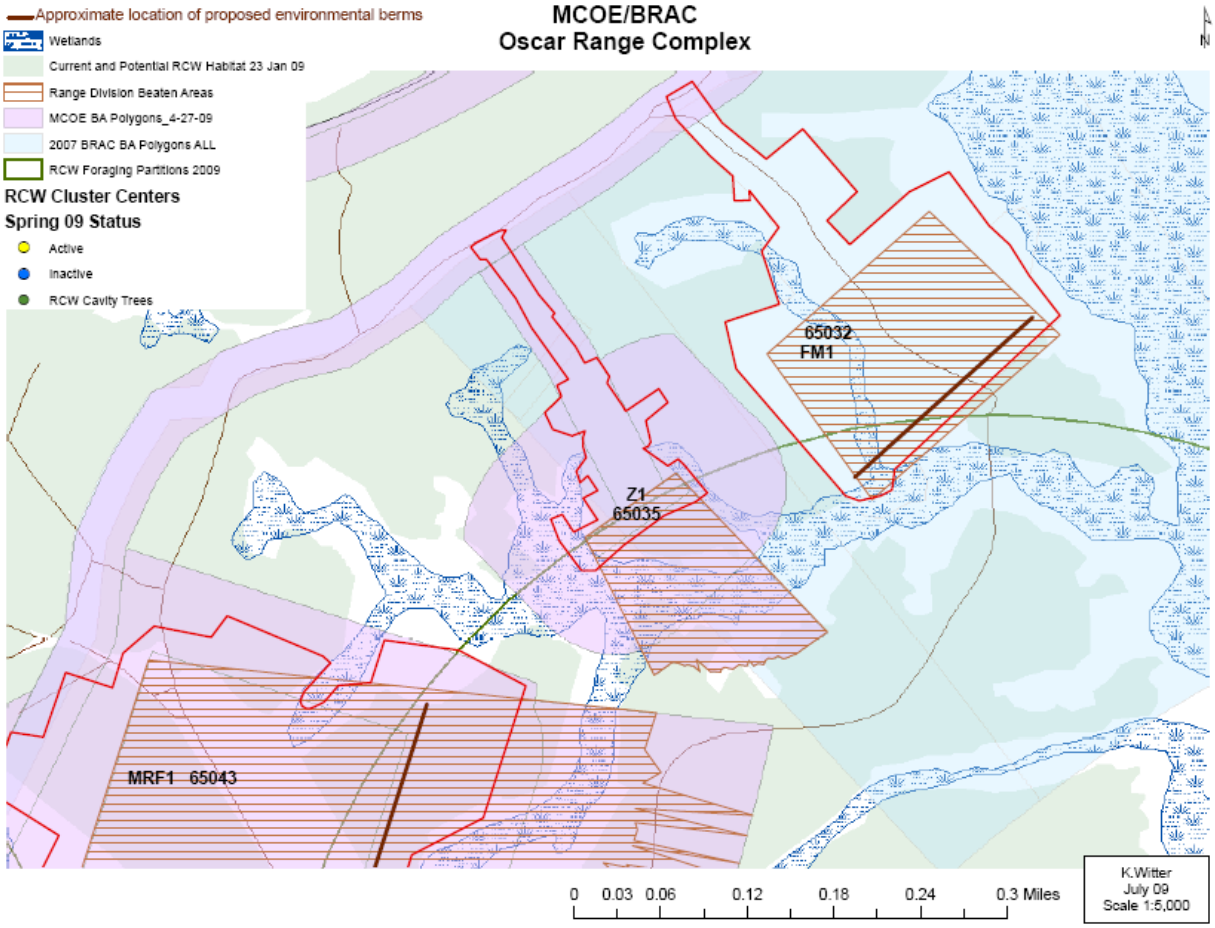


FIGURE 13. Zero Range 3 (Z3) PN 65037 - OSCAR RANGE COMPLEX

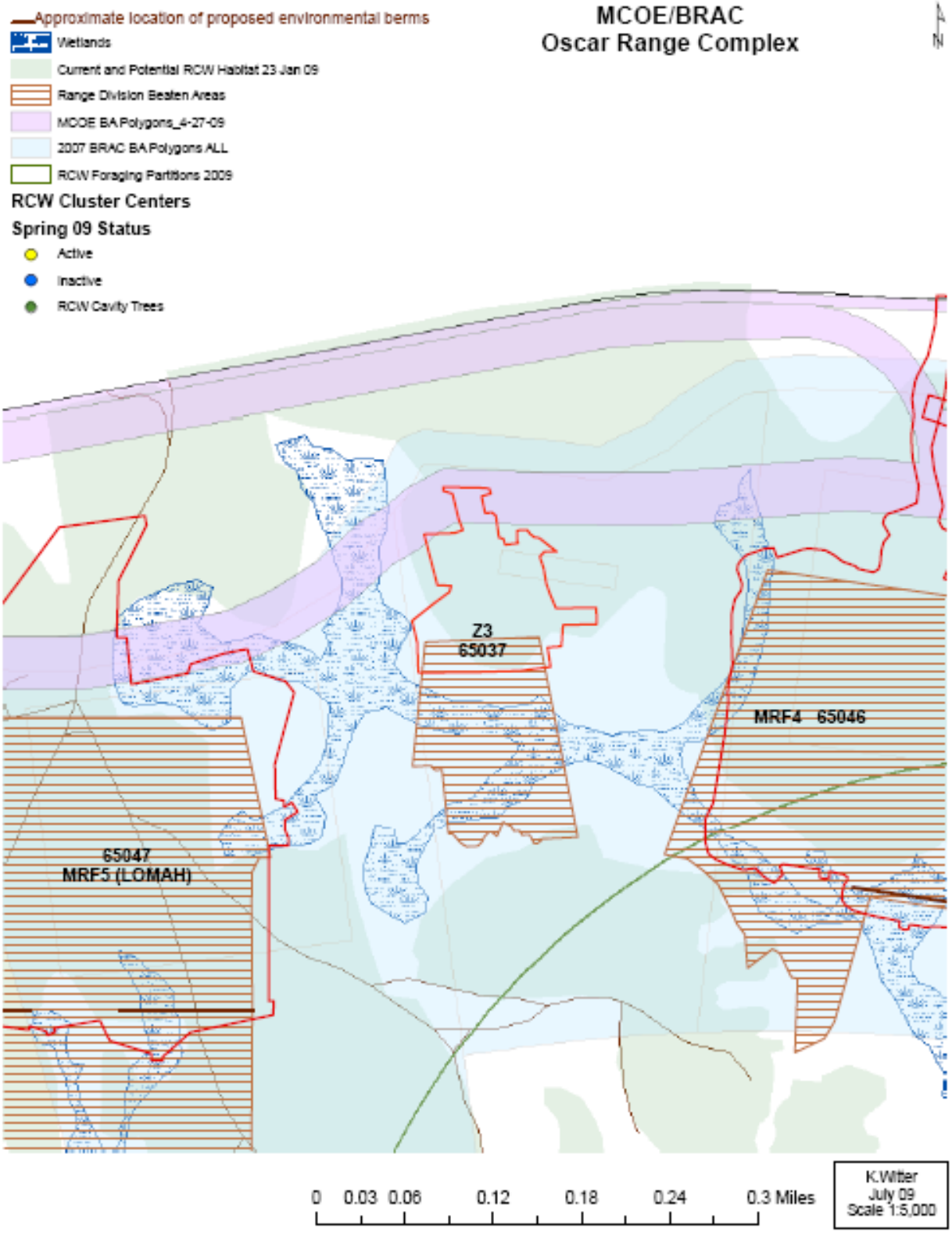


FIGURE 14. Zero Range 5 (Z5) PN 65039 - OSCAR RANGE COMPLEX

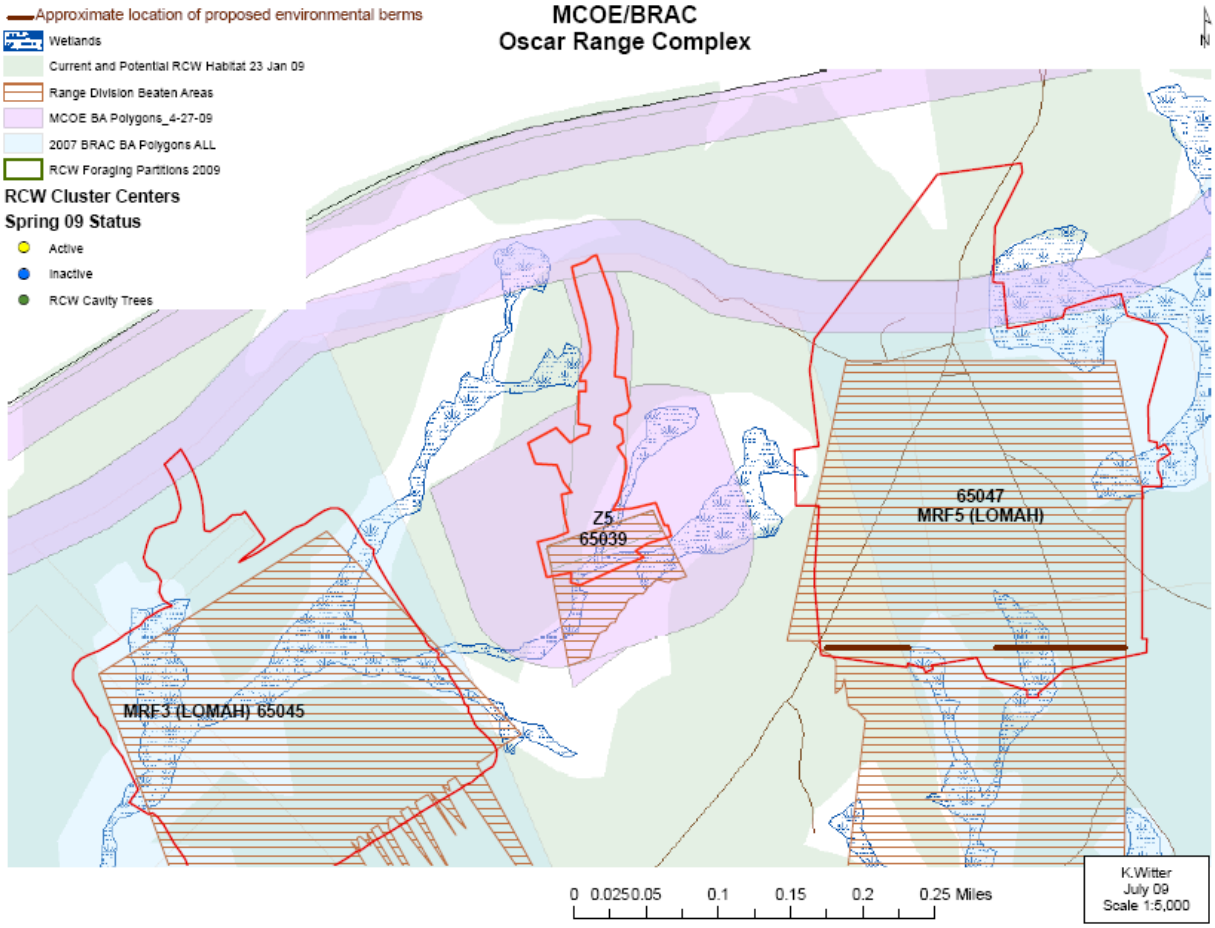


FIGURE 15. Modified Record Fire Range 3 (MRF3) PN 65045 - OSCAR RANGE COMPLEX

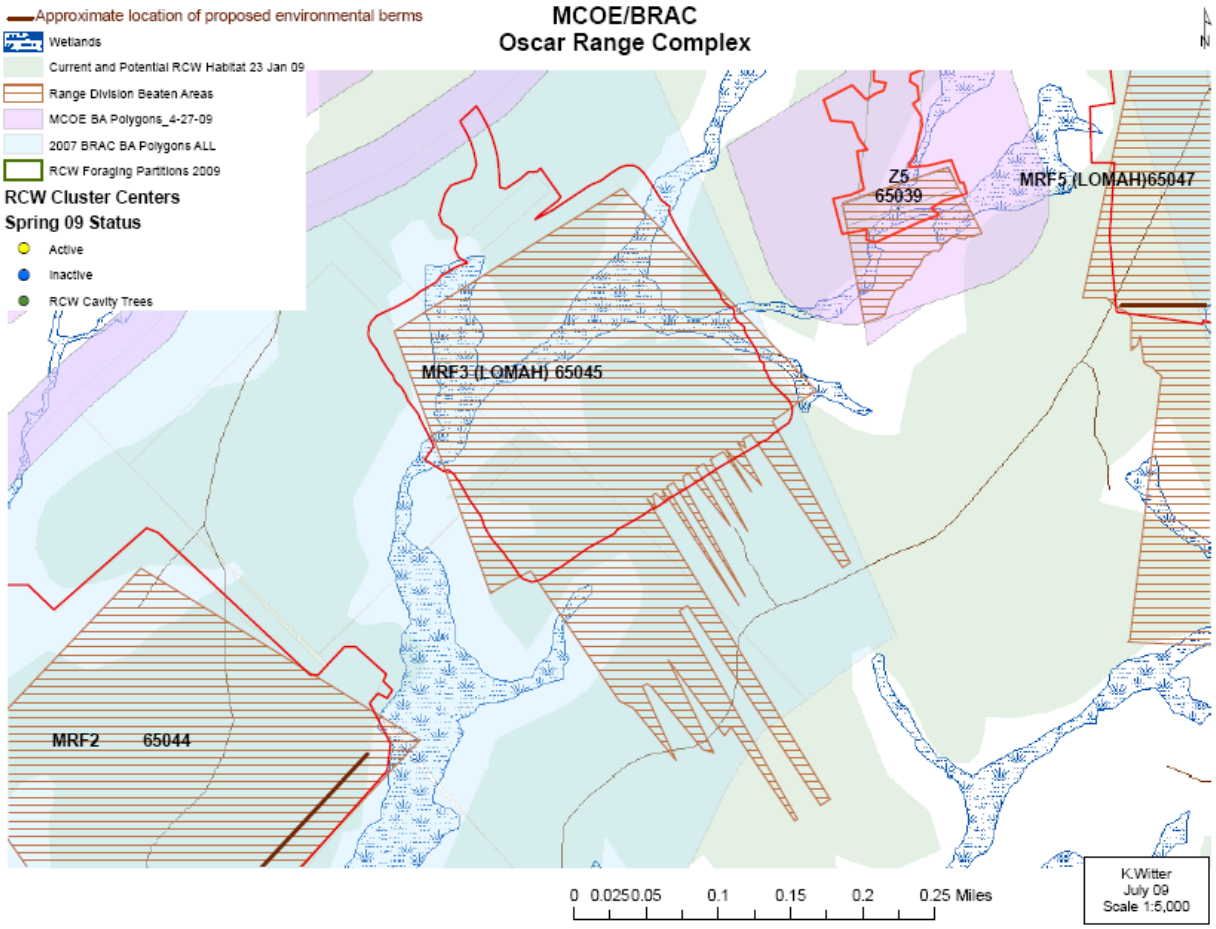
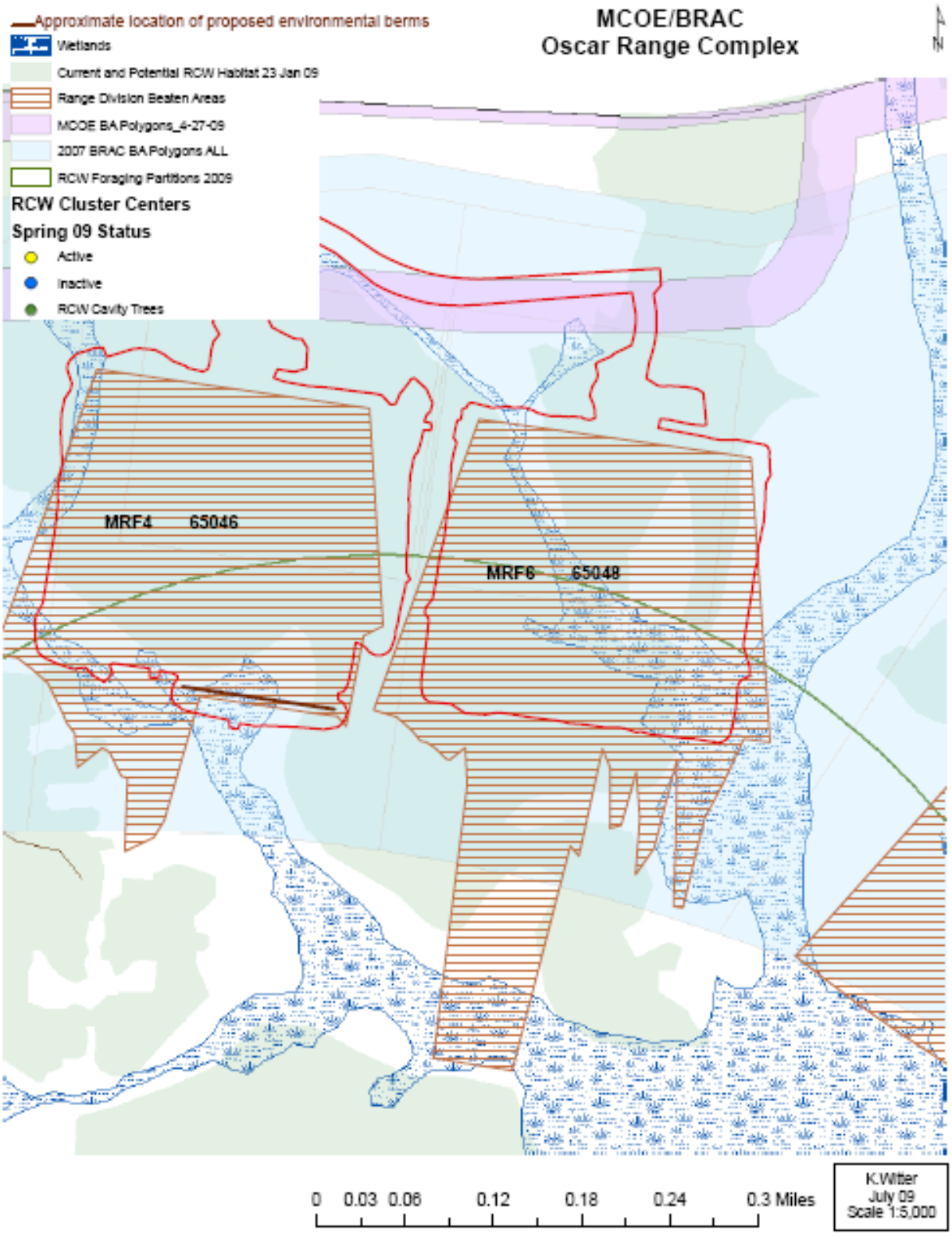


FIGURE 16. Modified Record Fire Range 6 (MRF6) PN 65048 - OSCAR RANGE COMPLEX



APPENDIX 6

Monitoring Plan to Evaluate Effects of Heavy Maneuver Training on the Red-cockaded Woodpecker Population on Fort Benning, Georgia.

Background

Under the Base Realignment and Closure (BRAC) of 2005, the Armor Center and School currently at Fort Knox, Kentucky will be transitioned to Fort Benning, Georgia. Changes in range configurations, facilities construction, Soldier census, and training activity associated with this BRAC action may potentially impact habitats and populations of the endangered red-cockaded woodpecker (RCW) on Fort Benning. Currently, under the U.S Fish and Wildlife Service (USFWS) RCW Recovery Plan, the Fort Benning RCW population is designated a "Primary Core Population," which is the highest level of importance under the Recovery Plan. Fort Benning recently completed formal consultation with the USFWS to evaluate potential effects for Maneuver Center of Excellence (MCOE) actions on the Installation's RCW population. In the resulting MCOE Biological Opinion (BO) dated 29 May 2009, the USFWS identified as "Reasonable and Prudent Measures" (RPM2) and "Terms and Conditions" (TC2) the following requirements:

> "In coordination with the Service, develop a monitoring plan by the end of October 2009 for RCWs affected by heavy maneuvers."
>
> "The monitoring plan for heavy maneuver effects must quantify and compare the response of subjected RCWs to those not subjected to maneuver disturbance."

The monitoring plan presented below was developed to meet these requirements of the MCOE BO. Implementation of this monitoring plan is contingent on USFWS review and approval.

The Southern Maneuver Area will be a designated trail system for training that will involve tracked and wheeled vehicles as well as mounted and dismounted troops. Operational use is anticipated in January 2011. Within the corridor, specific areas will be designated for tracked vehicles, while other areas may be thinned or cleared and used by dismounted troops (Figure 1). Various training scenarios will be conducted in this area on a regular basis, and infrastructure improvements will be made to support training. The current design involves 3 interconnected "fingers" of trails that extend roughly north-south and are interconnected at the southern terminus. Access to the Southern Maneuver Area is from a "finger" of the corridor extending from the west. This portion of the Southern Maneuver Area restricts heavy maneuver training to on-road use only, however off-road wheeled vehicle and dismounted maneuver training is permitted.

The Northern Maneuver Area will be a designated trail system for training that will involve tracked and wheeled vehicles. However, off-road heavy maneuver training will only occur within 25 ft. of roads and trails or will otherwise require approval

through the Fort Benning NEPA process. Operational use is anticipated in January 2011 (Figure 3).

Monitoring Objectives

The primary objective of this monitoring effort is to document whether heavy maneuver training associated with MCOE activities affects the RCW population and its habitats (also see Appendices 1-3) on Fort Benning, Georgia. The following null hypotheses (H_0) will guide data collection, summary, and statistical analyses to characterize heavy maneuver training activity in RCW clusters and evaluate relationships and interactions between heavy maneuver training activity and the RCW population and its habitats.

- $H1_0$: No relationship exists between RCW demographic parameters and frequency, duration, intensity, or timing of heavy maneuver training activities during 2010-2015 breeding seasons (March-June).
- $H2_0$: No relationship exists between habitat/site characteristics and frequency, duration, intensity, or timing of heavy maneuver training activities during 2010-2015 breeding seasons (March-June).
- $H3_0$: No relationship exists between RCW demographic parameters and any observed changes in habitat/site characteristics resulting from heavy maneuver training activities.

Testing these hypotheses will rely primarily on observational data to investigate the relationship of heavy maneuver training activities, habitat and RCW demographic parameters. This approach in general will not establish cause-and-effect relationships between heavy maneuver training activity and RCW demographic and habitat parameters because it is not possible to have control over the "treatments" in this evaluation (i.e. heavy maneuver training activity cannot be adjusted due to mission needs). However, this approach is designed to provide adequate information to make informed evaluations and decisions regarding the associations of heavy maneuver training activity and RCW population response.

Issue

The Southern Maneuver Area is a critical juncture of connectivity between RCW clusters distributed along the eastern boundary of Fort Benning with the core RCW population. Unfortunately, much of the forested area south of the Southern Maneuver Area is relatively young with no established clusters, while most of the area to the north is associated with the Digital Multi-purpose Range Complex (DMPRC). Therefore, monitoring the impacts of heavy maneuver training on the existing and future RCW clusters is critical for assessing their persistence and survival as well as maintaining an important connective corridor. Without this corridor, the RCW population would likely fragment into a sub-population of isolated clusters along the eastern boundary; thus, impacting recovery at Fort Benning.

Monitoring Approach

Monitoring will include four principle approaches to determine the effects of heavy maneuver training. The proposed objectives include:

1) Complete demographic monitoring of RCW groups associated with existing clusters within ½ mile of the Southern Maneuver Area and the Northern Maneuver Area.

2) An evaluation of changes in RCW habitat Matrix data during the period of operational use of the Southern Maneuver Area.

3) A refined evaluation of annual changes in critical features associated with RCW foraging habitat Matrix criteria (e.g. pine basal area, midstory, and ground cover) with establishment and monitoring of vegetation plots within the Southern Maneuver Area.

4) Monitoring of heavy maneuver training intensity, duration, frequency and timing in the Southern and Northern Maneuver Areas.

Currently, the Fort Benning Conservation Branch staff is actively monitoring RCW population demography and dispersal through complete banding of all RCWs associated with clusters within the vicinity of the Southern Maneuver Area and the Northern Maneuver Area. These data will be associated with any potential changes observed in the RCW foraging Matrix data as well as local vegetation plot monitoring information.

To compare the RCW foraging Matrix data with vegetation plot data, both data sets will be collected from a common location; namely, 1/5 acre nested plots will either overlay known locations for foraging habitat assessments, or foraging habitat assessments will be centrally located within designed vegetation plot areas. Determining the association of these two sampling designs is critical to evaluating change associated with heavy maneuver training because the RCW foraging Matrix involves very general assessments of habitat characteristics at a broad-scale. These categorical data will be compared with continuous data collected from vegetation plots. These continuous data are subject to initial changes in conditions relative to broad, generalized categorical data; therefore, more valuable in detecting training impacts and projecting future change. Further, these data allow for continuous data comparisons with those values associated with heavy maneuver training thus, have the potential to provide stronger statistical relationships for evaluating impacts. Finally, this comparison will provide some level of validation and representativeness of RCW foraging habitat Matrix data for assessing project level impacts in the Sandhill physiographic province.

Comparisons of data will be made to address the direct impact of heavy maneuver training on RCW demography (Objective 1 vs. Objective 4) as well as indirect impacts (Objective 1 vs. Objective 2 and/or 3 vs. Objective 4); further, the association of Objective 2 and Objective 3 will be evaluated to determine which information is most valuable in validating project level impacts involving RCW foraging habitat assessments. Depending upon initial data assessments and observed patterns and to best fit observed data, these comparisons may involve structured-equation, MANOVA using discrete data groupings, discriminant multivariate, or step-wise

regressional modeling. Analyses may also involve weighted metrics (e.g. inverse distance), whereby, more distant values contribute less to the solution than those immediately associated with the cluster center. These analyses will include weighted analyses of foraging matrix data.

Through the forest inventory process and use of aerial photography/satellite imagery, monitoring of long-term indirect effects of heavy maneuver training on the development of future-potential RCW habitat and potential recruitment sites will be critical. These evaluations will develop through time to determine if heavy maneuver training inhibits or slows the development of essential habitat that will allow for improved connectivity of sub-populations and territories that currently lack connectivity. These evaluations, along with Installation-wide assessments of forest health conditions and the rate of successful transition from mid-successional mixed pine and loblolly pine to the desired future condition dominated by uneven-aged longleaf pine, will be useful in monitoring Fort Benning's progression towards RCW recovery and identifying associated habitat requirements.

Sampling Methodology

To meet Objective 1, standardized techniques are already being used to band and monitor all adult RCWs and nestlings within ½ mile of the Southern and Northern Maneuver Areas. These demographic monitoring techniques are described in Appendices 1A, 1B, and 1C.

Objective 2 will be addressed using forest inventory data used to calculate RCW foraging Matrix information for individual timber stands and ½ mile foraging partitions. These methods are consistent with current recommended approaches (MCOE BO, 2009) (Appendix 3). As stated, these will include an assessment imbedded within existing 1/5 acre plots. Sampling coordination will be arranged through the Conservation and Land Management Branches as well as the contracted organization collecting heavy maneuver training data. Matrix monitoring will consist of two initiatives; first will be collection of foraging habitat Matrix information using currently existing data, and resampled again in 2015. Points used to collect foraging habitat information will be geographically positioned within each stand, foraging partition, and heavy maneuver training treatment category. Geographic positioning of this information will allow for distance-based analyses of habitat change relative to heavy maneuver training (Objective 4) and RCW demographic response (Objective 1).

To address Objective 3, 20 nested vegetation monitoring plots will be placed within three types of designated maneuver training within the Southern Maneuver Area (Figure 1). The three training designations include; 1) off-road heavy maneuver and dismounted training, 2) on-road heavy maneuver with off-road dismounted personnel movement, and 3) on-road heavy maneuver with wheeled and dismounted maneuver training. Each of these 3 training designations will have 20 vegetation plots randomly placed within each area (60 total plots). These placements will be sub-divided so that 10 plots are randomly positioned along the periphery of the heavy maneuver area boundary and 10 placed at more interior positions of the maneuver area within the ¼ mile RCW foraging partition. Each of these plots will be associated with a RCW partition or future-potential cluster site. Each set of 20 plots will be assumed to represent conditions and impacts associated within each of the three treatments. Direct comparisons of data will be made between logical combinations (e.g. road-side only vs. off-road tracked vehicle movement, etc.).

Categorical impacts within each training "treatment" can then be weighted by proportional area to evaluate the collective impacts of heavy maneuver training. Further, the weighted proportions of affected area within each "treatment" for each partition can be weighted to evaluate associations with bird demography. For example, bird demography associated with partitions with limited percentages of off-road tracked vehicle training can be compared with those having higher percentages of off-road tracked vehicle training. These comparisons can be through direct acreage proportions or weighted analyses (e.g. inverse distance weighting).

Methodologies to address Objective 3 have also been deployed by TNC to address installation-wide forest health monitoring efforts, and vegetation plot monitoring protocols are fully described in Appendix 2. Background and methodology for obtaining forest inventory data are also described in Appendix 2. Background and methodology for calculating RCW foraging habitat Matrix scores are described in Appendix 3.

Also, comparisons will be made between data from the Southern Maneuver Area, Northern Maneuver Area, and similar sites elsewhere where there is no heavy maneuver training. Beginning in 2010, these data will be collected annually and continue during the 5-year period after the Southern and Northern Maneuver Areas become operational, including information from the pre-harvest condition if any thinning or clearing occurs. Field data will consist of nested 1/5 acre plots, and are further described below.

The CERL research plan described below details the process that will be used to characterize heavy maneuver training activities based on type and number of personnel and vehicles, intensity, duration, frequency, and associated temporal and spatial factors.

Sampling Period

Training data and RCW demographic data will be collected during the RCW breeding season between March-June. All RCW demographic data collection has already been initiated for affected clusters, most of which currently have previous years of consecutive monitoring. Data will be collected annually through 2015, which would provide 5 years of data collection post-operations of the Southern and Northern Maneuver Areas. Although training is not anticipated to begin until 2011, training data collection described below will be initiated in 2010 to collect baseline information for comparison. Vegetation monitoring will also begin in 2010 and will be collected annually between March-October through 2015.

Training Data Collection

Characterizing training activity in heavy maneuver areas will essentially be a targeted sampling of training activity with trail camera systems. Multiple camera systems will be strategically located across training area categories as described above to characterize training levels in sampled training categories. Training activity recorded in the visual field of the camera systems will be analyzed as an index of relative training activity levels among training area categories.

The advantages of this approach are that it (1) characterizes training activity under actual conditions; (2) provides temporal and spatial information on maneuver activities; (3) provides data that are easily statistically summarized and analyzed; and (4) requires minimal interaction with unit training so that the training "behavior" is not influenced by researcher observation (Hayden et al. 2002).

High definition digital trail camera systems (Figure 2) will primarily be used to monitor military maneuver activities within focal areas of the Southern and Northern Maneuver Areas. These systems are motion activated with a very fast triggering speed, have infrared sensors for nocturnal recording capability, can record at a rate of 1 picture/second 24/7/365, have large data file storage availability, and have a wide detection range. Each sample observation will encompass 24-hour iterations and will record across multiple days within the RCW breeding season. Military maneuver training "events" recorded by these systems will be summarized to determine type of personnel (civilian, civilian staff, or military), number and type of vehicles and personnel, timing and duration of events, nature of events (off-road or road transit), and notes on any other characteristics of the observed event. An event is defined as any related set of activities by a group of personnel or vehicles within a sample 24-hour period.

Camera units will be located to adequately capture variation of training activity in focal maneuver areas relative to the Fort Benning ranges overall. Approximately 10 units (5 on-road and 5 off-road) will be located in the Southern Maneuver Corridor, where off-road maneuver activities will be allowed in some sub-areas. Approximately 5 units will be located in the Northern Maneuver Corridor, where no off-road vehicle traffic will be allowed (Figure 3). Approximately 5 units will be located at random road locations on Fort Benning, where it is anticipated that "normal" traffic patterns are independent of heavy maneuver training areas. Anticipated specific locations for camera installation are shown in Figure(s) X (*to be added as once final site selection is completed*), but trail cameras may be relocated periodically to increase surveillance coverage of focal maneuver areas.

For analyses, categories for the three heavy maneuver training designations will be: 1) off-road heavy maneuver and dismounted training, 2) on-road heavy maneuver with off-road dismounted personnel movement, and 3) on-road heavy maneuver with wheeled and dismounted maneuver training. Installation data on base military census and unit status will be used as covariates in analyses of field sampled activity data.

RCW Demographic and Habitat Data Collection

RCW response variables for heavy maneuver and habitat effects will be derived from the Installation's monitoring data collected annually. Appendices 1A, 1B, and 1C provide a detailed description of the protocols that will be used to collect RCW demographic data on Fort Benning in conjunction with this heavy maneuver monitoring plan. Appendices 2A and 2B provide a detailed description of vegetation monitoring protocols that will be used. Appendix 3 provides a detailed description of RCW foraging Matrix calculations. Previous research (Hayden et al. 2002) has shown that the number of auxiliaries (group size) and prior reproductive success are the strongest predictors of current year reproductive success. Therefore the primary response variables for analyses will be group size, nest success, and number of young fledged per

breeding pair. Specifics of RCW demographic and reproductive data collection are also provided in the Fort Benning INRMP and the MCOE Biological Assessment. Data for adult retention and survival will also be evaluated; however, the 5-year monitoring period and sample sizes in maneuver training activity categories of interest may result in low statistical power to detect differences among categories.

Analyses

It is anticipated that MCOE-associated heavy maneuver training activities will be phased in over the 2010-2015 time period. To account for differences in heavy maneuver activities across years, appropriate repeated-measures statistical methods will be used to evaluate sample unit response (demographic and reproductive response measures for individual RCW clusters) across the time series. Data reduction for habitat variables will likely be performed using principle components analysis to reduce the number of variables used for regression analyses described below. Analyses of the relationships between dependent (RCW response variables) and independent variables (habitat data, training area categories, and field measured training activity variables) will be performed using multiple linear regression approaches (GLM and logistic). MacNally (2000) discusses the potential pitfalls in ecological applications of this approach, particularly in predictive versus causal inferences of the results. The analyses conducted here will evaluate the most parsimonious predictive relationships between the dependent and independent variables using AIC model selection approaches. These model selection approaches are used to evaluate the relative importance of the independent variables as predictors of observed variance in the independent variables. The most parsimonious model will identify the fewest model terms that will significantly and most consistently account for observed variance in response measures of interest. The overall sample size and placement of RCW groups within training activity categories will depend on where heavy maneuver activities occur on the landscape and to what intensity relative to RCW group locations.

Reporting

Data from the monitoring will be summarized and reported annually to Fort Benning by 31 December. This report will document methods, data summaries, analysis results, and conclusions. Fort Benning will submit a report to the USFWS in accordance with the MCOE BO. Comprehensive analyses incorporating year effects and evaluation of survival and retention parameters would not be completed until the final year, but relevant data will be reported annually.

References

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MacNally, R. 2000. Regression and model-building in conservation biology, biogeography and ecology: The distinction between – and reconciliation of – 'predictive' and 'explanatory' models. Biodiversity and Conservation 9:655-671.

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APPENDIX 1A.

Maneuver Center of Excellence (MCOE) Demographic Monitoring Plan

A monitoring strategy for clusters impacted by MCOE actions on Ft. Benning.

THE MCOE DEMOGRAPHIC MONITORING PLAN HAS NOT BEEN COMPLETED YET. ONCE COMPLETED AND APPROVED IT WILL BE INCORPORATED INTO THIS MONITORING PLAN.

APPENDIX 1B.

Red-cockaded Woodpecker Demographic Monitoring Plan

A monitoring strategy for clusters impacted by BRAC/Transformation actions on Ft. Benning.

This plan discusses monitoring procedures designed to assess the impacts of Transformation actions, especially the Base Realignment and Closure (BRAC), to Red-cockaded woodpeckers (RCW) on Ft. Benning. Specifically, this document satisfies the U.S. Fish and Wildlife Service (USFWS) requirement for a 'RCW Demographic Monitoring Plan' for groups potentially affected by Transformation actions. Consistent with paragraph 6 of the 'Reasonable and Prudent Measures' outlined by the USFWS in their 20 August Biological Opinion (BO), this plan and its implementation meet the non-discretionary requirements presented in 'Terms and Conditions' paragraph 7.

Proposed Action

As mandated by Congress, the U.S. Army is currently undergoing a reorganization and redistribution effort which involves the BRAC process. Many of the activities associated with this transformation will occur within the boundaries of the Ft. Benning Army Installation. One of the largest of these actions involves moving the Armor School from Ft. Knox to Ft. Benning. Under the proposed action, the Army would provide the facilities, infrastructure and equipment needed to support this transformation and the associated influx of soldiers and training as a result. In addition to upgrading cantonment areas, the Army will also conduct upgrades to existing training ranges and roads as well as construct numerous new ranges and tank trails throughout the Installation.

Pursuant to section 7 of the Endangered Species Act, Ft. Benning's Conservation Branch (FBCB) conducted a thorough Biological Assessment (BA) to determine the possible impact these BRAC actions may have on the environment and various plant and animal species. The assessment determined that the actions were likely to adversely affect, among other species, the resident RCW population, but not jeopardize its continued existence on the Installation. The assessment also described current, on-going and future monitoring and management criteria that will ensure survival and persistence of this species (Ft. Benning, 2007).

The Red-cockaded Woodpecker

In 1970, the USFWS listed the RCW as endangered (Federal Register 35:16047), and in 1973, the passage of the Endangered Species Act provided federal protection for this endangered species. The major component in the determination to list the RCW was the documented decline in local populations and massive reduction in foraging and nesting habitat. Today's population represents less than 3% of what was present in pre-colonial America (USFWS, 2003).

The RCW is a territorial, non-migratory, cooperatively breeding species（Lennartz, 1987). Breeding pairs are monogamous and produce broods of 1-4 fledglings per year. Many groups also support one or more 'helpers', which are usually the male offspring from the pervious

season. The remaining offspring typically disperse an average of two miles from their natal cluster within their first year.

Historically, the RCW occupied a wide range throughout old-growth, fire-maintained pine ecosystems of the southeastern United States. Although still widely distributed, the range of the RCW is now limited and fragmented as a result of timber clearing for agriculture, fire suppression, natural disasters, and disease. The RCW is the only North American woodpecker that excavates its roost and nest cavities exclusively in living pines, thus the habitat and cavity trees are both limiting factors for the RCW (USFWS, 2003).

RCWs on Ft. Benning

In September 1994, the USFWS issued a Jeopardy Biological Opinion (JBO) to Ft. Benning which concluded that ongoing military training, timber harvest and construction activities on would "jeopardize" the continued existence of the Installation's RCW population. Since that time, intensive management activities have increased the habitat and improved conditions for the RCW in an effort to recover the species and comply with USFWS requirements. In 2002, Ft. Benning received a BO for the Endangered Species Management Plan that was non-jeopardy for the RCW.

Currently, Ft. Benning supports 306 manageable RCW clusters with 262 Potential Breeding Groups (PBG). PBGs consist of one male and one female with or without helpers that may or may not successfully fledge young. Due to the social dynamics of the RCW, referencing the number of PBGs is a more accurate measure of population size than the number of individual birds or clusters. The USFWS has mandated a goal of 361 PBGs to meet recovery criteria.

The Army complies with federal policy through employment of the Endangered Species Management Plan, an extensive plan which includes guidelines for species surveys, monitoring and data collection for the RCW as well as resource and habitat management and rehabilitation. U.S. Army Infantry Center Regulation 210-4 provides protocols specific to training activities near RCW clusters on Ft. Benning.

Monitoring BRAC/Transformation Impacted Clusters

The major threat to the RCW as result of BRAC/Transformation action stems from the direct loss of foraging habitat and cavity trees. Other threats include habitat fragmentation, interruption of natural dispersal and interference with reproductive success due to increased harassment in the form of soldier activities such as maneuver training and the noise resulting from gunnery firing.

Monitoring Criteria

As mandated by the USFWS 20 August 2007 BO, Ft. Benning will monitor 100% of the RCW clusters impacted by BRAC actions. Impacted clusters are those clusters whose cavity trees are within 200' of road projects and/or within 0.5 miles of a proposed Transformation project as well as all clusters experiencing habitat loss from within their foraging partitions as a result of any project. Monitoring will include banding all adults and nestlings in the cluster and will be conducted for five years after project completion and/or training initiation.

FBCB will employ the monitoring and management practices outlined through Army guidelines and the RCW Recovery Plan for BRAC/Transformation impacted RCW clusters on the Installation. The attached memorandum for record (Enclosure 1) describes Ft. Benning's protocol for these activities in detail. The current monitoring plan implemented on Ft. Benning meets the monitoring requirements outlined in the 20 August 2007 BO. Monitoring protocols involve determining the group composition and reproductive success of the population through the use of color band identifications and regular nest and fledge checks throughout the breeding season.

In the BA for the BRAC actions, Ft. Benning requested permission for the Incidental Take (i.e. elimination) of 32 RCW clusters as a direct or indirect result of Transformation activities. Although 'taken', those clusters not removed from the landscape will continue to be managed according to the Army RCW Guidelines (Ft. Benning, 2007).

Continued Management of Eliminated Clusters

Analysis presented in the 2007 Biological Assessment (BA) determined that, of the 32 clusters granted take, 14 may still have the ability to reach the RCW Recovery Standard for habitat totals in the future. The USFWS mandated in their 20 August 2007 BO that none of these clusters should be deleted from management. "Continued management of these clusters may result in the perpetuation or reformation of groups and allow these sites to be counted towards the Installation population goal. Many of these clusters can play a role in maintaining demographic connectivity and continue to contribute fledglings for overall population stability and growth" (USFWS, 2007).

FBCB acknowledges that clusters will become inactive or activate over time. The specific clusters to be monitored on an annual basis will be provided to the USFWS in the required quarterly reports as outlined in the terms and conditions of the 20 August 2007 BO.

Future Monitoring

The analysis performed for the BA took into account project information current as of January 2007. The BA discussed impacts to 91 active and inactive RCW clusters on Ft. Benning. In order to satisfy the terms and conditions as outlined by the USFWS in their 20 August BO, FBCB re-assessed impacts to clusters due to their proximity to proposed roads and projects and identified additional clusters which will require demographic monitoring.

Since final submittal of the BA analysis and BO response, numerous proposed projects have changed in scope, location and design. For this reason, FBCB will re-analyze impacts for each project as the design phase progresses. Re-analysis of project footprints and scope of training events may determine that clusters are experiencing new or additional impacts or that clusters originally anticipated to experience impacts will no longer be affected. Due to the fluid nature of Transformation/BRAC actions, Ft. Benning anticipates that there may be changes to proposed projects which will necessitate revision to this plan over time.

Summary

In summary, Ft. Benning will monitor and band 100% of active impacted clusters annually. FBCB will monitor impacted groups following established protocols as outlined by the USFWS and Army guidelines. RCW demographic monitoring will provide valuable data with respect to

the impact of large scale construction and range operation on the population. Thorough monitoring will also allow Ft. Benning to detect and react to unexpected impacts from proposed actions to the RCW population. Ft. Benning anticipates alteration of this monitoring plan over time to reflect changes in both population activity and in proposed BRAC/Transformation actions. If monitoring identifies unexpected impacts, Ft. Benning will consult with the USFWS to determine the appropriate course of action.
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APPENDIX 1C.

IMSE-BEN-PWE-C 09 April 2007

SUBJECT: Red-cockaded Woodpecker Population Monitoring and Banding

A. Introduction

The Monitoring Program is setup to determine population trends, reproductive success and response to management and military activities, as well as banding birds for translocation purposes. This includes annual inspections of all clusters and banding of adults and nestlings in the 25% sample clusters and all active recruitment clusters (for five years after activation). All sample clusters and recruitment clusters are also visited during the breeding season to determine if breeding is occurring in these sites (recruitments clusters for five years after activation). This will provide an accurate picture of breeding success at Fort Benning. Non-monitoring clusters will be visited until the composition of the site is determined. The easiest and preferred way to determine the presence of a potential breeding pair is to document a nest. In clusters where no nest can be found, the effort must be made to determine if there is a potential breeding pair that has not nested, if it is a single bird cluster, or if the cluster is captured. Once this determination is made, the cluster does not need to be checked any further for breeding.

The 25% sample clusters were randomly selected from the total active clusters. Clusters in the A20 and K15 impact areas are not included in the population monitoring due to access limitations, except for three clusters in A20 that have been cleared for management by EOD.

Data from the breeding season will be used to determine breeding success and also to determine the best sites for recruitment clusters for that year. This will also provide for a pool of birds for possible translocation efforts for that year.

All recruitment sites will be visited during the breeding season and again in the fall of each year. As clusters are activated, all adult and nestlings will be banded. Occupied recruitment clusters will be monitored for five years. Data on military activities in these sites will also be documented.

Annual reports of all activities will be submitted as required.

All written data that is collected should be recorded in black ink and be clear and legible. If not, data will be returned and you will be asked to redo data sheets.

B. Nest Checks

Each cluster should be checked for a nest about every 7-10 days, with no more than 11 days between checks. There should be only one nest per cluster, but until a nest is located, each active cavity must be considered a potential nest site. Nests are typically in the most active cavity, and often in the most recently completed cavity. However, at the beginning of the breeding season some nest cavities show only moderate activity. Pay special attention to the previous years nest cavity. Birds will on occasion reactivate a tree to use as a nest tree. This most often occurs with renesting

attempts. Always pay attention to previously listed inactive cavities/trees in clusters that have not nested or have failed.

Most nests can be found by scraping loudly with an axe handle/rake on the tree to flush the incubating adult. However, some birds will lean out to see what is going on and may be difficult to see. Use the peeper to check cavity contents whenever a RCW is flushed. The only way to conclusively document a nest attempt is to observe RCWs brooding eggs/tending nestlings. Therefore, in order to document a nest in a non-monitoring cluster, the technician must observe/flush an adult RCW from a nest or document nestlings. During every other nest check cycle, all active cavities should be peeped in sites where no nest has been found. If no nest is found by the middle of the breeding season, conduct a morning follow of group members to determine group status. The target group should be observed for a half an hour to an hour, immediately after the birds exit their cavities in the morning. Also check all cavities previously listed as inactive as it could have been reactivated and become a nest tree. Group status is classified as (1) potential breeding group, indicated by two or more birds that remain together and peacefully interact, (2) solitary bird, indicated by a bird that remains solitary for the duration of the follow, or (3) captured cluster, indicated by no birds or a bird that roosted in the target cluster but joined a neighbor group. If doubt as to the group status exists, the follow time is extended or the follow is repeated on another day. Also, survey the surrounding area (up to 1/4 mile) for new cavity trees. Any active tree more than 150 m from a nest tree should be checked for nests even when it is grouped with a cluster containing a nest (two nest trees within sight of one another are not unusual). Once eggs are found, return to the nest in 8 days. If you find the same number of eggs, check again in 8 days. If there are more eggs when you return, check again in 9 days. If chicks are found, the next check is scheduled by the optimal banding age (7-9 days old). Nestlings should be aged beginning with Day 0 (see handout). If it is necessary to band nestlings that are younger than 7 days old, it may be necessary to file down the bands in order for them to fit on the leg. If this is done, the band that is closest to the foot should never be filed as this may still result in a toe hung situation. Return when the nestlings are 18-20 days old to determine sex of nestlings. No nest should be peeped if the nestlings are 21 days or older as this may cause premature fledging. During these visits, adults should be identified. If a nest fails before fledging, that site must be put back into the nest check cycle. Check for nests through July. Continue to monitor sites after fledging for possible second nest. Each active tree should be peeped every other visit as sometimes adults will not flush when tree is scraped. This will ensure that a nest attempt is not missed. Make sure to scrape or lightly bang on each tree before inserting the peeper. This will give any roosting bird a chance to flush from the cavity. Mortality has been documented due to birds getting pinned by a peeper, so be cautious when inserting a peeper. Peepers should only be used one hour after sunrise and one hour before sunset.

Flag each nest tree found in banding clusters. This is not necessary in non-banding clusters.

Notify the Monitor/Survey Biologist once banding as soon as completed in a cluster. This may be done via email or a note given to the Biologist. Indicate the cluster(s) banded and the date banding occurred.

Data taken during the nest checks are recorded on nest check section on the pentabs. There should be one sheet for each cluster. It is extremely important to record the number of adults observed during nest checks. Pursue adults to identify if time permits. Never assume you will be able to identify the bird at a later date. If adults are observed, record number of adults and band information on nest check sheet/band ID sheet. Note number of unbanded birds. These birds will have to be caught and banded after the breeding season concludes for that cluster. Adults can be captured two weeks after nestlings fledge as long as a second nest is not discovered.

Inactive clusters should be revisited once every three weeks, as clusters have been known to become activated during the breeding season and produce nests. Inactive clusters that do no have any suitable cavities do not need to be put into this rotation.

Weekly reports of nesting activity should be turned in. Reports are prepared as an EXCEL file. The form is located on the P-drive under shared folders, Nest reports and should be filled out by COB each Monday. You should use the filter button to find your sites and fill in as needed. Turn off the filter when finished. Fill in as per the handout.

C. Climbing Trees

Swedish ladders are a safe and efficient way to climb trees, but it takes time to develop confidence and speed. Base sections must be fastened securely parallel to the trunk. Additional sections can be handed up to you or carried over your shoulder. Sections can be lowered in the same ways. Sometimes sections must be dropped if ladders will not come apart. Do this only if necessary and try to break the ladder's fall by dropping it in some brush. Never stand under a tree when someone is putting on or taking off sections. Use a safety belt at all times. Chain extensions or bungees can be used if the tree is too big for the chain on the ladders. Always keep the chain tight. Trees that are very large, lean, or have limbs below the cavity present special problems-consult a biologist if you have questions.

D. Nest Check Data Sheet

Section to be revised per use of tablet computers.

E. Banding Nestlings and Adults

Once nestlings are discovered and aged, plan the next nest check so that the young are the ideal age for banding. Begin with Day 0 for aging purposes. The object of the capture procedure is to place a monofilament loop over some part of the bird, ideally the neck, draw it tight, and gently pull the bird from the cavity. Capturing nestlings with a puller requires patience and experience. Keep pullers clean at all times. Use of cornstarch keeps the filaments lubricated. Make sure all loose cornstarch is tapped away as it could harm nestlings by clogging their respiratory tract. Nestlings are captured and banded between day 7 and day 9. Banding nestlings older than 10

days old is prohibited. Nestlings of this age are not easily hurt regardless of where they are snagged since their bones are not fully ossified and feathers have not erupted. Only trained personnel capture nestlings. Each nestling is to be banded with three color bands (representing the cluster) on the right leg, and a color band and a USFWS silver band (representing the individual) on the left leg. It may be necessary to band nestlings that are younger than 7 days old. Because the legs are shorter at these ages, it may require that the bands be filed in order for them to fit on the leg. If this is the case, the band that is next to the foot should never be filed as this may result in a toe hung situation.

While their eyes are closed (up to 8-9 days), nestlings respond to shadows across the cavity entrance by begging for food. This makes them fairly easy to catch by placing a hand over the entrance as you insert the puller. Nestlings become harder to catch as they get older and once their eyes open. They may "spook" and flatten against the bottom of the cavity. You must work a puller loop under them or hope to snag a wing or head.

Nestlings must be kept warm and dry by placing them in a pouch once pulled. Leave the puller in the entrance cavity to deter adults from entering the cavity once nestlings are pulled. Do not drop or leave them in direct sunlight. Record any injuries on nest check sheet. Band and weigh the nestlings on the ground in a clear, shaded area. Weigh each nestling using bag and pesola scale. Make sure to subtract the weight of the bag to get nestling weight and record on banding sheet. Be careful when applying bands, especially aluminum bands (always put on last). If a band is not opened properly, it may close lopsided, crushing or cutting the leg. Such bands are difficult to remove. Record any injuries on nest check sheet. Before banding, make sure you have the correct band colors, and that the individual colors you are choosing have not been used before. This can be determined by checking the colors used for the site in the banding section. After banding and weighing, check the bands for correctness and make sure you recorded all information correctly. It is very easy to band a bird wrong. Nestlings should be returned to cavity rear end first.

Adults are banded in the same manor, with three color bands on the right leg and one color band and one USFWS band on the left leg. These combinations are found on the banding section on the tablet computers for each cluster. Once captured, take the bird back to the vehicle for banding or to where ever banding equipment is located. It may be necessary to carry banding equipment to a particular tree. When banding adults, the bird should be held with forefinger and thumb forming a circle around the neck and the other fingers supporting the body. Color bands are applied first and the USFWS band last. Always double-check to make sure bands were applied correctly. Adults are weighed and released. Care should be taken when releasing the bird to let the bird go so that it will fly into a forested area. Never let the bird go in an opening. Also, pay attention to the possibility of predators in the area. Hawks have been known to snatch a bird right after it was released. A bird can also be released by placing it directly on to the bole of a pine tree. If a banded bird is recaptured, note combination and USFWS number and immediately release the bird. Replace faded color bands or bands that have fallen off as necessary. Sappy USFWS bands can be scraped clean using a band applicator. Extreme care should be taken when removing bands. Legs can easily be injured or broken.

A single person may raise up to 2 poles on their own as long as the trees are reasonably close together. One pole should be manned and the other attached to the tree using bungee or some other means to secure the pole to the tree and the net must be a closure-type net. All poles with extensions must be manned. If ladders need to be used to catch a bird, there must be 2 people present.

Unbanded adults may be caught and banded 2 weeks after a nest fledges or July 1 for clusters that do not nest or have failed and not renested by this date.

F. Banding Sheet

Section to be revised for tablet computer use.

G. Rechecks

One recheck should be scheduled to determine sex of the nestlings. This check is done at day 18-20. Peep the nest tree and look for a red patch on the head of nestlings. Males will have the patch and females will not. Record the number of each sex observed. If the nest has failed, then the cluster is put back in to the nest check rotation. Do not peep a nest if the nestlings are 21 days or older as this could cause premature fledging. A second check may be done around day 15 to determine if nestlings are still present or to identify adults, but this check is not mandatory.

H. Fledgling Checks

RCW's usually fledge about day 26-29. Fledging checks should be scheduled as close to these days as possible. Ideally, we would like to see the birds when they first leave the cavity. The longer the fledge check is delayed, the greater the chances some or all fledglings might die before this check. If all potential fledglings in a cluster are not found in the first check, the cluster must be checked again. There are several reasons fledglings may be missed. They often remain frozen in the treetops during their first days after leaving the nest, and can be difficult to impossible to find at this time. Listen for begging sounds when adults enter the area and watch where the adults go. The fledglings are much easier to observe when they begin moving with the group. Still, fledglings may be left some distance from the cluster at roost time. Adults will fly directly back to them when leaving the cluster in the morning and can often be found by following adults at this time. Try to identify all birds in the cluster by band identification. Record all data on the recapture/visual id data section. Spotting scopes are used to identify fledglings.

I. Adult Observations

Adults should be counted and identified whenever encountered. This information should be recorded on recapture/visual id data section. One of our major goals is to determine the number and identity of all group members in each cluster, especially during the breeding season. All adults in a group are rarely at the nest at the same time unless there are only two birds. The group usually moves as a unit after fledging,

though a weak bird may lag behind. Large groups may split into subgroups. Do not assume that a bird will be seen again or that adults seen at a nest tree are the same ones with fledglings (sometimes they are not). Record only the number of adults you are sure of. You can indicate the possibility of additional adults in the comments. Do not look up band colors on birds expected to be in an area, it is very easy to see bands you expect to see. Spotting scopes are used to identify adults.

Make sure to do adult ids in active monitoring and recruitment clusters that do not nest. It is important for translocation needs to determine if a cluster contains a potential breeding pair or a single bird.

Also, in non-monitoring clusters where no nest is found, a determination must be made as to whether there is a single bird or a potential breeding pair. This is necessary to determine translocation needs for the fall.

J. Capturing Adults

Adults are captured either at sunrise or sunset. If capturing at sunrise, areas that must be scheduled should be scheduled for two consecutive days. Banding is done only if temperatures are above 40 degrees F. The extension poles must be set up in advance because it is hard to make sure the net is over the cavity when it is dark. You must arrive at the cluster before sunrise as most birds leave their cavities when the sun rises. A few have been known to flush when it is still dark. It is very important that you are quiet when entering the cluster and when you are raising the pole. Loud noises can cause the bird to flush. Be sure to park the vehicle far enough away from the cluster so as not to flush the birds. Turn lights off once you enter the cluster. If capturing at sunset, watch the active trees and see which cavities the birds enter. Poles are set up at as many active trees as can be observed. You must get your net over the cavity within minutes after the bird enters the cavity. Play tape or scrape tree to get the bird to flush. In many cases, if you wait too long, the bird will not flush. If you do not have enough time to capture and band the bird before it gets dark, do not continue to try and capture the bird. It must be light enough for the bird to find its cavity after being banded. If a bird has to roost outside, it is more vulnerable to predators and severe weather.

When setting up nets the day before capturing, make sure the net is centered over the hole. It is best to mark the ground at the point where the end of the pole is set and where the base of the pole is set. Poles should be laid out so that the pole when lifted straight up will be over the hole. If this cannot be done, make sure to record where the pole is in relation to the hole so that the pole can be properly raised. If necessary, use a brush cutter to clear the area around the pole so that the pull-string will not get tangled and inadvertently cause the net to close. Be sure to retighten the blue locks on the extension poles the next morning prior to raising the pole. Sometimes the sections will fall when you raise the net and you will have to try and remeasure the distance to the cavity in the dark. This loud noise can also cause the bird to flush. If necessary, use duct tape to make sure the lock is secure. Make sure the drawstrings are attached before raising the pole and pull it gently closed once you are sure the bird is in the net. The pole should be raised by first placing your foot at the base of the pole to make sure it is secure. Use the same method when lowering the pole so that the base does not slip. It is best to twist the net around the pole as you lower it to ensure

that the bird cannot escape. Be sure to lower the net gently to the ground. If the bird hangs in the top of the net and the net does not have a drawstring, try lowering the net by releasing each section and keeping the net against the tree. Tall trees present a difficult challenge. This may require an extra extension or the use of ladders. If this is the case, extreme care must be taken not to harm the bird. A spotter may be necessary in these situations. If ladders are used, get out to the site a little earlier to allow for time to set up. This must be done in the dark to limit the possibility of flushing the bird. First climb up to the appropriate height on the ladder. This height should be predetermined the day before when setting up to capture. If possible, the person who set up on the tree should do the capture. Once at the proper height, a second person should raise the pole and hand it to the person on the ladder. Once the bird is captured, carefully lower the pole, using a spotter if necessary. Record all data on the banding section of the tablet computer. Never capture an adult if it is raining or if temperature is below 40 degrees F.

If a banded adult is re-captured, note band combinations and USFWS number and immediately release the bird. If bands are too sappy to read, take the bird back to the truck and scrape off sap or replace color bands as necessary. Questionable combinations can be looked up on the tablet computers. Searches can also be done on the band number.

One person can set up and capture off of multiple trees if a) poles do not have extensions, b) poles are within visual site of the bander, c) unmanned poles are strapped/bungeed to tree, d) bird(s) is (are) caught/banded/released and then bander sets up to catch another bird that has not flushed yet.

Unbanded birds may be captured beginning 2 weeks after the nest fledges or July 1 if the cluster has not nested. Clusters where the nest failed can be captured beginning July 1 if they have not renested. Adults can be captured through 31 March. No adults should be captured during the breeding season.

L. Translocation

As a general rule, only juvenile birds are translocated. The bird to translocate and any birds in the target cluster must be banded. The target cluster should be visited to confirm the need for the juvenile male (in the case of a single female) or a juvenile female (in the case of a single male). Pairs of juveniles may also be translocated to recruitment clusters. The target cluster must have a suitable roosting cavity for each translocated bird. This can be either a natural or artificial cavity. Each cavity should be checked the day prior to translocation to make sure it is empty and/or not being used by another RCW. The cavity is then screened so that no other animal can use it.

The bird to be translocated will be captured in the evening. See Section J for proper capture techniques. After capturing the bird, it is placed in a transport box and taken to the target cluster. The bird is placed into a cavity to roost overnight. The screen should be replaced to assure the bird remains in the cavity overnight. Return to the cluster the next morning and remove the screen when the other bird(s) flush. The cluster should be revisited again that evening to check for roosting. A morning or evening check should be made a week later and for several weeks thereafter to

document roosting. If the bird is not seen, nearby clusters should be checked to see if the bird is roosting elsewhere.

When translocating pairs of birds to a new recruitment site, there should be one other site available for each pair translocated. These sites should meet all minimum requirements for a recruitment site and should have at least 4 clean cavities. These cavities can be screened until the birds are released, but screens must be removed once the birds are released. This gives the birds other nearby opportunities for roosting.

If a non-target RCW is captured, it should be returned to the cavity from which it was caught. Place the bird in a transport box and climb the tree. The birds should be held in the cavity by placing a screen, hand or some other object over the entrance until the bird settles down. This should be a minimum of 15 minutes. Descend the tree as quietly as possible so as not to flush the bird.

Each translocation should be documented via a Memorandum For Record for end of the year reporting purposes.

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Conservation Branch

APPENDIX 2.

FORT BENNING UPLAND PINE ECOSYSTEM MONITORING PLAN AND PROTOCOL

2009

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CONTENTS

EXECUTIVE SUMMARY

The purpose of this report is to provide an update to the 2004 ecological monitoring plan for upland pine ecosystems on Fort Benning developed by The Nature Conservancy (TNC) and Fort Benning. Since 2004, several significant developments that influence the monitoring program have occurred, including increased concern about forest health, increased concern over air quality impacts due to prescribed fire, implementation of the red-cockaded woodpecker (RCW) matrix tool for habitat assessments, increased use of herbicides to achieve restoration objectives, and most notably, planned development of new training ranges and maneuver corridors associated with the 2005 Base Realignment and Closure (BRAC) recommendation and the Maneuver Center of Excellence (MCOE) initiative. These developments have stressed the need for a monitoring program that is dynamic, forward-thinking, and integrated with all possible programs to make the best and most efficient use of available resources. The plan and protocol described herein build upon earlier work to more clearly define the upland monitoring framework and objectives, and to provide a detailed methodology for sampling.

Important to any restoration project is identifying and describing a target or desired condition to serve as a benchmark against which ecological monitoring can measure restoration progress and success. On Fort Benning, desired future conditions (DFC) for upland pine restoration are based largely on habitat requirements and preferences of the RCW. The DFC has been qualitatively described previously in the installation's Integrated Natural Resources Management Plan (INRMP). Through research and monitoring data, a more quantitative DFC has been developed for preliminary use to describe desired vegetation structure. Given such a DFC description, departures from the DFC can then be characterized via the condition 'tier' concept (e.g. excellent, good, fair, poor). The DFCs and condition tiers provide a framework for on-the-ground monitoring. A system of permanent monitoring plots provides data to evaluate movement of upland areas toward or away from desired conditions. Sampling on these plots is intensive and repeated over time allowing construction of long-term records of vegetation dynamics, demographics, and response to disturbance. These permanent plots are augmented by a network of temporary plots that are not monumented and are less-intensively sampled, but can efficiently cover more total ground area. Temporary plots are tied to the Fort Benning timber inventory process and are important for evaluating the larger landscape for both standard forestry metrics like stand density and regeneration counts, and ecological attributes like tree health and invasive species.

Over time, data from permanent and temporary monitoring plots will provide Fort Benning natural resource managers with ecological assessments and critical information about long-term ecological change. Basic land management questions will be addressed, such as did the percent cover of bunch grasses increase or decrease from one sample period to the next? Are there fewer sweetgum stems in the midstory this sample period compared to last? How many loblolly pine trees died from last year to this year? Additional questions related to cause and effect and response to management may be addressed via research projects.

Finally, this monitoring program contemplates decision-support tools intended to "close the loop" between monitoring and planning, providing critical feedback to managers striving for long-term success in restoration and management.

BACKGROUND

Upland, pine-dominated areas on Fort Benning are perhaps the installation's most important natural resource in that they provide extensive training opportunities for the military as well as habitat for numerous rare species, including the federally endangered red-cockaded woodpecker (RCW). Fort Benning's uplands are believed to have been dominated by longleaf pine prior to European settlement, but present day stands are mostly mixed pine (longleaf, loblolly and shortleaf pines) and mixed pine-hardwood due to past agricultural practices, past forest conversion, and fire suppression. Longleaf pine reforestation began on a small scale on Fort Benning in the early 1990s as land managers noticed increases in southern pine beetle activity and disease in loblolly and shortleaf pines. This effort intensified following the U.S. Fish and Wildlife Service (FWS) 1994 Jeopardy Biological Opinion (JBO)[20] that military and land management activities at the time were "likely to jeopardize the continued existence of the RCW." This opinion was based on observed damage and degradation to RCW habitat resulting both directly and indirectly from military training and forestry practices. Among the effects listed were (1) habitat modification, primarily midstory hardwood encroachment and loss of herbaceous understory, resulting from inadequate prescribed burning, (2) erosion and sedimentation impacts on cavity trees and foraging habitat, (3) shortfall in future recruitment stands and cavity trees as a result of disease-related mortality, and (4) impacts of exotic plants, primarily kudzu, on foraging habitat and pine regeneration and productivity.

Following the JBO and during preparation and implementation of the installation's Integrated Natural Resources Management Plan (INRMP; USAIC 2006), Fort Benning land management goals began emphasizing reforestation of longleaf pine and an intensive prescribed fire program to promote longleaf pine natural recruitment and restoration of native groundcover. Longleaf pine is more suitable for RCW because it is longer-lived and because it is less susceptible to disease and pine-beetle attack compared to loblolly and shortleaf pines (Boyer 1990). The same characteristics also make longleaf pine more suitable than other species as a sustainable forest cover type for Fort Benning's upland areas. In 2000, Fort Benning and TNC contracted with Mr. Leon Neel, consulting forester out of Thomasville, GA, and the Joseph W. Jones Ecological Research Center to document the Stoddard-Neel (S-N) approach to forest management and its application at Fort Benning to restore and maintain longleaf pine. The result of this effort was a report describing the S-N approach (Jack 2002). Stand-improvement thinnings and prescribed fire are basic tenets of this approach.

In 2003, Fort Benning tasked The Nature Conservancy (TNC) with developing and implementing a monitoring program aimed primarily at determining whether longleaf pine restoration goals for the installation's uplands were being met (see Addington 2004). The plan described key management issues facing Fort Benning at the time and it documented existing monitoring activities among Fort Benning's Environmental Management Division (EMD) and Integrated Training Area Management (ITAM) programs. The plan also identified information gaps, and made recommendations for new monitoring projects to address information gaps. Implementation began shortly thereafter with the establishment of permanent monitoring plots. Meanwhile, several research studies funded by the Department of Defense (DoD) Stategic Environmental Research and Development Program (SERDP) Ecosystem Management Program (SEMP) concluded, and technology transition began via the SEMP technology transfer coordinator (Imm et al. 2008). Several new developments specific to RCW population and

[20] W.J. Olds, Jr., Acting Regional Director, U.S. Fish and Wildlife Service to Major General J.A. White, Commanding General, U.S. Army Infantry Center, Fort Benning, Georgia, untitled letter dated September 22, 1994.

habitat management have been instituted, including use of the RCW Matrix for evaluating habitat quality, and the one-time use of herbicides to combat woody plant encroachment within RCW clusters where fire alone would be inadequate.

Of the key upland management issues identified in the monitoring plan, forest health and groundcover restoration continue to be at the forefront. In 2006, SERDP funded a new study to evaluate environmental factors influencing forest health and to develop a means of predicting tree mortality, and in 2007, SERDP and the Ecological Society of America (ESA) organized a workshop aimed at understanding and addressing the issue of loblolly decline on a regional basis (see ESA 2007). In 2009, forest health played a major role in the US Fish and Wildlife Services assessment of proposed impacts resulting from planned construction activities associated with the Maneuver Center of Excellence (MCOE) initiative. As for groundcover restoration, prescribed fire continues to be the primary means of reducing undesirable hardwood encroachment and enhancing native herbaceous groundcover across the upland landscape. Yet local air quality concerns and regulations are a looming threat to Fort Benning's prescribed fire program and will only heighten as Columbus and the region continue to grow. In 2008, SERDP funded a study on Fort Benning to characterize emissions from prescribed fire and to model air quality impacts.

While forest health and groundcover restoration via continued use of prescribed fire are challenges to upland restoration and recovery of the RCW, the biggest challenge arose in 2005 with the announcement of the Base Realignment and Closure (BRAC) recommendation and planned development of several new ranges and maneuver corridors across the installation to accommodate the relocation of the Armor School from Fort Knox, KY, to Fort Benning. This was followed soon after with the announcement of additional range construction projects and maneuver corridors associated with the MCOE initiative. These projects in total will impact a significant portion of Fort Benning's land base, in effect, requiring that Fort Benning more precisely manage its natural systems and resources in order to meet its management goals and endangered species recovery requirements. Ecological monitoring is vital to this process and is perhaps more important now than it ever has been in Fort Benning's past.

FORT BENNING UPLAND PINE MONITORING PLAN

Overview

Included here is a description of the overall framework for Fort Benning's upland pine monitoring program, organized as follows:

- Upland management goals and key management issues that should be focal points of the monitoring program
- Monitoring goals and objectives
- Desired future conditions (DFC), or reference conditions against which the success of the longleaf restoration effort can be measured
- Ecological condition classification quantitatively describing the degree of departure from the DFC, to allow tracking of progress toward or away from the DFC
- Delineation of upland sampling area and sampling strata
- General monitoring approach based on both permanent and temporary plots
- Variables to measure
- Sampling schedule
- Data management and analysis
- Land management record-keeping
- Decision-support and adaptive management, including tools such as the burn prioritization model for incorporating monitoring output into the management decision-making process
- The role of research
- Monitoring program structure to facilitate integration among Fort Benning staff and peer review of monitoring methods and output
- Results communication to the larger scientific audience outside of Fort Benning

Management Objectives and Key Management Issues

Fort Benning's current upland management goals and objectives originated with the 1994 FWS Jeopardy Biological Opinion and the viability threats to the RCW listed therein. Viability threats included (1) incompatible forestry practices such as overharvesting of older-aged pines, (2) inadequate prescribed burning, resulting in hardwood encroachment and loss of herbaceous understory, (3) pine tree mortality due to disease and insects, (4) invasive, exotic plants, particularly kudzu, and (5) soil disturbance and erosion caused by military training, land management activities, and feral hogs. Upland land management goals formulated for the installation's INRMP were done so as to abate these viability threats, and are focused on restoration of the longleaf pine ecosystem as a sustainable and resilient forest for Fort Benning's uplands, one best suited for recovery of the RCW and other rare species.

Forest Health

Sustaining healthy loblolly pine stands while regenerating longleaf is essential for maintaining the current acreage of suitable RCW habitat. Over half of all RCW cavity trees (artificial inserts plus natural cavity trees) on Fort Benning are loblolly pine. Loblolly pine on Fort Benning is generally considered 'offsite' in the uplands, meaning that under a frequent fire regime similar to the historical fire regime, it would typically be restricted to bottomlands and slopes. Though loblolly often grows well in the uplands, it is less fire-tolerant and shorter-lived than longleaf and

may be more vulnerable to disease and insect attack. For years now, Fort Benning land managers have been concerned about a potential bottleneck in available RCW foraging habitat that could occur if the rate of loblolly pine mortality exceeds replacement rates by either loblolly or longleaf pine. The rate of loblolly mortality and the factors influencing mortality are still not well understood. The main management question with regard to this issue is: What is the rate of loblolly mortality, how is it spatially distributed across the upland landscape, and are there management actions that can be taken to ameliorate the situation?

Groundcover restoration
Several studies have shown direct relationships between habitat groundcover quality and RCW survival and fecundity (see USFWS 2003 beg p.42 for summary discussion). For this reason, groundcover restoration is a major emphasis of the USFWS Recovery Plan for RCW. On Fort Benning, prescribed fire is the primary means of restoring groundcover. The primary goals of Fort Benning's fire management program are to reduce hardwood density and cover in the mid- and under-story, and increase percent cover and richness of native, herbaceous species. Is the current three-year fire regime in place on Fort Benning in fact accomplishing this goal? If not, why not? Would additional variability in the regime (both frequency and seasonality) be beneficial? Could ignition patterns and other variables affecting fire behavior be more precisely manipulated to achieve desired fire effects?

In addition to prescribed fire, use of herbicides as a means of controlling undesirable hardwoods in the mid- and under-story has increased over the past five years. Similar management questions revolve around this practice, e.g. are herbicides having desired effects and how are herbicide treatments interacting with prescribed fire to influence restoration trajectories?

Longleaf Pine Regeneration
Land management goals with regard to longleaf regeneration are to optimize survival and growth of artificial regeneration (planted seedlings), and to increase natural recruitment via stand thinning and prescribed fire. Since the mid-1990's, Fort Benning has aggressively implemented an artificial regeneration program that replants over 1500 acres a year to longleaf pine. Relevant management questions here include: What is the percent survival of planted longleaf pines across the landscape, how does it vary spatially and what factors might affect spatial patterns? What is the growth rate of regeneration? What are the effects of site-preparation practices on longleaf pine survival and growth? Relevant questions with regard to longleaf pine natural recruitment are as follows: What overstory conditions, such as longleaf pine basal area, are necessary in order to get adequate longleaf pine regeneration? What is adequate longleaf pine regeneration? What understory conditions are most conducive to longleaf pine regeneration? Can relevant thresholds, such as degree of canopy openness or understory competition, be identified and managed for? How is rooting disturbance from feral swine impacting natural and artificial recruitment on a landscape scale?

Invasive Species and Habitat disturbance
The 1994 JBO, the TNC-Fort Benning Conservation Action Plan, and the INRMP all identify exotic, invasive plants and habitat disturbance as significant viability threats to the upland longleaf pine system. Invasive species of particular concern in the uplands include bi-color lespedeza (*Lespedeza bicolor*), Chinese lespedeza (*Lespedeza cuneata*), kudzu (*Pueraria lobata*), Japanese climbing fern (*Lygodium japonicum*), and Japanese honeysuckle (*Lonicera japonica*), among others. Though not documented as occurring on Fort Benning, cogon grass (*Imperata cylindrica*) arguably represents the greatest invasive threat to upland systems. Cogon grass was discovered in the vicinity of Fort Benning in 2008.

Invasive species are often associated with habitat disturbance, soil surface disturbance in particular. On Fort Benning, soil disturbance results primarily from military training and land management activities. Construction activities associated with BRAC and MCOE projects are now a major source of soil disturbance as well. Management goals here are to minimize or prevent increases in the occurrence of both invasive species and soil disturbance.

Monitoring Goals and Objectives

The primary goal of Fort Benning's upland pine monitoring program is to provide Fort Benning natural resource managers with information about long-term ecological change and whether management actions are having intended effects and resulting in desirable restoration trajectories. The land management issues described above provide context and direction to the monitoring program, and monitoring output should enable inference between land management actions and ecological outcomes. However, the monitoring program is designed to track small-scale[21] change over time across the upland landscape, and is currently less able to determine broader-scale patterns, and direct cause-effect relationships between individual management actions and ecological outcomes. The sampling objective for the monitoring program is to be capable of detecting a 20% change in all measured variables with 80% confidence.

Desired Future Conditions

"Longleaf pine is the dominant upland pine species; longleaf pine stands have an open architecture and multi-aged distribution, with many trees 200 plus years old, a few shrubs, a suppressed midstory of mixed hardwoods, a sparse to abundant understory dominated by mixed grasses and forbs (the composition and relative abundance of which reflect the different soil conditions present on Fort Benning), and a few standing dead trees (snags); longleaf pine stands are regenerated naturally and are manipulated silviculturally using low-impact harvest methods and single-tree selection prescriptions. Landscape-level native species richness and evenness are maintained over time, and invasive species and disturbance impacts are minimal. Species currently of conservation concern such as the red-cockaded woodpecker (RCW), gopher tortoise, Bachman's sparrow, eastern diamondback rattlesnake, fox squirrel, and gopher frog are found where habitat is suitable and in numbers sufficient to ensure population viability. Population age structures are such that continued viability of the populations is assured; populations are not declining.

In total, longleaf pine forests occupy 90,000 upland acres and grade down-slope into high-quality hardwood and mixed hardwood-pine (primarily loblolly pine) communities. Upland-slope ecotones are dynamic and are determined by fire frequency and edaphic conditions rather than anthropogenic disturbance. Upland fire regime is variable in return interval (1-3 years), intensity, season of burn, and ignition pattern. Fire and forest management are practiced with the goal of maintaining healthy, uneven-aged longleaf pine stands. Stands will exhibit

[21] "Small-scale" in this context can be thought of as plot-scale, in this case at the 30 x 30 m scale.

compositional variation, stability, and resilience to light or natural disturbance, and will provide sustainable settings for military training."

-Fort Benning 2006 Integrated Natural Resources Management Plan

Desired future conditions (DFCs) are useful to natural resources managers because they provide target conditions and long-term goals for ecosystem management, and can be used as a reference or benchmark against which monitoring programs can interpret change from one measurement period to the next. Fort Benning's DFC for upland pine communities has been qualitatively described in the installation's INRMP as cited above. Yet the INRMP also emphasizes the need to describe the DFC in more quantitative terms as empirical data for reference conditions become available through ecological monitoring.

A stand-alone report providing a more quantitative DFC description has been developed for this reason (Harrison et al. 2009), providing an empirical assessment of vegetation structure and composition on 12 tenth-hectare "reference plots" surveyed on Fort Benning. Results suggest that Fort Benning's DFC or management target for its upland pine forest should be a predominantly longleaf pine forest, with canopy trees 80 years or older, averaging some 14 to 19 inches in diameter in a sparsely stocked (basal area 35 square feet/acre) to medium stocked (basal area 80 square feet/acre) condition. Midstory should be sparse (<10% cover) and the ground layer should be relatively continuous and rich (>50% cover in herbaceous species, 10-50% cover in bunch grasses, 5-10% cover in legumes, 5-25% cover in composites, 0-25% cover in woody shrubs, and 50-100 species present on any 400 square meters. The need for additional DFC attributes (e.g. spatial patterns, dynamic considerations, and soil-site gradients) are discussed in the DFC report as well.

Ecological Condition Classification

In addition to quantifying the DFC for upland pine communities, it is also important to describe and quantify a 'gradient' in ecological condition that is based on the DFC but describes departure from the DFC. This will enable tracking of progress toward or away from the DFC. Several condition classes (e.g. poor, fair, good, very good) will be developed with associated measurable characteristics. This classification will then also allow for refinement of management goals within each class. For example management goals for areas considered 'very good', or representative of the DFC, will be formulated to reflect a maintenance management strategy whereby the habitat is to be maintained as is primarily through the use of prescribed fire. Likewise, management goals for poor-condition habitat will be formulated to reflect more of a restoration management strategy. Where appropriate, management goals will be refined into more measurable sets of management objectives. For example, in sweetgum-infested areas, a measurable management objective for an individual management action such as a prescribed burn or herbicide treatment might read: "We want to reduce the cover of sweetgum in the under-story by 20% over a one-year period."

Upland Habitat Delineation and Stratification

The 2004 monitoring plan provided a delineation of upland area based on Fort Benning's National Vegetation Classification System (NVCS) map. This delineation was used to determine approximate boundaries of Fort Benning's larger upland area, totaling nearly 95,000 acres. Fort Benning's timber inventory was then consulted to identify mature pine stands (40+ years old)

within the larger upland matrix. Initial strata then included soils and timber types, under the assumption that timber types represent pine species composition and could be used to identify loblolly-dominated and longleaf-dominated areas. Plots were then randomly located within soils × stand type strata. Eventually, as the upland landscape is better characterized by ecological condition relative to the desired condition, strata will become condition tiers as opposed to timber types. Having plots grouped by condition tier is more meaningful to management because it better enables evaluation of plot movement from one tier to the next. Fort Benning's timber inventory and output from the foraging habitat assessment tool should be consulted semi-annually to incorporate areas for monitoring that may have been excluded from the initial upland delineation, but are coming online due to restoration. Some subset of plots should coincide with locations of LCTA plots, Falcon plots, and RCW clusters. This is important for leveraging existing historical data. In these cases, plot locations are 'pre-determined' based on locations of historic plots.

Monitoring Approach

A combination of permanent plots and temporary plots will be used for collection of ecological monitoring data. The permanent plot approach is intended to provide explicit descriptions of change over time on areas sampled but may lack the sample size required to accurately characterize the entire upland landscape at any single point in time. It is also not as well-suited to larger-scale assessment and detection of things such as invasive species occurrences or forest disease or insect outbreaks. The temporary plot approach will provide a better characterization of the entire upland longleaf pine matrix, but more in the form of sequential coarse-scale "snapshots." Each approach has its advantages and disadvantages, and the combination of the two approaches will make for a strong overall assessment and monitoring program.

Detailed sampling protocols for both the permanent and temporary plot approaches are provided in Appendices 1 and 2. The temporary-plot approach is integrated with Fort Benning's existing forest inventory procedure.

Variables to Measure

Field measurements are divided among overstory, midstory and understory strata at various spatial scales within plots. Individual variables measured as part of the monitoring program are described in more detail in the monitoring protocols included in the appendices. Briefly here, they include:

- Tree diameter at breast height (DBH)
- Tree species (scientific or common name)
- Tree height and height to the base of the live crown
- Crown condition following the U.S. Forest Service's Forest Health Monitoring program (USDA Forest Service 2000). This includes light exposure, crown density, foliage transparency, and crown dieback. A crown vigor "class" is also assigned to each tree according to crown condition as follows: 1=good, 2=intermediate, 3=poor.
- Tree location via GPS
- Longleaf pine regeneration tally
- Tally of mid-story hardwood stems by species
- Percent cover of understory vegetation by plant functional group and individual species of management interest

- Understory species richness
- Invasive species presence and percent cover
- Fuels characterization by fuel type (1-hr, 10-hr, 100-hr, and 1000-hr fuels)
- Soil surface disturbance and compaction

Sampling Schedule

There is no fixed sampling schedule associated with the upland monitoring program. Rather, after initial sampling, all plots should be sampled again one complete growing season after a management action. Management actions include prescribed fire, timber harvest, or herbicide treatment. For example, if a monitoring plot is burned by prescribed fire during February of 2007, it should be re-sampled during the growing season of 2009. That way, plots are allowed one full growing season to recover from any immediate, short-term impacts of the management action, but more important lasting effects are observable (and may be subsequently monitored as warranted). The typical dormant season to growing season cutoff date used on Fort Benning is March 15th. If multiple management actions occur, sample one complete growing season after the most recent action. Because management actions (or inaction) are generally the greatest factor effecting ecological change, this sampling scheme will make it possible to hold "time since management action" somewhat constant and make for easier interpretation of long-term change by reducing the confounding effects of time since management action on change. If no management actions occur within a 5 year period, plots will be sampled at the 5 year mark.

Data Management and Analysis

Data will be maintained using Microsoft Excel and Microsoft Access. Data entry is often easiest in Excel due to increased spreadsheet functionality, and spreadsheets can be easily imported into Microsoft Access for relational database management. The database will include associated metadata describing what each data file represents. ArcMap will be used for managing all spatial data.

Power analysis will be used to determine how many plots are necessary to detect the desired degree of change (20%) with the specified level of confidence (80%). Power analysis for individual variables will be conducted following the first several years of data collection to determine if the desired statistical power is in fact being met. If it is not, establishment of more plots may be necessary. Likewise, if it is, or if it is being exceeded, fewer plots may be necessary, in which case plots can be deleted.

The range of variation in measured variables among plots will be characterized initially using simple descriptive statistics. This includes plot means and standard deviations for each measured variable. Figure 1 provides an example of this for understory percent cover measurements. Plots will then be grouped according to similarity in ecological condition, and the biotic and abiotic factors that most strongly distinguish among condition groups will be evaluated. Cluster analysis and non-metric multidimensional scaling are two analyses that can be used for this, though additional ordination techniques will be explored as well.

Plot E3-1

Veg Functional Group	%Cover
Bunch Grasses	2.22
Legumes	4.41
Other Forbs	1.47
Hardwood Trees	52.25
Shrubs	10.72

Plot K18-LS-W1

Veg Functional Group	%Cover
Bunch Grasses	11.13
Legumes	5.19
Other Forbs	27.19
Hardwood Trees	0.04
Shrubs	5.41

Figure 1. Example plot photos illustrating the range of variation in under- and midstory vegetation.

Ecological change from one sample period to the next will be assessed by evaluating differences in plots means. Degree of difference and whether it is statistically significant can be evaluated using Analysis of Variance (ANOVA). However, for the purposes of most land managers, simple depiction of change from one sample period to the next is adequate. Did the percent cover of bunch grasses increase or decrease from one sample period to the next? Are there fewer sweetgum stems in the midstory this sample period compared to last? How many loblolly pine trees died from last year to this year? These are the types of questions Fort Benning land managers are interested in and they can be addressed with relatively simple analyses.

Land Management Record-Keeping

In order to make inferences about the influence of land management actions on ecological change and restoration progress, it is vital that land management records be kept up-to-date and accurately, and preferably in spatial format. Land management activities to be maintained in spatial format in GIS include (1) forest stands that are harvested, (2) burn units burned, and (3) areas treated with herbicides. These records will be maintained on an annual basis, corresponding to each fiscal year (October 1 to September 30)

Decision Support/Adaptive Management

"Closing the adaptive management loop" is a phrase often used to describe the last phase of an

effective restoration and monitoring program. After planning, implementing actions, and monitoring, results from the monitoring program should be brought full-circle back to the planning phase and should influence management decision-making during the planning process. While in theory the adaptive management loop is straightforward and orderly, in practice closing the loop is often one of the biggest challenges to monitoring programs. Yet, it is also one of the most important components.

GIS technology offers promising ways in which monitoring output may be linked to the management decision making process. On Fort Benning, this has already proven to be the case with the RCW Foraging Habitat Assessment Tool, whereby forest inventory data feeds a GIS-based model for estimating or 'scoring' RCW habitat quality, and areas receiving low scores are then prioritized for restoration management activities. Use of this tool was instituted on Fort Benning in 2006.

Through the years, Eglin Air Force Base (EAFB) has been particularly adept at incorporating GIS-based decision support tools into their land management and monitoring programs. Two tools in place at EAFB are (1) an ecological condition model that uses remotely-sensed ecosystem attributes such as presence of longleaf pine to predict habitat quality relative to desired conditions, and (2) a burn prioritization tool that takes output from the condition model along with other input variables to determine annually what areas should be burned by prescribed fire to best achieve ecological restoration goals. Although similar in concept to the RCW Foraging Habitat Assessment tool already in place on Fort Benning, the ecological condition model in place at EAFB relies primarily on input variables that can be derived from satellite imagery, and is therefore much less dependent on ground-based data such as forest inventory data (note: it does rely on ground-based data from permanent monitoring plots as a means of assessing model prediction accuracy, but not as input variables). Comparison of the RCW Foraging Habitat Assessment tool to an ecological condition model developed for Fort Benning would be a worthwhile endeavor as a validation of both techniques, but may also enable Fort Benning to invest less in its ground-based inventory process if this process could be reliably augmented with remote-sensing. Conversely, an efficient and timely forest inventory, whether purely ground-based or hybridized between ground-truth plots and remotely-sensed data, could be used to drive an ecological condition model in place of the satellite imagery approached used by Eglin. Use of both an ecological condition model and a burn prioritization tool should be explored and considered by Fort Benning.

The Role of Research

Fort Benning has a long and rich history as a supporter of, and a host site for, important ecological research. Research groups from all over the Southeast and elsewhere have conducted research on Fort Benning, often through the Department of Defense's Strategic Environmental Research and Development Program (SERDP). A detailed history and important findings of SERDP-sponsored research on Fort Benning can be found in Imm et al. 2008 and in the installation's INRMP. The role of research within a monitoring program context should be to address specific land management questions and issues in more detail and, where possible, experimentally, so that cause-effect relationships between restoration actions and ecological outcomes can be better evaluated. As mentioned above, monitoring programs generally are not well-suited to assessing cause-effect relationships due to lack of an experimental component with adequate replication and controls. Well-designed research projects are capable of filling this void, and Fort Benning's monitoring program should ensure that research projects conducted on Fort Benning have relevance to land management.

Measures of Success

Ultimately, the success of Fort Benning's upland restoration program will be measured in terms of (1) attainment of desired future conditions, (2) environmental compliance, and (3) sustainment of the military training mission. The upland pine monitoring program described herein will provide information specifically about desired future condition attainment, but results should always be interpreted in the context of environmental compliance and military training mission sustainability. Environmental compliance within the uplands revolves primarily around RCW recovery and compliance with the Endangered Species Act. The RCW is the single most important species indicator of upland pine system health and function, and data from the RCW population monitoring program will always be referenced as a means of evaluating restoration progress and success. Such data includes RCW potential breeding group (PBG) abundance, number of active RCW clusters on the landscape, and RCW brood size, survival and overall population growth. These metrics are evaluated annually by Fort Benning's Conservation Branch staff. Sustainability of the military training mission is a similar bigger-picture metric that can be assessed by such things as number of military training events per year.

Outreach and Results Communication

Communication of monitoring program results to a larger scientific audience is an important component of program because it enables program exposure, invites additional peer review, and increases the likelihood that recent advances and technologies in the field of ecological monitoring are incorporated into the program. In addition to the monitoring annual report mentioned previously, monitoring committee members and others involved in upland monitoring will be encouraged to communicate results of the program via talks and poster presentations at regional and national science meetings.

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APPENDIX 2A.

PERMANENT PLOT SAMPLING PROTOCOL

This document describes the approach for establishing and sampling permanent field plots. As described in the monitoring plan, plots will be located randomly within upland strata. Plots can be randomly located within GIS using a random locator function, and these points can then be copied to a GPS unit for location in the field. Once located in the field, the methods described below for plot establishment and field measurements should be followed.

Plot Design

Plots are 30 x 30 m in dimension, with a nested 20 x 20 m plot (four 10 x 10 m subplots) and sixteen 1 x 1 m quadrats as depicted in Figure 1.

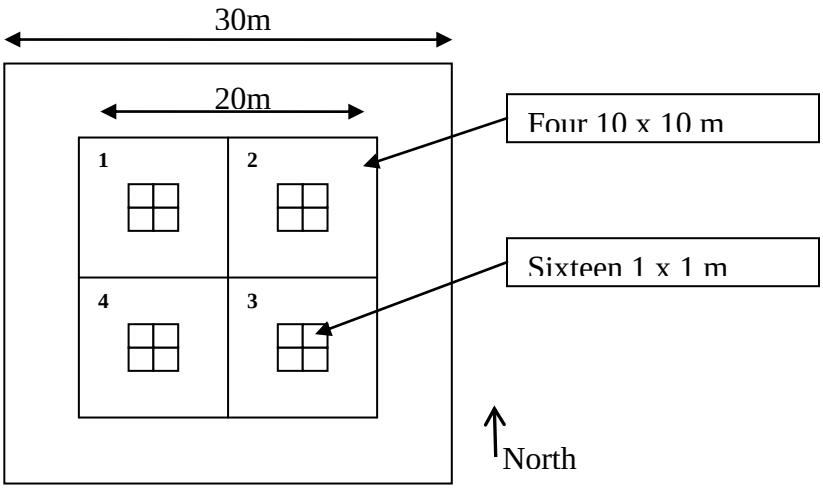

Figure 1. Monitoring plot layout including the 30 x 30 m plot, the 20 x 20 m plot (divided into four 10 x 10 m subplots), and the sixteen 1 x 1 m quadrats.

Overstory and longleaf regeneration measurements are carried out within the full 30 x 30 m plot, while midstory measurements occur within the 10 x 10 m subplots, and understory/groundcover characterization occurs within the 1 x 1 m quadrats.

Plot Establishment

Equipment needed: metal conduit, hammer, flagging, pin flags, curly stakes, two 50 m tapes, two 10 m tapes, 1 x 1 m PVC quads, range pole, tree diameter tape, clinometer, compass, GPS unit, go-no-go gauge, chaining pins, camera, tree tags, aluminum nails, clipboard, datasheets, and pencils.

30 x 30 m plot. Crews of 2-3 people are necessary for plot establishment. Crews will first locate plot center in the field using the GPS unit. Once located, plot center is monumented with conduit. From plot center, crews stretch a 50 m measuring tape diagonally across the hypotenuse of the 30 x 30 m area. Plots should be oriented along north-south-east-west axes, so that the four plot corners are positioned at NW, NE, SE, and SW directions from plot center. The distance of the hypotenuse is 42.4 m; from plot center one crew member walks 21.2 m in the NW direction. Once this corner is located, the crew member at plot center stretches the tape 21.2 m in the SE direction, so that the 0 m mark is at the SE corner and the 42.4 m mark is in the NW corner. Monument plot corners with pin flags and curly stakes. Curly stakes should be inserted so that the curled part of the stake is flush with the ground surface. Repeat this process for locating and establishing the NE and SW corners. Once all four plot corners are marked, the plot can be "trued" by measuring the 30 m distance between plot corners and adjusting corners accordingly. A right-angle gauge can also be used for this purpose. Leave the tapes in place for establishment of the 20 x 20 m and 1 x 1 m plots.

20 x 20 m plot. The 20 x 20 m plot is divided into four 10 x 10 m plots. Using the same tapes already stretched diagonally for the 30 x 30 m plot, locate 7.1 m and 35.3 m along each tape. These distances correspond to the corners of the 20 x 20 m plot (the hypotenuse length of a 20 x 20 m plot is approximately 28.2 m, and the difference between 35.3 and 7.1 is equal to 28.2 m). Monument these corners with both pin flags and curly stakes.

1 x 1 m quadrats. The sixteen 1 x 1 m quadrats are established in four clusters, each with four 1 x 1 m quadrats as depicted in the Figure 1 above. Using the same tapes as above already stretched diagonally, locate 14.2 m and 28.2 m along each tape. These are the distances for the cluster centers. Monument each cluster center with both a pin flag and curly stake.

GPS. It is important that all plot centers and corners are GPSed so that plots can be easily relocated upon subsequent sampling visits. Three shapefiles are used for this purpose: (1) polygon shapefile for the 30 x 30 m plot, (2) polygon shapefile for the 20 x 20 m plot, and (3) a point shapefile for the plot center and the 1 x 1 m plot cluster centers.

Field Measurements

Overstory and longleaf pine regeneration sampling – 30 x 30 m plot

Overstory is defined here as any woody species whose crown occupies a dominant, co-dominant, or intermediate position within the overall stand crown cover. Individuals are considered dominant if the crown extends above the general level of the crown cover, co-dominant if the crown is nearly all to entirely within the crown cover, and intermediate if the crown is below the general level of the crown cover but extends into it to some degree. Overstory sampling is conducted within the full 30 x 30 m plot area for all trees greater than 10 cm in diameter at breast

height (DBH). Each individual tree is tagged using a numbered aluminum tag and the following measurements are carried out:

- Tree diameter at breast height (DBH)
- Scientific (or common) name recorded
- Tree height and height to the base of the live crown
- Presence of bark char and height of bark char
- Crown condition following the U.S. Forest Service's Forest Health Monitoring program (USDA Forest Service 2000). This includes light exposure, crown density, foliage transparency, and crown dieback. Definitions for each of these are provided in USDA Forest Service (2000) and instructions for how to code each characteristic are provided on the upland pine monitoring datasheet.
- A crown vigor "class" is also assigned to each tree according to crown condition as follows: 1=good, 2=intermediate, 3=poor.
- Each individual tree location is GPSed.

Additional measurements within the 30 x 30 m area include:

- Snags (dead trees) greater than 3 m in height are recorded (by species if possible, by pine v. hardwood if not) and given a death code as follows: 1=needles still on branches, recently dead, 2=no needles but most branches still present, 3=few to no branches present. These codes are defined on the upland pine tree monitoring datasheet as well.
- Longleaf pine regeneration is tallied by stage class using a dot tally. Stage classes include grass stage, bolting stage, and sapling stage. Definitions for each of these stages are provided on the upland pine monitoring datasheet.
- Gopher tortoise burrows, if present, are tallied by tortoise age class.
- Soil surface disturbance features, extent, and cause (if known) are noted.

In total, measurements within the 30 x 30 m area will yield overstory tree species composition, tree density (number of trees per unit area), basal area, snag density, longleaf regeneration presence and density, gopher tortoise burrow presence and density, and presence and extent of soil surface disturbance.

Midstory sampling – 20 x 20 m plot & 1 x 1 m quadrats

Midstory is defined here as any woody species whose crown occurs below the general level of the stand crown cover but above 1 m height. On Fort Benning, this strata, if present, tends to be composed mostly of small diameter (1-2 cm) hardwood stems that are greater than 1 m in height but less than about 3 m height. However, any individual less than 10 cm DBH should be sampled here, since these individuals are not captured in the overstory sample. Sampling will occur within the four 10 x 10 m subplots and within the sixteen 1 x 1 m quadrats and will include:

- Stem tally by species (record species or common name)

This tally will yield midstory stem density and frequency of occurrence, and will enable development of midstory species-area curves, as sampling occurs across additive spatial scales.

Understory and fuels sampling – 1 x 1 m quadrats & planar intercept transects

Understory is defined here as any plant less than 1 m in height. Understory measurements within each 1 x 1 m quadrat include:

- Percent cover of vegetation functional groups and individual species of management interest

- Species richness

Percent cover (%) is estimated visually by vegetation functional groups. Vegetation functional groups are as follows: bunch grasses, other graminoids, legumes, other (non-legume) forbs, ferns, woody vines, pines, hardwood trees, and shrubs. The following individual species of management interest are also measured when present: *Pteridium aquilinum* (brackenfern), *Pinus palustris* (longleaf pine), *Ilex glabra* (gallberry), *Liquidambar styraciflua* (sweetgum), *Quercus nigra* (water oak), other *Quercus* sp., *Rubus* sp. (blackberry), *Vaccinium* sp. (blueberry). These are species that are of management interest because they either indicate high quality or ecological integrity (Archer 2003, Mulligan and Hermann 2004, NatureServe 2006), are difficult to manage such as sweetgum and water oak, or represent soft mast for wildlife such as blueberry. Percent cover of invasive species (by species), bare ground, pine litter, and hardwood litter is also estimated. For all percent cover estimates, cover classes are used. Cover class widths follow the North Carolina Vegetation Survey (NCVS) protocol (Peet et al. 1998): 1 = trace; 2 = 0-1%; 3 = 1-2%; 4 = 2-5%; 5 = 5-10%; 6 = 10-25%; 7 = 25-50%; 8 = 50-75%; 9 = 75-95%; 10 = >95%.

Species richness, defined as the total number of species per plot, is measured within each 1 x 1 m quadrat. A meander search within the full 30 x 30 m plot is then conducted, to document species not occurring within the 1 x 1 m quadrats. Because a trained botanist needs to be present to conduct this sampling, this sampling need not occur at every plot visit, but should be conducted as often as practical.

Fuelbed characteristics are represented to some degree by the understory percent cover measures above. Additional fuels measurements to better represent downed woody debris and litter/duff depths are conducted along the two diagonal transects following standard methods developed Brown (1974). Beginning at the 0 m mark in the SE and SW corners, crew members walk along each transect and tally all downed woody debris by size class that intersects the transects. Size classes include 0-0.25 inches (1-hour fuels), 0.25-1 inches (10-hour fuels), 1-3 inches (100-hour fuels), and >3 inches (1000-hour fuels). Fuels are easily classed by size using a go-no-go gauge. Additionally, every 4 m along each transect, crew members measure litter and duff depths to the nearest 1 mm. Measurement points along each transect are as follows: 4, 8, 12, 16, 20, 24, 28, 32, 36, and 40 m. This amounts to a total of 20 measurement points per plot.

Photo documentation

At the time of plot establishment, four photographs are taken at each plot to document visual plot condition and changes over time. Photos are made from plot center in the direction of each plot corner, beginning at the NW corner and working around the plot clockwise. A range pole is placed at the center of each understory plot cluster (i.e., at the center of each set of four 1 x 1 m quadrats). Photographs are centered on the range pole. See Figure 3 for an example.

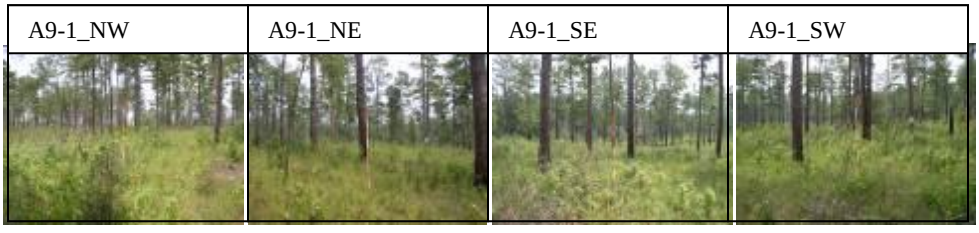

Figure 2. Plot photo series for plot A9-1. A range pole is placed at the center of each understory plot cluster and the photographer stands at plot center and takes photos in the direction of each plot corner.

APPENDIX 2B.

TEMPORARY PLOT – FOREST INVENTORY SAMPLING PROTOCOL

Included below for documentation purposes is the forest inventory protocol developed by Fort Benning staff in 2006. This protocol and additional information can be found on Fort Benning's network P: drive at:

P:\Environmental Division\Land Mgmt. Branch\Timber Mgmt\Forest Inventory\Data\2009\Supporting Info

Fort Benning Forest Inventory Procedures
Based on USFWS RCW requirements- initiated in 2006
Updated 27 July 2007

The following guidelines will be used to collect forest inventory data in pine and pine/hardwood stands on Fort Benning:

1) Stand Delineation

   a) Delineate each stand using the most recent aerial photography available. A stand is a contiguous group of trees sufficiently uniform in species composition, age, or arrangement of age classes and condition to be considered a homogenous and distinguishable unit. All stands will be digitized into a shapefile which will be linked to an Access database containing the majority of the attribute data. The projection will be UTM and the datum NAD 83 Zone 16 North.

   b) Stand size will be a minimum of 10 acres (with exceptions).

   c) Each stand should be identified by a unique number beginning with training compartment letter(s) and a 2 digit compartment number followed by a two digit stand number starting with 01 and continuing in sequence until all stands within the compartment are numbered. Use of old stand numbers is recommended, but no gaps within the new numbering sequence should occur.

2) Data Collection Points

   a) Sample points in each stand were determined by using a GIS computer software systematic random procedure and were modified to allow for an adequate distribution of points to reflect stand diversity. The sample points were randomly placed on a square grid pattern (in each cardinal direction) and spacing between sample grid points were determined by stand acreage.

   b) Use 10 points in homogeneous and 20 points in heterogeneous stands. All plantations less than 30 years old are considered homogeneous. All other stands are considered

heterogeneous. In stands smaller than 10 acres 1 point per acre will be used for homogeneous stands and heterogeneous stands.

c) At these sample points, variable radius 10-factor basal area prism plots will be used to collect overstory data as outlined below. Midstory will be collected using 0.1-acre circular plots (~37 ft radius), and groundcover will be collected at 0.01-acre circular plots (~11 ft radius).

3) Characterize Pine and Canopy Hardwood Characteristics of the Stand

a) Recorded FY-03 forest inventory stand ages will be used unless it's obvious that the data is incorrect. If the stand age data is perceived to be incorrect then the following data collection procedure will be used: At every other plot, determine age of a typical dominant or co-dominant tree by using an increment borer. If the stand is a pine plantation, it is only necessary to core one tree. In stands that have been heavily thinned and underplanted with longleaf pine the stand age and forest type will be determined by the overstory until the overstory is reduced to 20 BA at which time the age and forest type will revert to the plantation age and forest type.

b) Record the following characteristics for each basal area prism plot in tree:

i) Species of each tree
ii) DBH of each pine and hardwood tree > 5" DBH to nearest .1 inch
iii) Total height of pulpwood trees and wolf trees and # logs for sawtimber trees
iv) Health of tree (crown vigor 1=good, 2=fair, 3=poor ocular estimate)
v) Disease / insect affecting tree (0-none, 1-fusiform rust, 2-littleleaf disease, 3-annosus root rot, 4-black turpentine beetle, etc)

c) Record the following characteristics for each 0.1 acre fixed radius plot:

i) Longleaf pine regeneration density. Record number of seedlings (grass stage 0-1' tall), bolting (1-6' tall), and saplings (>6' tall and <5" dbh) separately (0, 1-10, 11-50, and >50)
ii) Snags - dead, pine or hardwood, min 10" dbh and 10' tall (#)
iii) Hog damage presence (none, isolated, extensive)
iv) Gopher tortoise burrow present (Y/N)

4) Characterize Hardwood Midstory

a) Collect midstory data at all sample points.
b) Use 0.1-acre (~37 ft radius) plots when categorizing midstory.
c) Categorize midstory species as scrub oak, sweetgum, upland hardwood (red oak, white oak, hickory) or other hardwood.
d) Categorize midstory height as low (<7 ft tall), medium (7 – 15 ft tall), or tall (>15 ft tall).
e) Categorize midstory density as sparse, moderate, or dense. No ranges of stem counts have been established to differentiate these categories of density, but the definitions of these categories should be somewhat intuitive.
f) In assessing midstory in the field, height of the majority of the midstory stems is determined first (step 4.d.). For example, if on average 20% of the stems exceed 15 ft but 80% are 7-15 ft, the height category is moderate, not tall. Once this height is determined,

total midstory density of all stems is estimated (step 4.e). Pictures of different stands are available on cd to illustrate each of the categories.

g) When aggregating plot data to the stand level, assign each stand the midstory category for the mode or most frequently occurring category in the stand. If the stand is essentially evenly split between two categories, the stand should be assigned the category with the higher density and height combination. That is, if a stand is 50% medium height, sparse density and 50% medium height, moderate density, then the stand should be assigned to the latter category.

h) For use in the RCW Foraging Analysis computer program, the following codes should be used to describe midstory height and density:
   - 1 = Low, Sparse
   - 2 = Low, Moderate
   - 3 = Low, Dense
   - 4 = Medium, Sparse
   - 5 = Tall, Sparse
   - 6 = Medium, Moderate
   - 7 = Tall, Moderate
   - 8 = Medium, Dense
   - 9 = Tall, Dense

5) Characterize Groundcover

a) Collect groundcover data at all sample points.
b) Use 0.01 acre (~11 ft radius) plots when categorizing groundcover.
c) Record % herbaceous groundcover, % bare ground (includes hardwood leaves because low flammability), % pine straw, and % woody vegetation in 10% increments. When these four percentages are added together, their sum should equal 100%.

6) Determine acreages of stands by the use of geographic information systems (GIS) computer software.

7) Stand fire history will be recorded as the date of the last prescribed burn (wildfire date can be used only if the wildfire met the upcoming prescribed burn objectives).

8) Summary (and sample) of individual plot data input will include the following. All required forest inventory data needs to include data to satisfy the RCW matrix will be calculated from the following:

Compartment #	A01
Stand #	01
Stand Acres	25
Average Stand Age	1935
Site Index	70
---	---
Plot#	01
Forest type	21
Tree Species	Longleaf pine
Tree DBH	12.3
Tree Height Ft/Logs	2.5
Tree Disease/Insect	0

Tree Crown Health	0
Longleaf Regeneration	>50
Snags	3
Feral Hog Damage	0-none, 1-isolated, 2-extensive
Gopher Tortoise Burrows	Y/N
Midstory Composition	Sweetgum, Scrub Oak, Upland Hwd, Other
Midstory Characterization	LS
Ground Cover	Herb-20, PS-20, BG-50, Woody-10
Last Burn (date)	3/15/05

9) Summary of compartment forest inventory data (Current Forest Inventory) will include:

Compartment #, Stand #, Stand Acres, Stand Age, Site Index, Forest Type, Pine BA, Hardwood BA, Total BA, Pine MBF, Pine Cords, Hardwood MBF, Hardwood Cords, Crown Health, Insect/Disease, Longleaf Regeneration, Snags, Hog Damage, GT Burrows, Pine BA < 10", Pine BA > 10" < 14", Pine BA > 14", Overstory Hardwood BA, % Hardwood in Canopy, Hardwood Midstory Composition, Hardwood Midstory Characterization, Herbaceous, Last Burn

APPENDIX 3.

RCW Habitat Matrix Calculations

NOTE: A DESCRIPTION OF RCW HABITAT MATRIX CALCULATIONS WILL BE ADDED FOR THE FINAL PLAN.

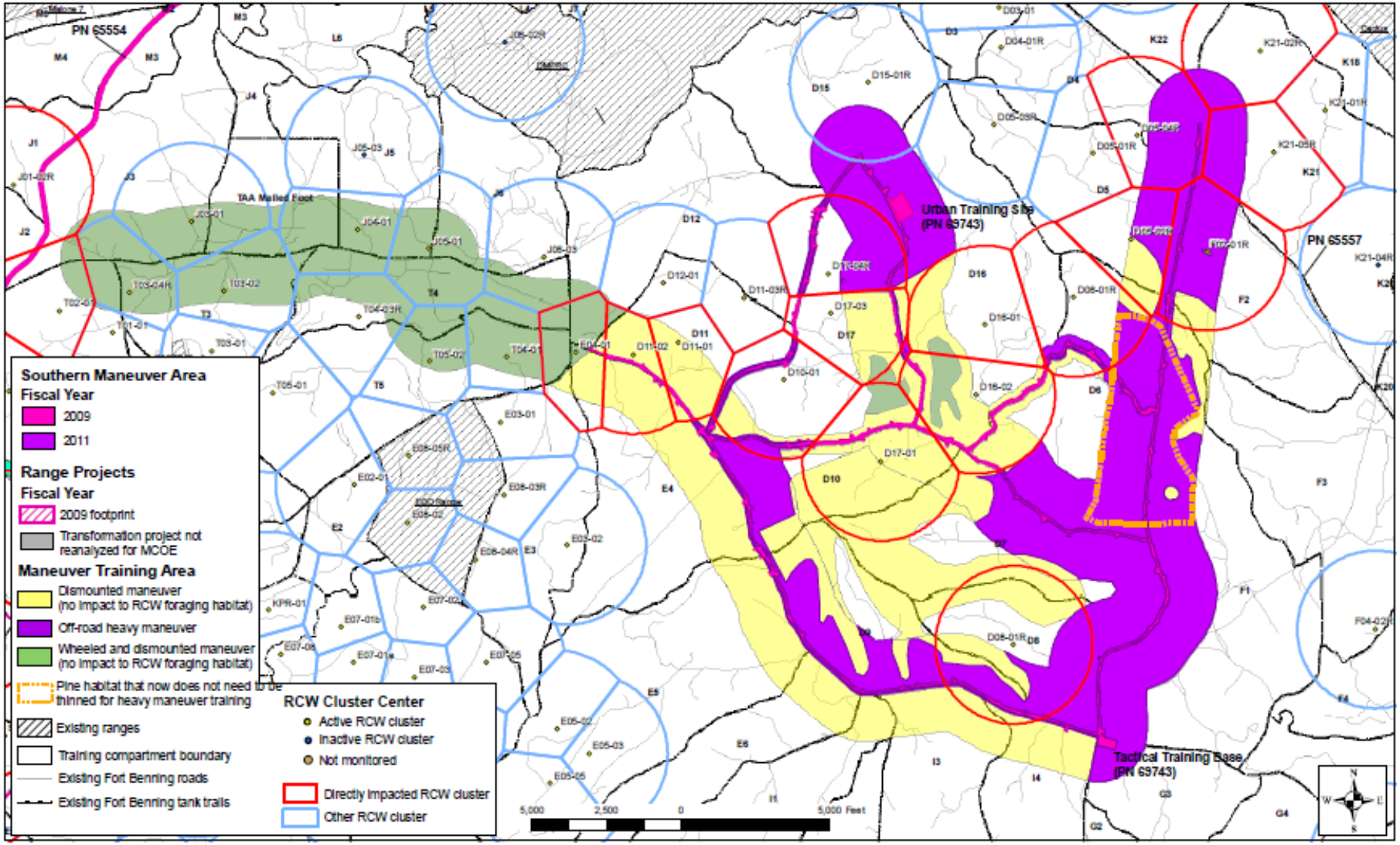

Figure 1. Southern Maneuver Area.

Figure 2. Picture of the trail camera system that will be used to monitor military maneuver activities on Fort Benning during this project.

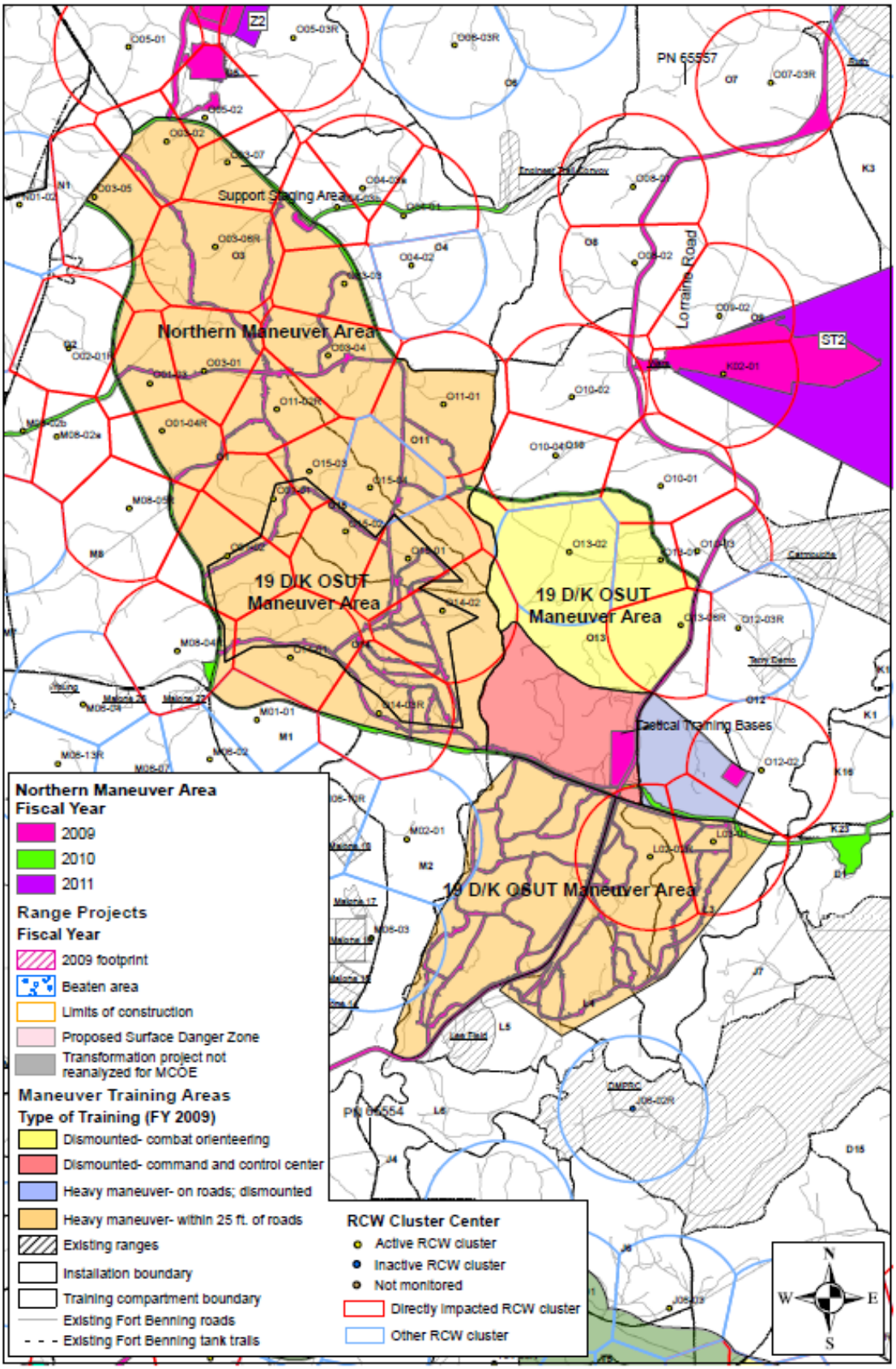
Northern Maneuver Area
Fiscal Year
2009
2010
2011
Range Projects
Fiscal Year
2009 footprint
Beaten area
Limits of construction
Proposed Surface Danger Zone
Transformation project not reanalyzed for MCOE
Maneuver Training Areas
Type of Training (FY 2009)
Dismounted- combat orienteering
Dismounted- command and control center
Heavy maneuver- on roads; dismounted
Heavy maneuver- within 25 ft. of roads
Existing ranges
Installation boundary
Training compartment boundary
Existing Fort Benning roads
Existing Fort Benning tank trails
RCW Cluster Center
Active RCW cluster
Inactive RCW cluster
Not monitored
Directly impacted RCW cluster
Other RCW cluster
Support Staging Area
Northern Maneuver Area
19 D/K OSUT Maneuver Area
19 D/K OSUT Maneuver Area
19 D/K OSUT Maneuver Area
Tactical Training Bases
Lorraine Road
PN 65557
PN 65554
ST2
Z2
N
S
E
W

Figure 3. Northern Maneuver Area.

APPENDIX 7

Red-cockaded Woodpecker Monitoring Plan for the Proposed Multi-Purpose Training Range

A comprehensive monitoring strategy for red-cockaded woodpecker (RCW) clusters potentially impacted by upgrading Hastings Range to a Multi-Purpose Training Range (MPTR) on Fort Benning, Georgia.

I. Introduction

A Multi-Purpose Training Range (PN 64551) was originally proposed for construction in training compartments K9, K11 and K13, to the north of, and overlapping, Hastings Range in the Maneuver Center of Excellence Biological Assessment (MCOE BA) (USACE 2008). During the development of the MCOE BA Final Addendum, the Army reexamined its options and determined that it could fulfill the minimum training requirements by refurbishing the existing Hastings Range, an approximately 1,685-acre range (Figure 1). The actual cleared portion of the Hastings Range footprint that is maintained (mowed) is approximately 538 acres. Although the total acreage of the MPTR footprint is smaller, approximately 395 acres, the 538 acre footprint will likely still be maintained. The MCOE BA Final Addendum concluded that the only changes from the current use of Hastings Range would be the frequency and duration of training events; the target locations, firing points and types of ammunition used will not change (USACE 2009), (Appendix 3).

However, during the design development of the Hastings Range upgrade, it was realized that minor changes to the target locations and firing positions would be necessary (Figure 2). The target positions and firing points have to change in order to meet the current training standards of a MPTR for target layout demanded by the new Tank Tables specified in the Department of Army 3 September 2009 revised *Heavy Brigade Combat Team (HBCT) Gunnery Manual* (DA 2009). Fort Benning concluded in their Biological Evaluation of these changes to the MPTR design that the action may affect, but is not likely to adversely affect, the RCW or surrounding habitat. In order to validate that conclusion, Fort Benning has developed this monitoring plan.

II. Purpose

The RCW Monitoring Plan for the proposed MPTR addresses procedures designed to assess and monitor potential impacts to down-range and neighboring RCW clusters and habitat that could result from upgrading the existing Hastings Range to meet current training standards of a MPTR. Specifically, the objectives of this plan are to:

1. Validate the Line-of-Sight (LOS) and view shed analyses conducted by the Fort Benning Range Division (FBRD), which suggests that down-range RCW clusters and habitat will not be

adversely impacted by minor adjustments to target locations and firing positions associated with upgrading Hastings Range to meet current Army gunnery standards on a MPTR.

2. Monitor RCW response to additional noise impacts resulting from the increase in frequency, duration, and total number of large caliber rounds fired on the upgraded Hastings Range.

3. Implement standard RCW demographic monitoring protocols for all 19 RCW clusters that could be potentially affected to document trends.

4. Identify potential problems early to allow for a timely response to take corrective actions.

III. Validation of LOS analysis

One of the primary objectives of this monitoring plan is to validate the accuracy of the LOS and viewshed analyses and to confirm potential impacts do not adversely affect RCW clusters and associated habitat. Fort Benning will implement habitat monitoring protocols that survey frequently enough to detect and correct potential down-range impacts from small and large caliber munitions over large areas of RCW habitat and clusters. The level of monitoring activities must be conducted within reasonable timeframes so military training is not impeded.

1. Daily tracking of MPTR use. Data collected for the MPTR will be compiled from the Range Facility Management Support System (RFMSS) and will include:

a.) Unit(s) utilizing the range.
b.) Total number of personnel and vehicles using the range.
c.) Type of weapon(s) and ammunition used.
d.) Total number of rounds fired for each ammunition type.

2. At a minimum, establishment of photo-points in all 19 RCW clusters at the current cluster centers. Annual photo documentation of down-range cluster condition, pre- and post-operational status of the MPTR, will assist in the long-term identification and assessment of any cluster habitat degradation. In addition, any down-range impacts resulting from munitions that are observed in RCW clusters or habitat will be photo documented and reported to the USFWS as described below.

3. Ensuring that all future timber stand inventories conducted in down-range training compartments (K07, K08, K09, K12, K13, and K14) are assessed for ordnance impacts during routine sampling.

4. During the final stages of range construction when instrumentation and testing operations are conducted, Fort Benning Conservation Branch (FBCB) in collaboration with FBRD will conduct preliminary monitoring validations of LOS analyses for the range. FBCB will report these results to the U.S. Fish & Wildlife Service (USFWS).

5. FBCB and FBRD will collaborate during the initial operations stage of the MPTR for conducting on-site observations of actual live-fire training. Some elements of the LOS analysis

accuracy can be validated by simple observations of areas behind the firing line during live-fire training without any disruptions to military training. Some examples include: spotting of the targets (are targets being hit), visible signs of where rounds strike the ground (puffs of dirt either left, right, high or low) and tracer round trajectories may also provide valuable information.

6. Following standard transect techniques for RCW cavity tree surveys, as well as meander surveys, FBCB will inspect as described below, the 12 RCW clusters and cavity trees within the MPTR Surface Danger Zone (SDZ) for munitions impacts (Excluding the K15 Dudded Impact Area). These clusters include: K08-01, K08-02, K08-03, K08-04, K09-01, K09-02R, K12-01, K13-01, K13-02, K13-04, K13-05R, and K13-06 (Figure 3).

a.) These surveys will be focused within the 200 foot cavity tree buffer (cluster).

b.) Surveys will document and record any evidence of munitions impacts in RCW clusters (new ordnance found on the ground, topped or damaged trees, grazing wounds, limbs on the ground, small caliber bullet strikes, etc.). Locations of impacts will be identified and recorded with a Global Positioning System (GPS) unit. In coordination with FBRD and Explosive Ordnance Disposal (EOD), any new training round will be marked or disposed of following SOP for Unexploded Ordnance (UXO).

c.) If at any time munitions impacts are detected during these surveys within a RCW cluster or pre-project deficient cluster partition, the FBCB will collaborate with the FBRD and review previous training data and compare observations on the ground to determine the cause and decide on a course of action if necessary (e.g., eliminate a particular gun line position). The Garrison Commander and the USFWS will be notified within 24 hours of discovery. In the unlikely event that an impact involves significant damage (see below) to an active RCW cavity tree or damage that compromises the cavity integrity, Fort Benning will request consultation with the USFWS and the tree will be replaced with an artificial cavity within 24 hours of discovery. In addition, all findings will be reported to the USFWS monthly as stated in (10.) below.

Significant damage is defined as a direct strike to the bole of the tree from a large caliber round. Examples include: severing the tree itself, shearing off all or most of the canopy, or any wound that would compromise the structural integrity of the tree that would make it susceptible to toppling.

d.) In collaboration with the USFWS, frequency of cluster monitoring will be intensive at first as the MPTR becomes fully operational; monitoring will decrease over time if munitions impacts are not detected (Figure 6).

1. Each of the 12 clusters will be monitored every 7 to 10 days for munitions impacts during RCW breeding season demographic monitoring for a total of 5 years after the MPTR is in operations (See Demographic Monitoring below). This monitoring will coincide with regular nest monitoring and the frequency is subject to the conditions outlined below.
2. If the MPTR becomes operational before or after breeding season, each of the 12 clusters will be monitored weekly for the first month. In the event there are lapses in the operations schedule of the MPTR (e.g., the range was not used for a week),

then the first month of monitoring will consist of a total of 4 weeks when live fire has actually taken place on the range. If no munitions impacts are detected, monitoring will be reduced to monthly surveys.

3. If no munitions impacts are detected during monthly surveys for 3 months outside of breeding season, cluster monitoring will be reduced to quarterly surveys.
4. If no munitions impacts are detected during quarterly surveys for 3 quarters outside of breeding season, monitoring will be reduced to annual surveys.
5. If no munitions impacts are detected outside of breeding season after a total of 5 years, annual surveys outside of breeding season will be terminated and will be conducted during breeding season demographic monitoring for those clusters in the 25% Sample monitoring explained below.

7. Following standard transect techniques for RCW cavity tree surveys, including meander surveys utilizing All Terrain Vehicles (ATV), FBCB will inspect all foraging stands within the 0.5 mile partitions of the 12 RCW clusters within the MPTR SDZ for munitions impacts at least annually. Currently, the total foraging area is approximately 2000 acres. These clusters include: K08-01, K08-02, K08-03, K08-04, K09-01, K09-02R, K12-01, K13-01, K13-02, K13-04, K13-05R, and K13-06. Approximately 413 acres of foraging habitat that are allocated to future RCW clusters will also be monitored (Figure 4). This habitat monitoring will include:

a.) Completion of a baseline survey in all foraging habitat within the MPTR SDZ that has not been recently surveyed for munitions damage, prior to live-fire operations (excluding foraging stands that are within the K15 Impact Area).

b.) Conduct periodic meander surveys for munitions damage after high range-use training events in select down-range foraging stands. Coordinate with FBRD on selecting frequently used gun lines or shot combinations for prioritizing stands to monitor.

c.) The precise location of any munitions or munitions impacts that are found in RCW foraging habitat (and nesting habitat as described above) will be collected with a GPS unit and stored in the Installation's Geographical Information System (GIS). Tracking the locations of all munitions or munitions impacts to nesting and foraging habitat in the Installation's GIS will allow the FBCB to detect any consistent patterning of errant rounds, which will assist in the determination of cause. In addition, tracking any damaged pine trees will also ensure that stands that currently meet the criteria for the Fort Benning modified Standard for Managed Stability (SMS) are not reduced below these standards and habitat quality is not degraded over time.

d.) If at any time errant munitions impacts are detected during these surveys, the FBCB will collaborate with the FBRD and review the precise locations in the GIS, previous training data, and compare observations on the ground to determine the cause and decide on a course of action if necessary (e.g., eliminate a particular gun line position). All findings will be reported to the USFWS monthly as described in (10.) below.

8. Surveys for munitions impacts within RCW cluster partitions that are found to be pre-project deficient and in the MPTR SDZ will follow the same monitoring schedule as each of the 12 clusters within the MPTR SDZ. These partition surveys will follow the same standard transect survey techniques described above. Currently there are 2 RCW clusters that are pre-project deficient and within the MPTR SDZ: K13-04, and K13-05R (Appendix 4). Once habitat

improvements are completed in all potentially suitable stands within the foraging partition of cluster K13-04, this cluster will likely meet the Ft. Benning modified SMS and would no longer be pre-project deficient.

FBCB will notify the Garrison Commander (GC), FBRD, and the USFWS within 24 hours of discovery of any munitions or munitions-caused impact found in any RCW cluster or pre-project deficient RCW cluster partition. As soon as possible after notification, FBCB will provide USFWS an assessment of impacts and actions taken. If any significant damage (see 6. c. above) from large caliber munitions to pine trees in forest stands that meet foraging habitat standards is found in any pre-project deficient foraging partition, or on any active RCW cavity tree, Fort Benning will temporarily shut down the range and investigate the cause of any such damage. If a specific training scenario can be identified as causing the significant damage to pine trees that meet foraging habitat standards, then that training scenario would be eliminated; the GC and the USFWS notified, and training would resume. If a determination of cause cannot be attributed to a specific training scenario, as noted in the MPTR BE, infrequent impacts could occur downrange as a result of a "missed shot, ricochet, or other anomalies (e.g. skip, tumble, or deflected rounds outside the direct impact area)," then the GC and the USFWS would be notified, and training would resume (FBRD, personal comm.). Fort Benning will consult with the USFWS to provide associated information and to ensure that appropriate minimization efforts occur.

9. Fort Benning's intent is to avoid all impacts resulting from down-range munitions to the 12 RCW clusters/habitat that are within the MPTR SDZ by laying out each firing scenario (the "gun line" or "bore line" from firing point to target) such that a Line of Sight/Viewshed analysis shows it will not impact the clusters. As described in the MPTR BE and this Monitoring Plan, the Line of Sight/Viewshed analysis process will be validated through monitoring, however it cannot account for missed shots, ricochets, or other anomalies (e.g. "skip", "tumble", or "deflected" rounds outside the direct impact area) and could potentially impact RCW clusters/habitat. The MPTR Monitoring Plan is not only focused on ensuring that RCWs are not negatively impacted, but also to ensure that the Line of Sight/Viewshed analysis process is accurate.

All firing scenarios available to unit Commanders using the range are approved by the FBRD, which means that a Line of Sight/Viewshed analysis has been completed for each scenario. Any new firing scenarios requested by a unit Commander using the

range will not be authorized until a Line of Sight/Viewshed analysis has been completed and approved by FBRD. FBRD will notify the FBCB when new firing scenarios are approved to facilitate the down-range monitoring/validation process.

This validation process will be refined during all firing events until or up to the first 3rd Brigade gunnery event, which will receive an increased level of additional monitoring. This phase of monitoring will be used as further confirmation of the validation process. The increased level of monitoring will consist of additional weekly monitoring for each of the 12 clusters (and habitat within the 2 pre-project deficient foraging partitions; currently K13-04 and K13-05R) within the MPTR SDZ following the procedure described in the MPTR Monitoring Plan for the duration of the 3rd Brigade gunnery event. Once the validation process has been reconfirmed, monitoring frequency will resume to the level prior to this event. In addition to the 144R review process, FBCB and FBRD will coordinate at least monthly on the training schedule to identify any upcoming training event comparable to or exceeding the type of training conducted by the 3rd Brigade, to determine if additional monitoring is warranted. Fort Benning will include a copy of the MPTR training schedule as part of the monthly reporting requirement described below.

10. Monthly reporting. The USFWS will be briefed monthly on all aspects of the MPTR monitoring progress and findings at regularly scheduled MCOE monthly briefings.

IV. Assessment of Potential Large Caliber Weapon Noise Impacts on RCW Clusters

In collaboration with the US Army Engineer Research and Development Center/Construction Engineering Research Laboratory (ERDC/CERL), Fort Benning will develop and implement a study to assess the potential effects of training noise impacts on RCW groups adjacent to and surrounding the MPTR/Hastings Range area. This assessment will be similar in approach to the study conducted by Delaney et al. (2002) at Fort Stewart, Georgia, except that only passive (i.e., no experimental control) military operations will be recorded opportunistically.
The primary objectives of assessing noise impacts to RCWs are to:

1. Determine the peak and mean noise levels, frequency spectra, and the frequency and duration of noise events at a representative sample of the 19 RCW clusters around the MPTR/Hastings Range area at different times of the year to determine if roosting behavior is altered.
2. Evaluate the effects of noise intensity, frequency, and duration of military live-fire events on RCW nesting success, productivity, and nesting behavior.

Video cameras will be used as a means to record RCW response/behavior, 24 hours/day, over prolonged sampling periods. Electronic audio recording devices will measure frequency, duration, and intensity of military live-fire noise events. A proposal detailing the final design of this study will be submitted to the USFWS for review and approval before implementing this aspect of the monitoring plan.

V. Demographic Monitoring

There are currently 19 RCW clusters in the vicinity of Hastings Range. At present, all but two of these clusters (K11-03 and K12-01) are being monitored for various reasons including 25% Sample monitoring (USFWS 2002), Recruitment Cluster monitoring (DA 1996), Digital Multi-Purpose Range Complex (DMPRC) neighborhood monitoring (USFWS 2004), and MCOE Impacts monitoring (USFWS 2009) (Table 1). For the 2010 Breeding season, Fort Benning began monitoring five additional clusters because of proposed changes to the MPTR and to establish baseline information.

Fort Benning proposes to monitor all 19 clusters (Table 1) for a period of 5 years after operational use of the MPTR begins. After that time period, some of these clusters will continue to be monitored as required to maintain the 25% Sample monitoring and Recruitment Cluster monitoring. All demographic monitoring will be in accordance with current Fort Benning Standard Operating Procedures.

V. Access For Monitoring

The monitoring protocols established in this plan must be accomplished predominantly during regularly scheduled maintenance times on all ranges following the February 2010 Fort Benning Environmental Access Plan. Regardless of the unit firing, large caliber ranges are closed on a synchronized schedule for approximately 4 hours each morning and 3 hours in the evening for target and target systems maintenance. The access times generally are from 0400 to 0800 hours and from about 1700 to about 2000 hours. These down times are required to service the down-range targets between day and night gun lines. Routinely, this is sufficient time to replace targets and hit sensors that were damaged during training scenarios. This down time also provides the opportunity for selective visits to various RCW clusters and surrounding habitat for required monitoring. Additionally, there are expected to be more than 100 days spread throughout the training year that would be available for monitoring and management of RCW cluster areas and foraging habitat (F. Weekly, personal comm.).

Table 1. RCW Demographic Monitoring Status in the Proposed MPTR Area.

Cluster	CURRENTLY MONITORED	Purpose for Monitoring	Noise Contour
K08-01	AS OF 2010	MCOE - MPTR	Zone II
K08-02	YES	25% SAMPLE	Zone II
K08-03	YES	MCOE	Zone II
K08-04	YES	MCOE	**Zone III**
K09-01	AS OF 2010	MCOE - MPTR	**Zone III**
K09-02R	AS OF 2010	MCOE - MPTR	**Zone III**
K09-03R	YES	RECRUITMENT/MCOE	**Zone III**
K10-01R	YES	RECRUITMENT	Zone II

K11-02	YES	25% SAMPLE	**Zone III**
K11-03	AS OF 2010	MCOE - MPTR	Zone II
K11-04	YES	RECRUITMENT	Zone II
K11-05	YES	RECRUITMENT	Zone II
K12-01	NO (2011)	MCOE - MPTR	**Zone III**
K13-01	YES	25% SAMPLE	Zone II
K13-02	AS OF 2010	MCOE - MPTR	Zone II
K13-04	YES	DMPRC	Zone II
K13-05R	NO (2011)	MCOE	Zone II
K13-06	YES	25% SAMPLE/DMPRC	**Zone III**
K14-01R	YES	RECRUITMENT/MCOE	**Zone III**

VI. Implementation

Fort Benning has committed to carrying out the actions identified in the MPTR BE and this Monitoring Plan once USFWS provides concurrence via the associated informal consultation process. Fort Benning will provide updates on progress of implementation of the MPTR BE and this Monitoring Plan as specified in the MPTR BE and in conjunction with other reports and meetings required in the MCOE BO.

VI. References

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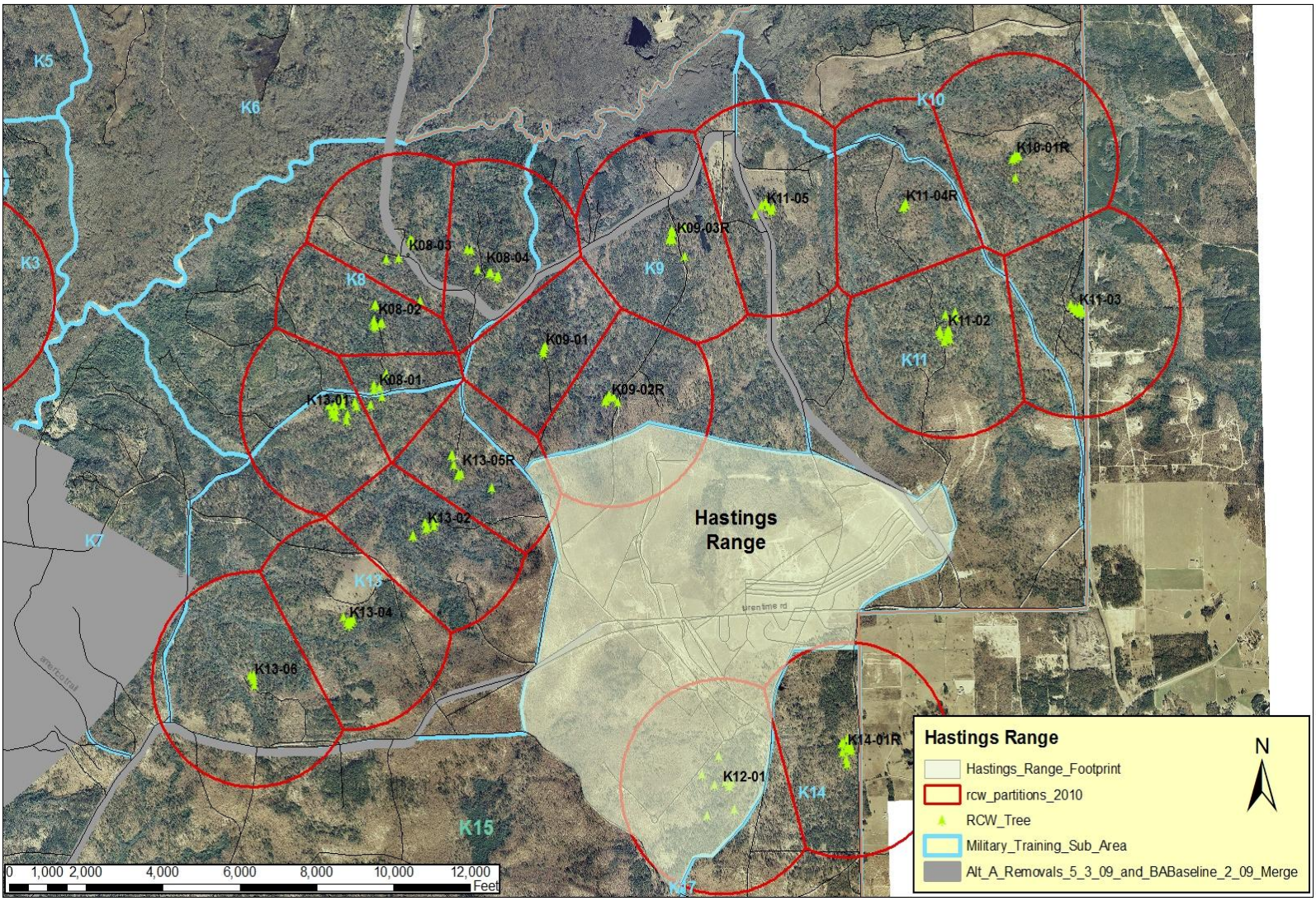


Figure 1. Current Hastings Range footprint, Fort Benning, Georgia.

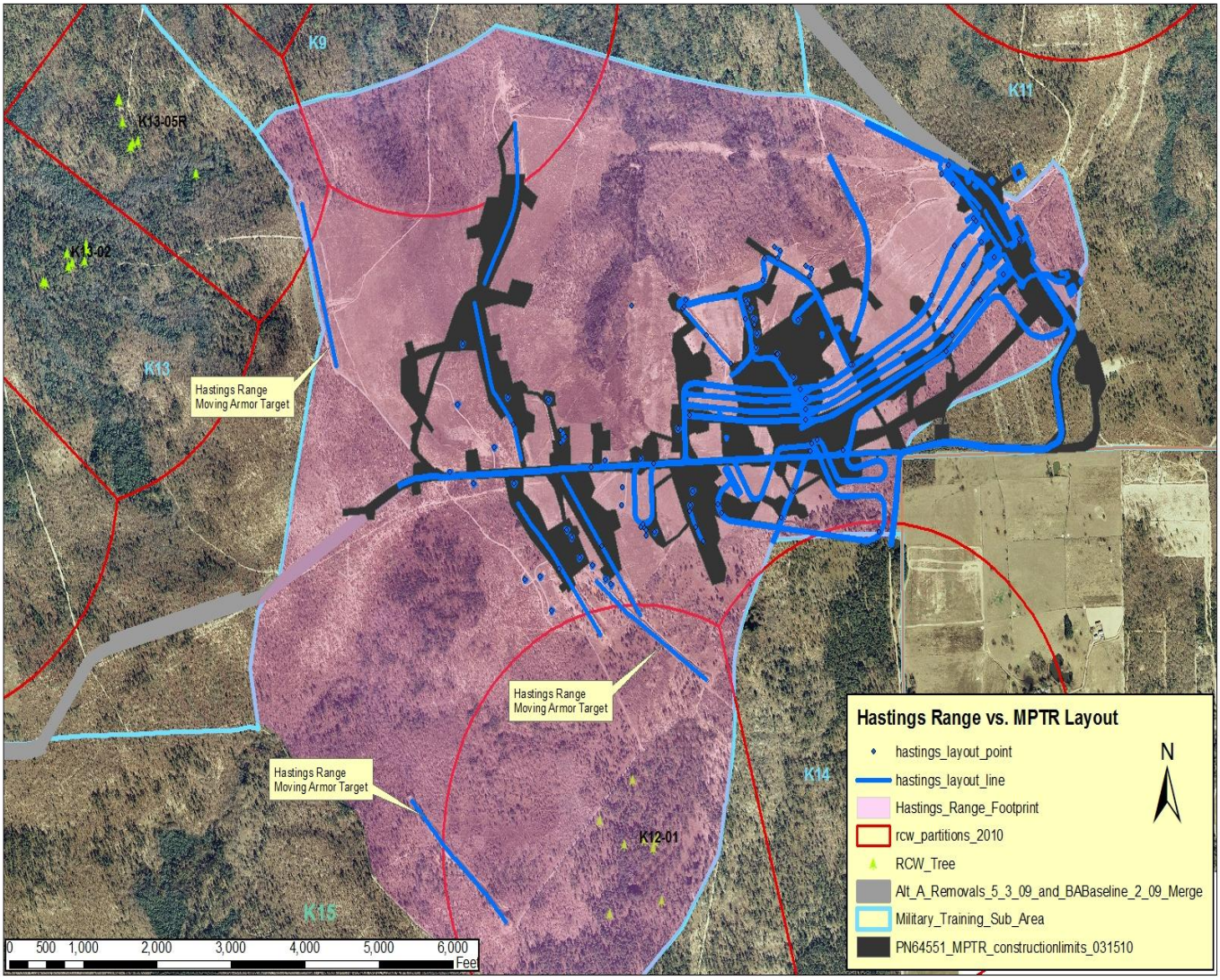


Figure 2. Hastings Range vs. Multi-Purpose Training Range configuration, Fort Benning, Georgia.

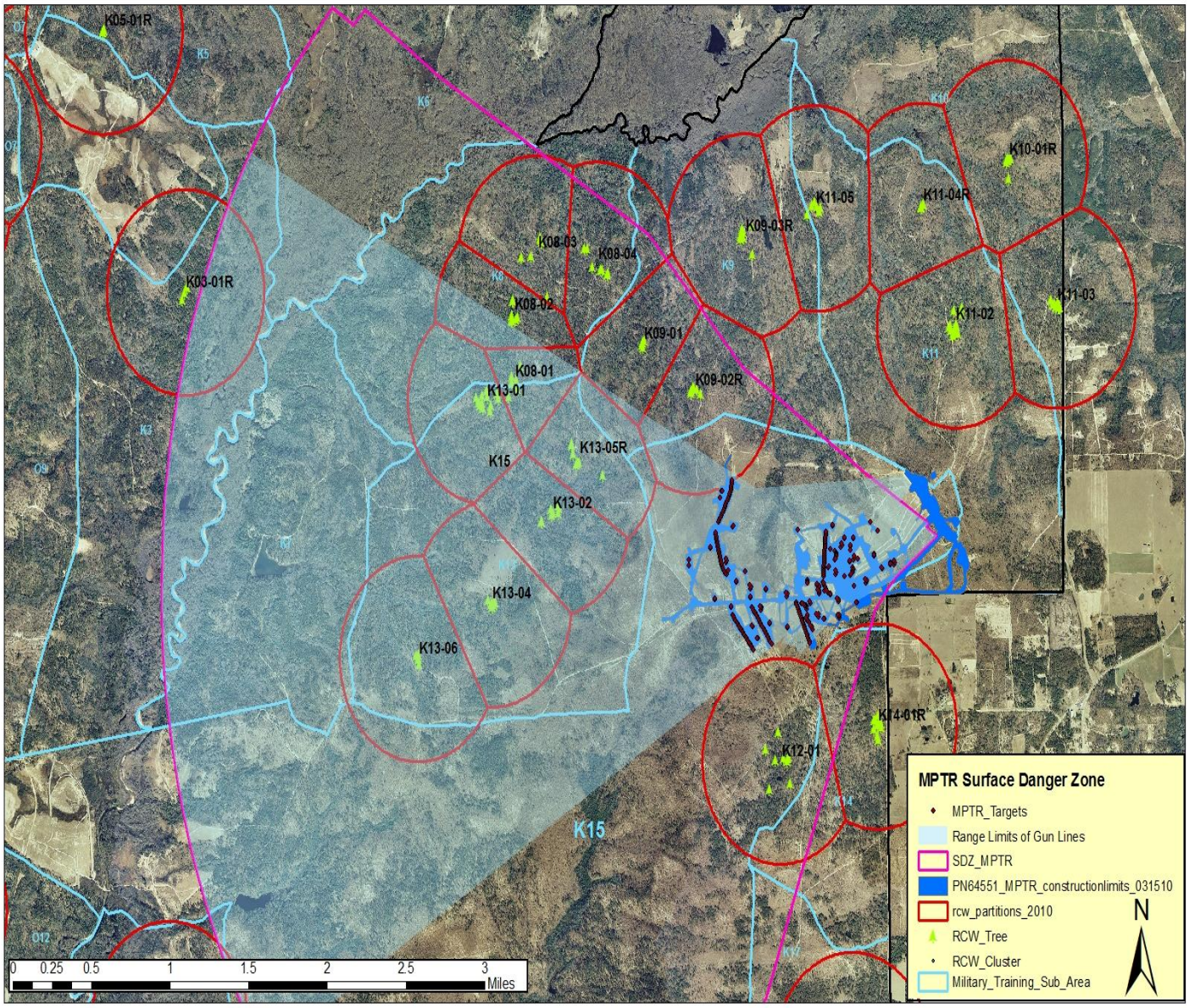


Figure 3. Surface Danger Zone and Target Limits of Gun Lines on the Multi-Purpose Training Range, Fort Benning, Georgia

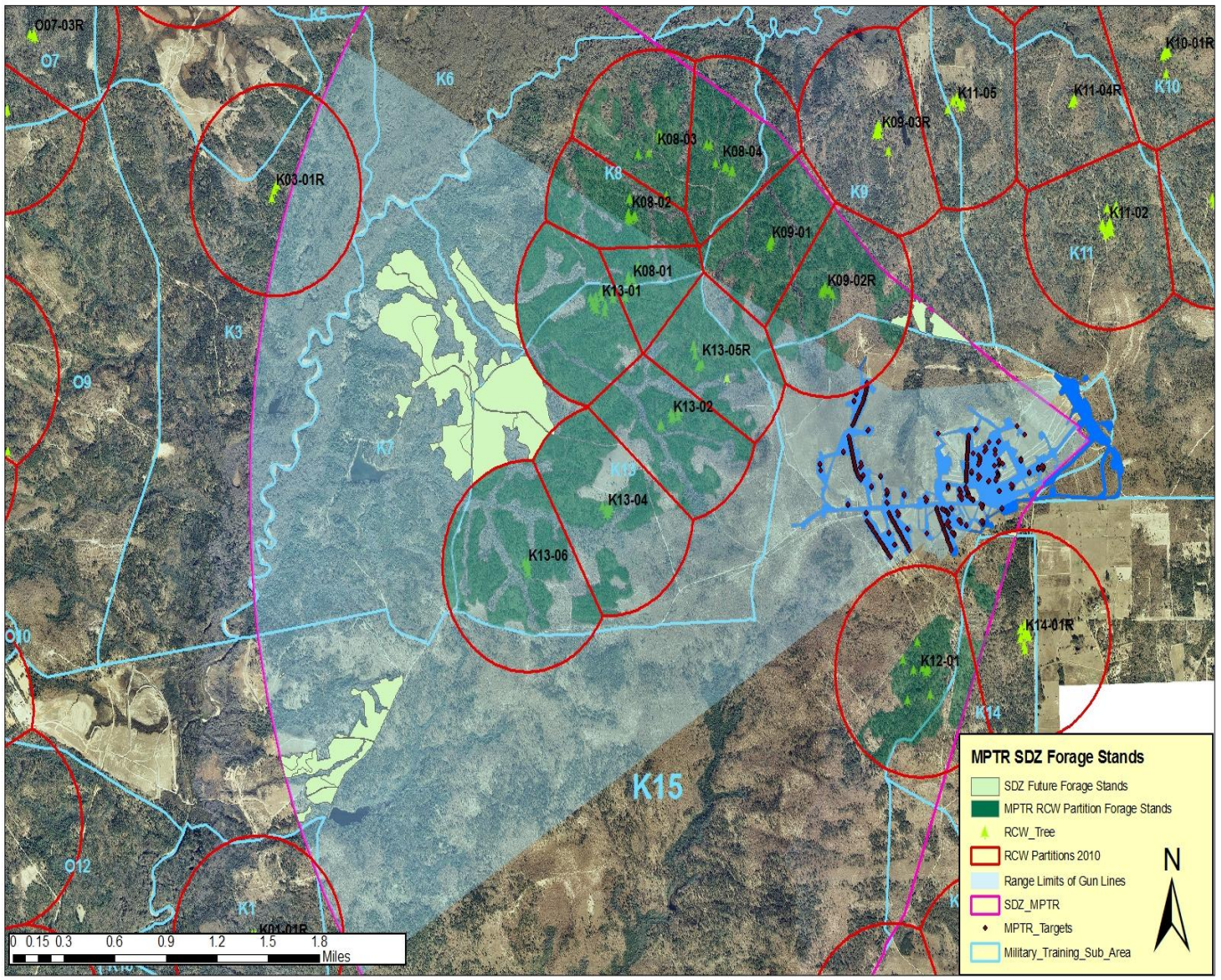


Figure 4. RCW Foraging Stands (Current, ~ 2000 acres and Future, ~ 413 acres) within the Surface Danger Zone of the Multi-Purpose Training Range that will be monitored, Fort Benning, Georgia.

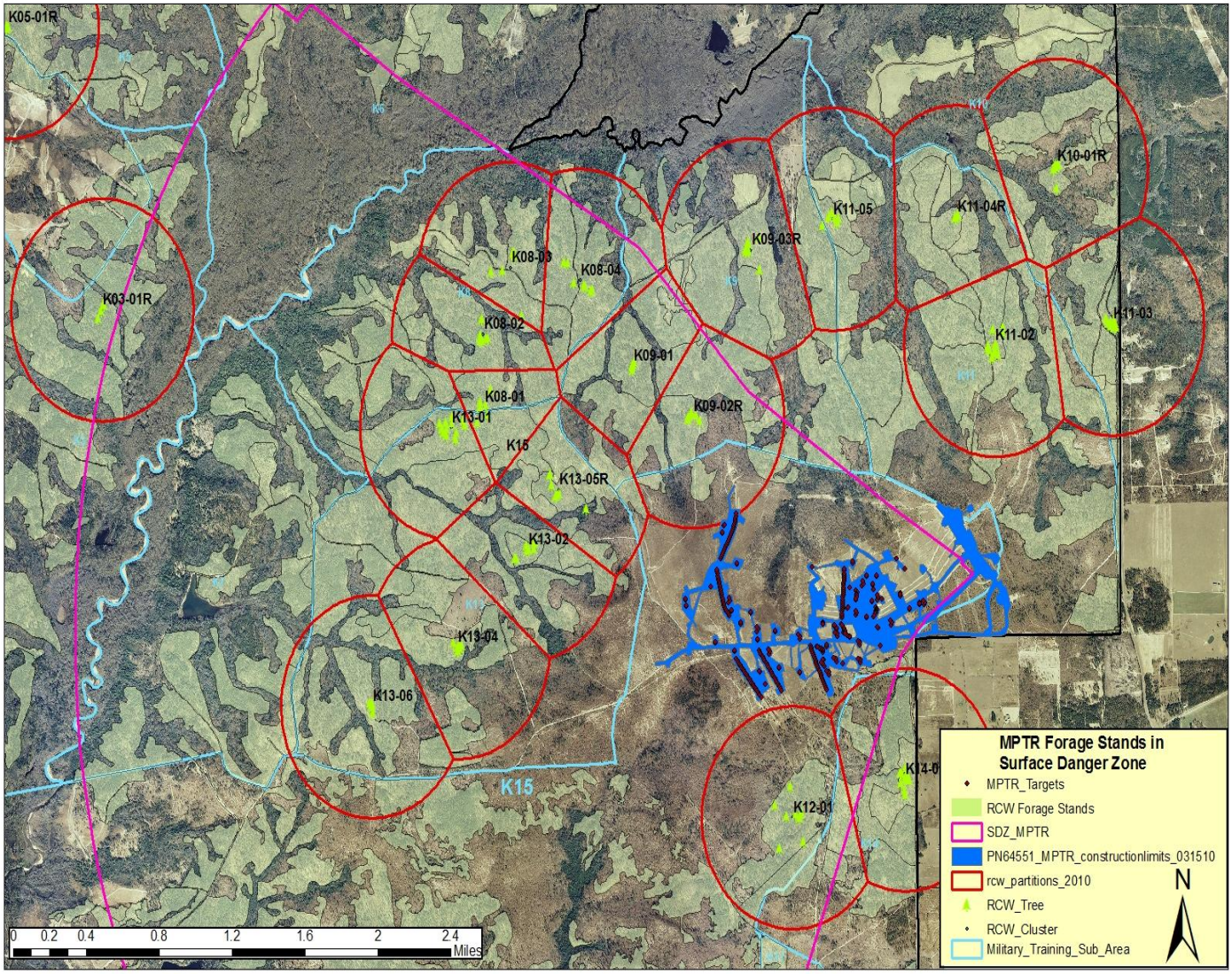
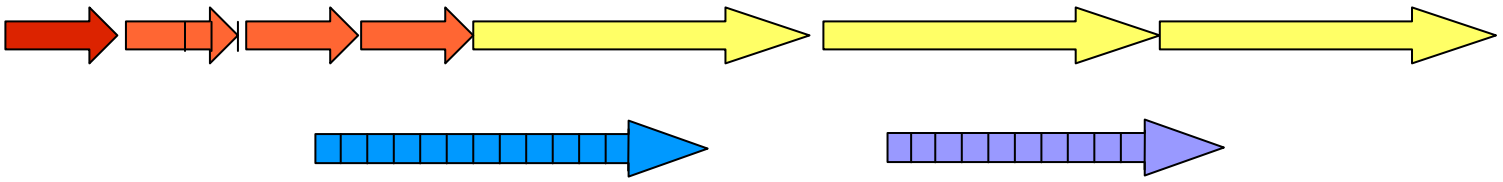


Figure 5. Current forest stands within the Surface Danger Zone on the Multi-Purpose Training Range, Fort Benning, Georgia.



Weekly monitoring for 4 weeks of MPTR use
Monthly monitoring for 3 months
Quarterly monitoring for 3 quarters
Annual monitoring for 4 years
First 3rd Brigade gunnery event and followup
Weekly monitoring interrupts regular schedule.
Breeding Season
Monitoring every 7-10 days during breeding season (approximately 3 months starting in Apr
interrupts regular schedule, for a total of 5 years.

Figure 6. Graphic of Monitoring Schedule/Timeline for the Multi-Purpose Training Range, Fort Benning, Georgia.

APPENDIX 8

A20 Red-cockaded Woodpecker Management Plan

This plan presents a management strategy for Red-cockaded woodpecker (RCW) clusters in the Fort Benning A20 Impact Area (A20). This plan satisfies the U.S. Fish and Wildlife Service (USFWS) requirement from the MCOE Biological Opinion (BO) dated 29 May 2009 to manage RCW clusters in A20 as an offset for clusters taken by Maneuver Center of Excellence (MCOE) actions (USFWS 2009).

MCOE Background

As mandated by Congress, the US Army is currently undergoing transformation involving reorganization and redistribution efforts at Fort Benning, the largest of these transformation actions involves moving the Armor School from Fort Knox to Fort Benning, in accordance with Base Realignment and Closure (BRAC). The Army will provide the facilities, infrastructure and equipment needed to support this transformation and the associated influx of Soldiers and training that result. In addition to upgrading cantonment areas, the Army will also conduct upgrades to existing training ranges and roads as well as construct numerous new ranges and tank trails throughout the Installation.

Pursuant to section 7 of the Endangered Species Act, Fort Benning conducted a thorough Biological Assessment (BA) to determine the possible impact these BRAC and Transformation actions may have on any endangered species. The assessment determined that the actions were likely to adversely affect, among other species, the resident RCW population, but not jeopardize its continued existence on the Installation. The assessment also described current, on-going and future management criteria that will ensure survival and persistence of the RCW (Fort Benning 2007). After completion of this BA, changes in several BRAC/Transformation projects and new projects were proposed and required additional consultation, resulting in the MCOE BA and addenda (Fort Benning 2009) and BO (USFWS 2009). This assessment determined that the actions were likely to adversely affect the RCW and jeopardize its' continued existence. The BO includes a Reasonable and Prudent Alternative (RPA) with several components that Fort Benning must implement to avoid jeopardizing the RCW. Part of the RPA written for this BO mandates Fort Benning to manage additional RCW clusters in the A20 Impact Area.

The Red-cockaded Woodpecker

In 1970, the USFWS listed the RCW as endangered (Federal Register 35:16047), and in 1973, the passage of the Endangered Species Act provided federal protection for this endangered species**.**

The RCW is a territorial, non-migratory, cooperatively breeding species (Lennartz 1987). Breeding pairs are monogamous and produce broods of 1-4 fledglings per year. Many groups also contain one or more 'helpers', which are usually the male offspring from the previous breeding seasons. Offspring not remaining as helpers typically disperse an average of 2 miles from their natal cluster within their first year. The most common periods for dispersal are just before or just after the breeding season (i.e. early fall or early spring).

Historically, the RCW occupied a wide range throughout old-growth, fire-maintained pine ecosystems of the southeastern United States. Although still widely distributed, the range of the RCW is now limited and fragmented as a result of short rotation timber management, clearing for agriculture, and urban and industrial development. The RCW is the only North American woodpecker that excavates its roost and nest cavities exclusively in living pines, thus the habitat and cavity trees are both limiting factors for the RCW (USFWS 2003).

Red-cockaded Woodpeckers on Fort Benning

As of October 2009, Fort Benning supports 316 manageable RCW clusters with 287 potential breeding groups (PBG). PBGs consist of one male and one female with or without helpers that may or may not successfully fledge young. Due to the social dynamics of the RCW, referencing the number of PBGs is a more accurate measure of population size than number of individual birds or occupied clusters. The USFWS has mandated a goal of 351 PBGs to meet Fort Benning's recovery goal (USFWS 2002).

As a result of the BRAC and MCOE actions, Fort Benning received Incidental Take for 89 RCW clusters as a direct or indirect result of these activities. Although considered legally taken, these clusters have not been removed from the landscape and will continue to be managed according to the Army RCW Guidelines (U.S. Army 1996) or any newer guidelines as appropriate.

Red-cockaded Woodpeckers in A20

The A20 impact area is located in the south-east portion of Fort Benning. It is surrounded by a series of ranges that are necessary to properly train Soldiers. Due to the nature of this training which involves live ammunition, an off-limits area or impact area is necessary for safety purposes. According to maps from 1962, at that time this area consisted of several small impact areas; but by 1970, the area had been consolidated into one impact area. Currently, A20 is approximately 9,275 acres with about 6,515 of that acres considered potential RCW habitat.

Fort Benning Conservation Branch (FBCB) first conducted formal surveys in the A20 impact area in 1996. This was followed by smaller surveys in 1997, 1999, and 2004. Prior to these surveys, documents indicate that 5 clusters were known to be in the A20 area. In all, these surveys identified 42 clusters within A20.

In 1999, an effort was undertaken to add clusters on the edges of A20 to regular management. Four clusters were targeted, A20-02, A20-04, A20-05, and A20-06.

Each cluster was visited with Range Division personnel and 3 clusters (A20-04, A20-05 and A20-06) were determined to be relatively clear of any unexploded ordnance (UXO) for regular entry without the need of an escort. These 3 clusters were added to management in 2000. A20-02 was determined by Range Division personnel to be too dangerous to access due to the amount of ordnance observed.

In 2003-2004, Fort Benning initiated formal consultation with the USFWS for the construction and operation of a Digital Multipurpose Range Complex (DMPRC). A Biological Opinion was issued on 30 June 2004 (USFWS 2004). Part of the minimization strategy put forth in this decision was to add to management enough clusters in the A20 area to offset 8 clusters impacted and considered taken by the project. Fort Benning identified 11 A20 clusters that would be easily accessible via an established road, Buckeye Trail. These clusters were A20-26, A20-27, A20-29, A20-32, A20-34, A20-35, A20-36, A20-37, A20-38, A20-39 and A20-40. Fort Benning began breeding season monitoring of these clusters in the spring of 2005 and added them as manageable clusters.

In 2006-2009, Fort Benning began the process of analyzing the BRAC initiative that included moving the Armor School from Fort Knox to Fort Benning. In preparation of the MCOE BA for formal consultation, it was decided to look more closely at A20 and the potential to manage more of these clusters. An aerial helicopter survey of the area was conducted from 2 – 7 February, 2009 by Dr. J. H. Carter and Associates, INC (JCA) and Fort Benning personnel to document as many of the clusters in the area as possible. As a result, 37 new clusters were recorded. Thus 71 clusters were documented in the A20 impact area (Figure 1). The Reasonable and Prudent Alternative from the MCOE BO (USFWS 2009), states that Fort Benning will manage a total of 50 RCW clusters in this impact area (36 in addition to the 14 currently managed).

During the spring 2009 breeding season, FBCB personnel and experts trained in the detection and disposition of UXO visited 11 of these new clusters and it was determined that they were safe for ground access as the area contained very few UXO and those discovered were properly cleared. All 11 clusters were determined to be active. In addition, work was begun to identify potential trails to as many other clusters as possible.

During December 2009 and January 2010, FBCB conducted ground surveys to verify the February 2009 aerial survey. An attempt was made to paint, tag, GPS, and survey each of these clusters and an effort was begun to improve existing roads and install new trails so that clusters could be easily accessed. As a result of these ground surveys and GIS mapping of the new trees documented, these data were compared to data collected during the February 2009 aerial survey and to previously know cluster locations. Of the aerially identified clusters, two clusters could not be located on the ground (A20-77, A20-78), 1 cluster had 1 relic cavity tree (A20-69) and 1 cluster was determined to be part of another cluster (A20-63). Thus, these 4 cluster designations were deleted, leaving 67 potentially manageable clusters (71 previously designated –

4). However, 2 new clusters were discovered during the December-January ground surveys (A20-79, A20-80) bringing the total number of clusters to 69.

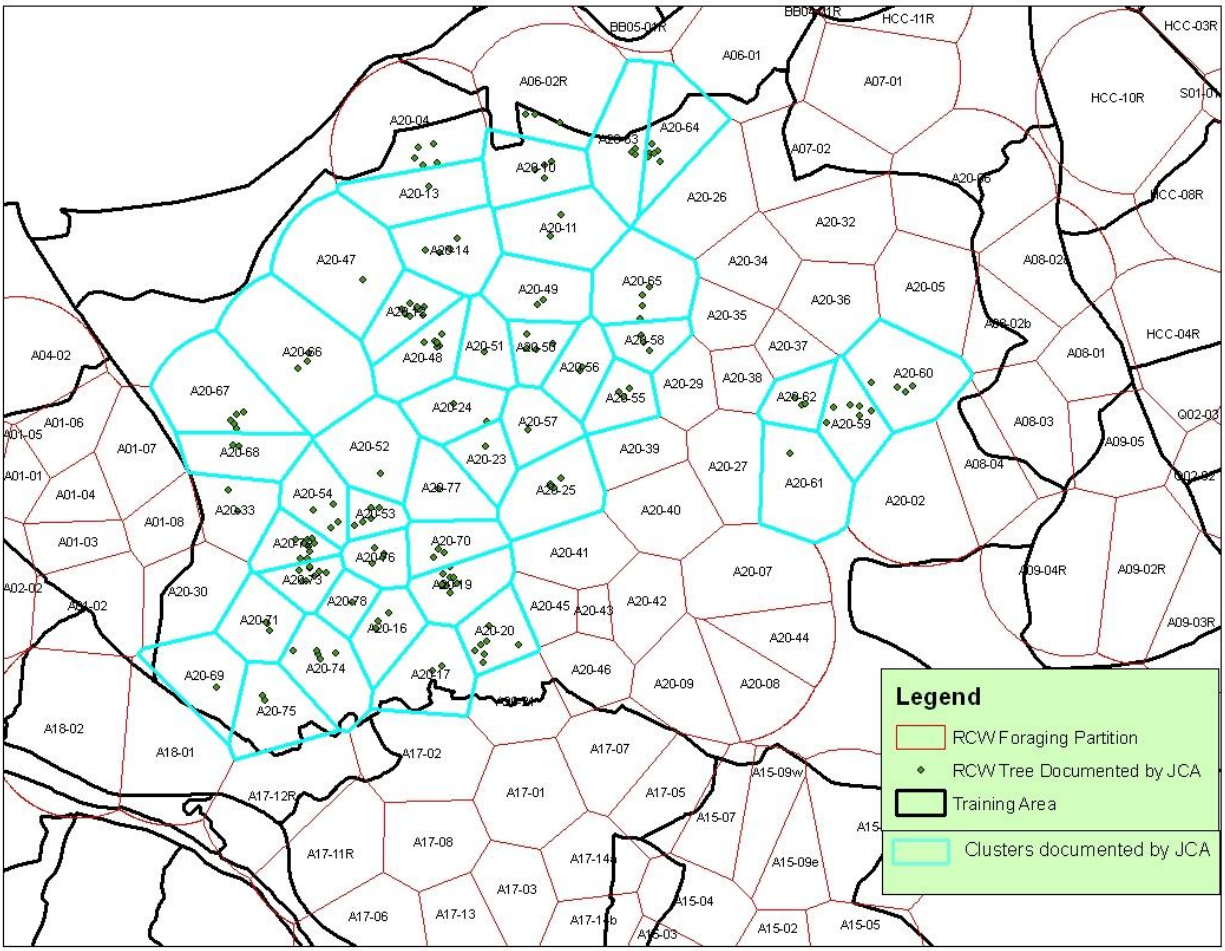


Figure 1. Red-cockaded Woodpecker Cavity Trees and Clusters Documented by Dr. J. H. Carter III and Associates, INC (JCA), Aerial Survey 2009

Two of these clusters, A20-02 and A20-47, had previously been considered unmanageable due to the volume of unexploded ordnance found in the clusters. A20-02 was revisited and was determined to be of no greater danger than other A20 clusters and the area was properly cleared of visible UXO. A20-47 is still considered unmanageable as unexploded ordnance makes it too dangerous for any type of ground access. Even though this cluster could be aerially surveyed, ground access would not be possible to perform any management deemed necessary. Eliminating A20-47 from management consideration leaves 68 potential manageable clusters, 63 active and 5 inactive. Of the 5 inactive clusters, 2 clusters are in habitat that is not good quality RCW habitat or will not have enough habitat to meet minimum standards to support a cluster (A20-11, A20-56), 2 can be managed to be reactivated (i.e. add artificial cavities)(A20-23, A20-52), and 1 needs further evaluation (A20-21). Therefore, eliminating the 2 clusters that are not manageable, there are 65 to 66 A20 clusters that currently can be managed, 51 to 52 of which can be counted towards the RPA requirement (the remaining 14 clusters are counted for DMPRC minimization and

regular management). A20 cluster and tree data collected during these aerial and ground surveys indicate that of the clusters now believed to be manageable, 63 are active and 3 are inactive, with 1 of the 3 inactive clusters requiring further evaluation (Figure 2).

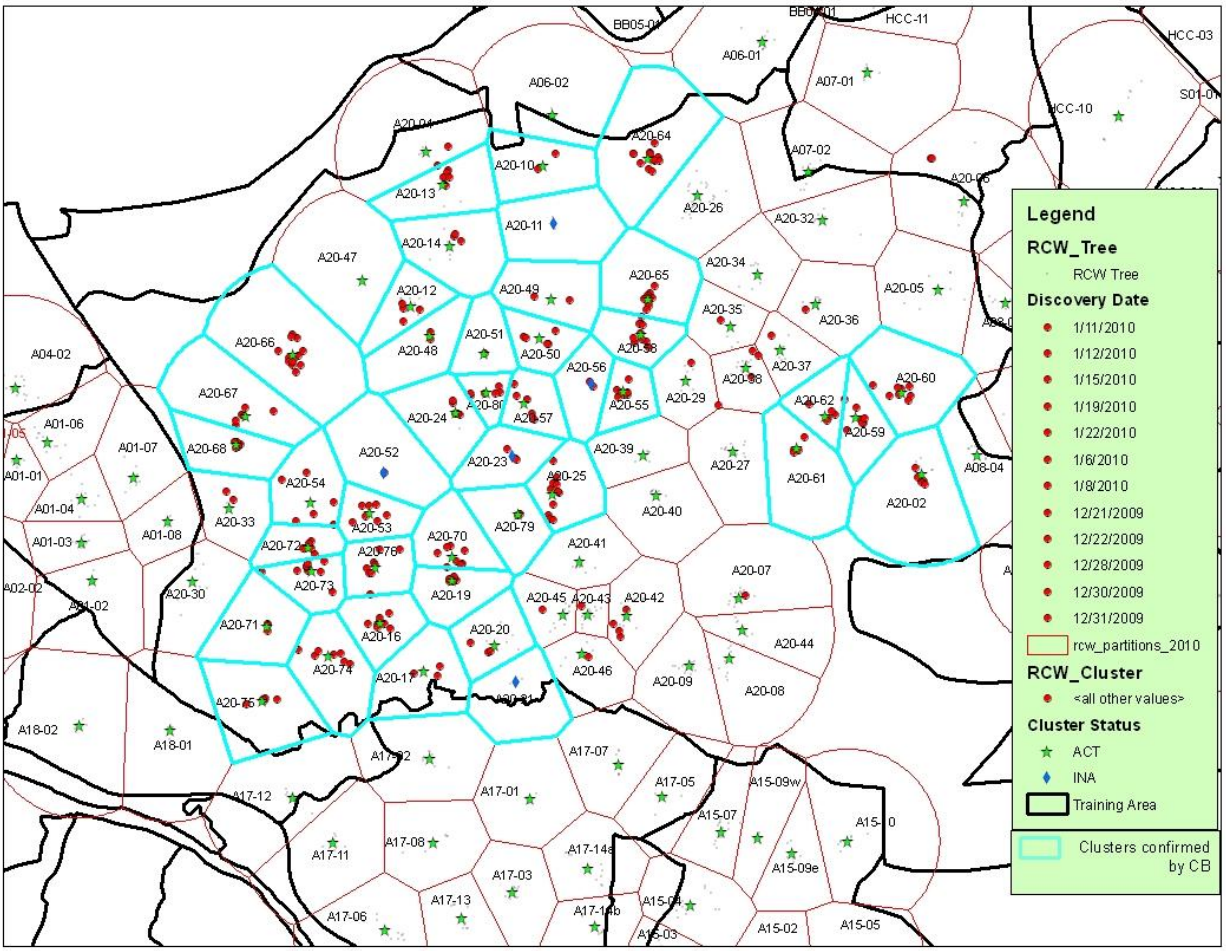


Figure 2. Red-cockaded Woodpecker Cavity Trees and Clusters Documented by Fort Benning Conservation Branch, December 2009 – January 2010

It must be cautioned that much of the data presented above for cluster designations relies on mapping exercises to determine which trees belong to which cluster by grouping trees that are in close proximity. Only through thorough documentation during the breeding season can the actual number of clusters and potential breeding groups be adequately assessed, thus the number of clusters may be slightly over- or under-estimated.

Management of A20 Red-cockaded Woodpecker Clusters

Requirements identified in the MCOE BO: According to the MCOE BO, "All clusters not currently managed in the A20 impact area (active and inactive) will be monitored aerially to determine number of active or suitable cavities per cluster. Any aerially monitored cluster with at least 4 active cavities can be counted towards the 36 A20 active clusters

which are required to satisfy this component of the RPA. For clusters containing less than 4 active or suitable cavities, ground access to a sufficient number of these for augmentation of artificial cavities to maintain the minimum standard of 4 suitable cavities would be required to reach a minimum number of 36 managed clusters. Conversely, if 36 aerially monitored active clusters contained 4 active cavities in a given year, then on-the-ground access would not be required for that year". This does not apply to the 14 clusters already managed to comply with the DMPRC BO (USFWS 2004) and Endangered Species Management Plan (ESMP) BO (USFWS 2002). Fort Benning proposes at this time to manage all known clusters in the A20 Impact Area, except those deemed unmanageable due to either poor habitat (A20-11, A20-56, and possibly A20-21) or because the area is too dangerous (A20-47) (Figure 3).

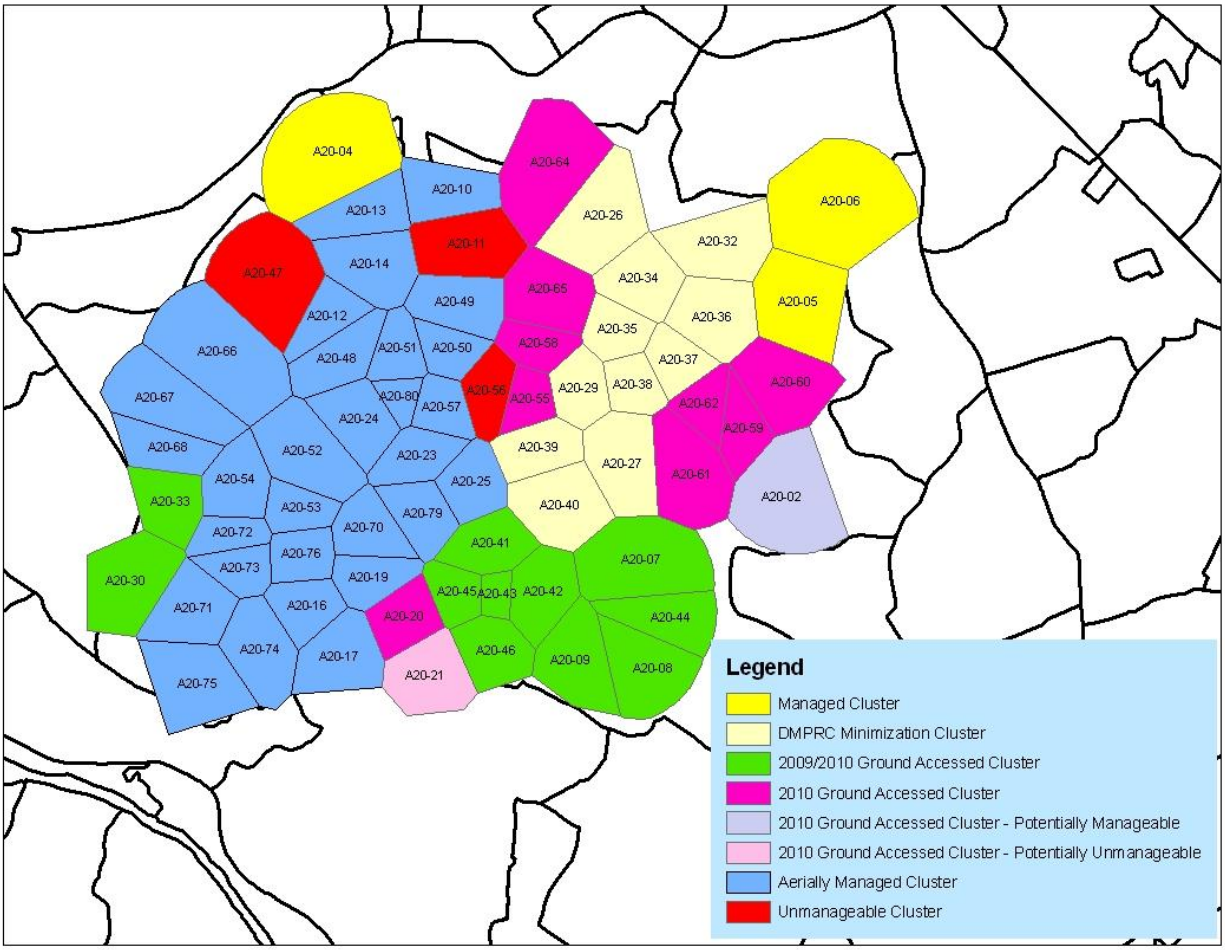


Figure 3. Management Status of Red-cockaded Woodpecker Clusters in A20 Impact Area

Management of A20 RCW clusters will follow basic RCW management as outlined in the 2003 Recovery Plan (USFWS 2003), the 1996 Army Guidelines (U.S. Army 1996), and Fort Benning 2002 ESMP (FBCB 2002). However, due to access and UXO hazard issues, some alterations are necessary. Therefore two modes of monitoring may be employed to meet the goals outlined in the 2009 MCOE BO (USFWS 2009), ground monitoring and aerial monitoring. The 14 clusters managed for the ESMC and DMPRC

BO's (FBCB 2002; USFWS 2004) will continue to be ground monitored. As specified above, 3 clusters are managed/monitored for the ESMP, 11 for DMPRC and at least 36 of the remaining manageable clusters will be added for MCOE BO (USFWS 2009) (Figure 3). Figure 4 shows all currently know RCW cavity trees.

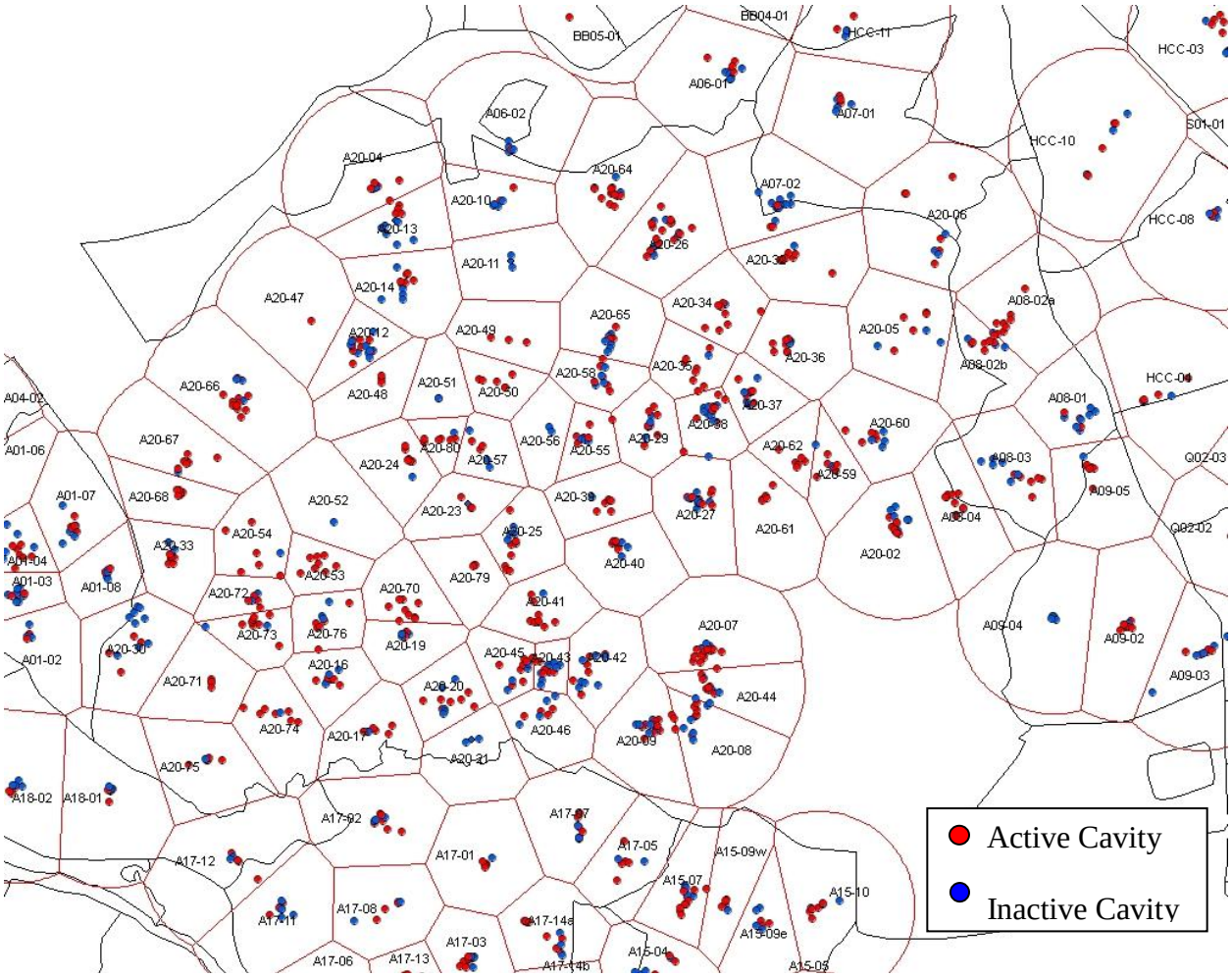


Figure 4. Current RCW cavity trees in A20 (February 2010)

Ground Monitoring

Fort Benning will visually inspect all 11 DMPRC and 3 ESMP clusters from the ground. Each cluster will be inspected during the spring of each year. During that time, each cavity tree and cavity will be inspected to determine activity (active, inactive), shape (normal, enlarged), stage (complete, start) species, condition (suitable, unsuitable), and status (live, dead). If the classified as 'unsuitable', a reason will be given with recommendations to make the cavity suitable. If the cavity cannot be made suitable, it will noted that it will need to be replaced with an artificial cavity. The height and aspect (direction cavity is facing) of each cavity will also be recorded. Each cavity under 50

feet will be inspected with a remote camera (peeper) to determine contents and suitability. Cavities over 50 feet cannot be assessed with the peeper as it is limited to a maximum height of 50 feet. Only activity, size and type will be evaluated for those cavities. Cavity trees will be inspected for any damage (fire, wind, lightning, munitions, etc.). Cluster status will also be updated. Based on cavity activity, each cluster will be typed as active or inactive. General condition of the habitat and trees will also be noted, to include hardwood or pine midstory (noting specifically if there are any hardwood or pine stems within 50 feet of a cavity tree), percent groundcover, pine decline, and presence of invasive species will be assessed. Based on this evaluation, specific cluster management recommendations will be formulated. Each cluster must have a minimum of 4 suitable cavities as described in the 2003 Recovery Plan (USFWS 2003). If a cluster does not have 4 suitable cavities, FBCB personnel will return to the cluster during the fall/winter of that same year to make 4 suitable cavities available by either cleaning out existing natural cavities or by installing artificial cavities. Other management actions will also be completed during this Fall/Winter time frame including hardwood/midstory removal or herbicide application and prescribed burning.

Breeding status will be assessed during the spring inspection to coincide with nesting. As cavities are inspected to determine contents, any RCW eggs/nestlings will be noted. For the 11 clusters monitored for compliance with the DMPRC BO (USFWS 2004), 8 potential breeding groups must be documented. Therefore, clusters are inspected during the peak of the breeding season and will be visited until 8 nests are found or at least 2 birds are consistently seen in a cluster. During these spring inspections, clusters and the area surrounding them will be surveyed for any new cavity trees.

Aerial Monitoring

Aerial Monitoring will be accomplished by flying helicopters over each known cluster in order to inspect the cavity trees in each A20 cluster (other than the 14 clusters which can be ground accessed and monitored for DMPRC and ESMP BOs (USFWS 2004, USFWS 2002)). Aerial inspections will be done in March to early April. As outlined in the MCOE BO (USFWS 2009), in order to be counted as a manageable cluster, the cluster must contain at least 4 active, suitable cavities. Activity, shape, tree species, and status will be noted for each cavity that can be observed. Habitat conditions will also be noted (amount of hardwood-midstory) so that management recommendations can be made (i.e. hardwood-midstory control, prescribed burning). The goal of the aerial survey is to document at least 4 active, suitable cavities in all clusters not planned for ground access. For those clusters not meeting these criteria, ground access will be necessary to determine cluster conditions. As many clusters as necessary will then be ground inspected as described above for Ground Monitoring. During the fall/winter of each year, management goals determined during the ground and/or aerial surveys for each cluster will be completed (i.e. clean/install cavities to make 4 suitable cavities, hardwood/midstory control, prescribed burning). Universal Transverse Mercator (UTM) coordinates will be collected for all new cavity trees discovered using Global Positioning System (GPS) units and added to the RCW cavity tree data base.

In any given year, one method or a combination of methods will be used to accomplish the monitoring goals and in the future, one method may become the preferred method. This will be evaluated yearly to determine the best methodology to use.

Hardwood/Midstory Control

Hardwood/midstory control may be accomplished by removal of individual stems with chainsaws and/or application of herbicides, including cut stump treatment, injection of individual stems, spot spraying, or aerial application. Aerial treatments will be conducted at times during the year as specified by the type of herbicide used and in accordance with the Fort Benning Integrated Pest Management Plan.

Prescribed Burning

Prescribed burning of clusters may be accomplished via aerial or ground ignition. Burns will be conducted under suitable weather conditions and to minimize disruption to training, usually during holidays or other stand down periods. Refer to the A20 Wildfire Response Plan for specifics on the management and determination of fuel loads. If ground ignition is used, lines of fire will be laid down in specified areas and then the area will be vacated. Due to the danger of fire causing ordnance to explode and thus endanger the prescribed burning personnel, it may prove unsafe to secure every tree in a cluster or nearby clusters. Thus a 'let burn' policy would be necessary. In the event that any active cavity trees are destroyed, replacement artificial cavities will be installed as soon as possible.

Access

Due to the many ranges that encircle A20 and their associated Surface Danger Zones (SDZ), access to A20 RCW clusters is limited, but can be accomplished through coordination with Range Division for both ground and aerial access. This is covered in more detail in the 2010 MCOE Access Plan and the 2004 DMPRC Impact and Monitoring Plan "Impact of the Construction and Use of a Digital Multipurpose Range Complex on Red-cockaded Woodpecker (*Picoides borealis*) Home Range and Habitat Use on Fort Benning, Georgia".

As detailed in the 2010 MCOE Access Plan, personnel can get access to A20 in the mornings, prior to firing on Ranges, during lunch hour stand downs, and in the afternoons, after Ranges are closed. Coordination is done through Range Division – Range Control and by scheduling in Range Facility Management Support System (RFMSS).

Additionally, weekends and holidays can be scheduled for access when there is no military training or scheduled military training is light. In some instances, SDZs are such that some areas can be accessed without impacting training while staying out of the SDZs. Coordination is done through Range Division – Range Control by scheduling areas in RFMSS. Access is necessary during the peak of the breeding season (May) for cluster inspections/breeding season monitoring and in the Fall/Winter to do any necessary surveys or habitat work (burning, hardwood control, cavity installation/repair). This work is typically done for several weekends during the spring and for the last two weeks of December (usually referred to as Exodus due to most military activities being shut down during the December holidays).

Access to A20 is also necessary during March of each year in order to conduct aerial monitoring of RCW clusters. This is done for approximately one week and is done for 2 hours in the morning, noonday and afternoon in order to have the least impact on training. The area is scheduled in coordination with Range Division prior to the 13-week training schedule. All units wishing to train on Fort Benning must schedule their training 13 weeks in advance. By scheduling the aerial flights prior to this, the trainers can better plan for their activities so conflicts can be minimized. Trainers will be informed of this scheduling at weekly Range Control meetings and through distribution of Range Bulletins. In the event of inclement weather during the scheduled time, further coordination will be made to re-schedule flights to least impact training.

Once aerial monitoring of clusters is complete, ground access will be scheduled for those clusters not meeting the 4 active cavity minimum in order to meet the MCOE BO (USFWS 2009) requirement of 36 clusters with at least 4 active cavities. These clusters will be ground monitored during the peak of the breeding season as per the same ground access protocol listed above. Clusters will be accessed during the Fall/Winter in order to accomplish any habitat management needs identified during the spring aerial and ground monitoring.

Roads/Trails

There are several roads/trails within the A20 Impact area that provide access to many of the known clusters. During December 2009 – January 2010, many of the existing roads/trails in A20 were improved and new trails were added to improve access to clusters by either 4x4 pick-up trucks or All Terrain Vehicles (ATV). Trails were placed to minimize clearing and tree removal. All of these roads/trails were surveyed for and cleared of any UXO to improve safety. Also, smaller trails were marked and cleared of any UXO so that each cluster may be easily accessed on foot or with ATVs. Trails will be maintained as needed. Further work is still required; including creating a north-south trail from Pierce Range to Lumpkin Trail, clearing access trails to most of the aerially managed clusters depicted in Figure 3 off of this north-south trail, and improving the east-west trail from Galloway Range to clusters A20-07, A20-08, A20-09 and A20-44. Figure 5 depicts all current roads/trails (in blue), those that were improved during December 2009 – January 2010 (in green), and those planned for improvements during 2010 (in red).

<u>Emergency Protocols</u>

Wildfire Response: See A20 Wildfire Response Plan.

Natural Disaster: In the event of a tornado or other natural disaster that may impact any A20 RCW clusters, FBCB and/or Fort Benning Land Management Branch personnel will inspect all clusters for damage, either by ground or aerially. If necessary, artificial cavities will be used to supplement any clusters in order to have 4 suitable cavities available to each RCW group where feasible. Coordination for access will be made with

Range Division and will be done as soon as possible following any such event. USFWS will be notified of any damage documented in any such event in accordance with the ESMP (Fort Benning 2002) and RCW Guidelines (U. S. Army 1996).

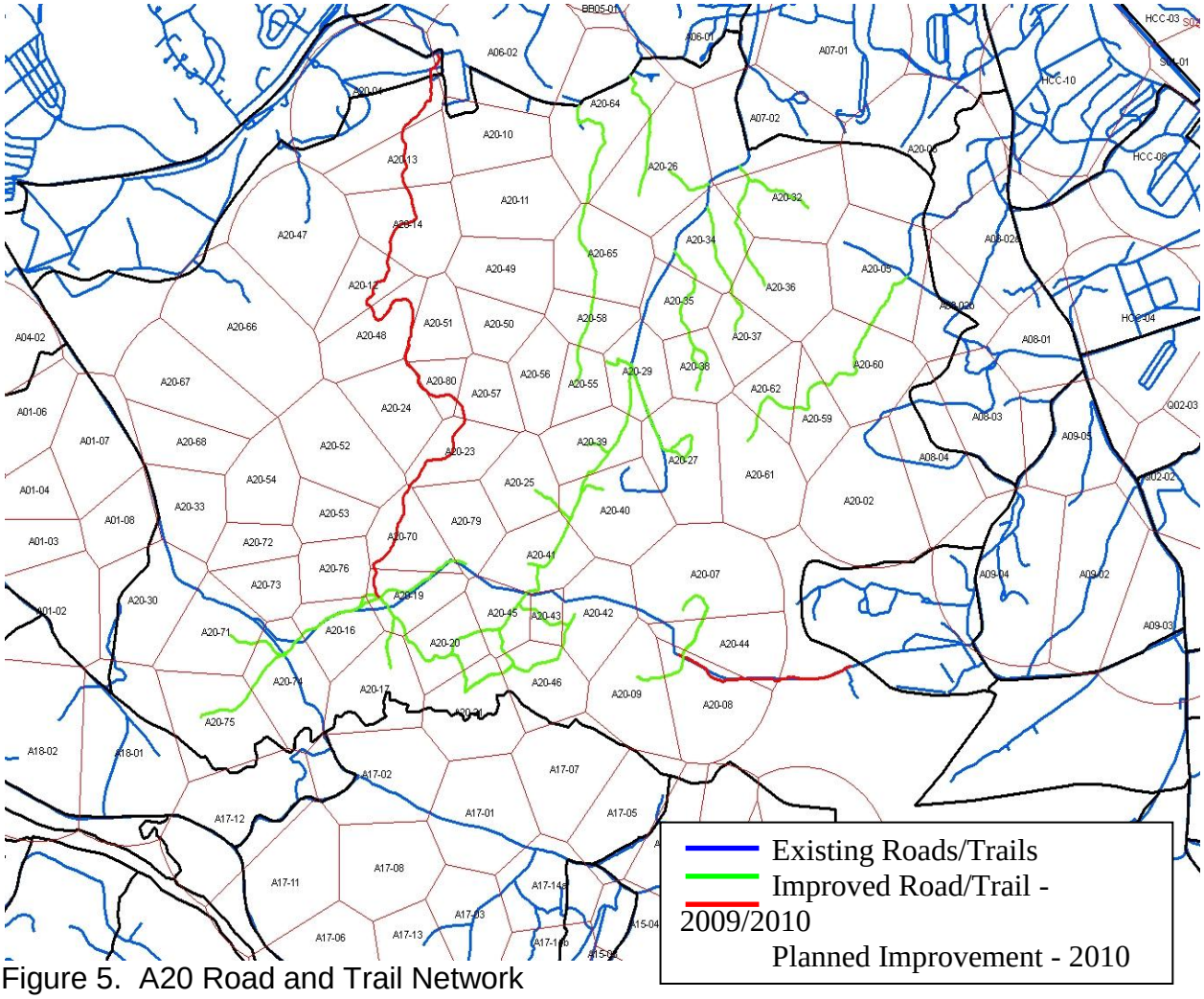


Figure 5. A20 Road and Trail Network

Survey

The area around each A20 cluster will be surveyed each year for new cavity trees, be it ground or aerial access. New trees documented during aerial surveys will be ground truthed the next time that cluster is accessed via ground access and will be painted, tagged and re-GPSed.

Areas where no RCW trees or clusters have been located in A20 will be surveyed every 10 years to document any new clusters in those areas. Surveys will be done either aerially or on foot. Survey protocols established in the 2003 Recovery Plan (USFWS 2003) will be followed for ground surveys. Aerial surveys will be conducted using a helicopter. North-South or East-West transects will be flown at approximately 50-150 meter intervals in order to get the best coverage. GPS units will be used to document

flight paths and to record any new cavity trees. Any new trees or clusters documented during these aerial surveys will be ground truthed the next time that cluster is accessed via ground access and will be painted, tagged and re-GPSed.

Reporting

Fort Benning will report all A20 findings to USFWS in the appropriate annual reports or as necessary in the case of cavity tree destruction.

References:

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U.S Fish and Wildlife Service, Atlanta, GA. 2003. Recovery plan for the red-cockaded woodpecker (*Picoides borealis*): second revision, 296 pp.

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APPENDIX 9

FORT BENNING ENVIRONMENTAL ACCESS PLAN

1. PURPOSE

This Environmental Access Plan provides justification for and outlines the protocols and procedures for scheduling and accessing training areas, ranges, and facilities on Fort Benning (FB) by forestry, wildlife, and other environmental personnel in order to meet environmental management and monitoring requirements while ensuring all training missions are met.

This document also serves as a comprehensive access plan that consolidates and supersedes all previous versions of access plans that satisfied the requirements of the US Fish and Wildlife Service (USFWS) biological opinions (BOs) at the time. Consolidating prior versions of access plans (i.e. DMPRC, BRAC and MCoE Access Plans) into one is practical since all three previous access plans specified access needs for Red-cockaded Woodpecker (RCW) population and habitat monitoring and management. The DMPRC access plan addressed access requirements to conduct specific population and habitat monitoring and management of eight RCW groups that incurred incidental take authorization. The BRAC and MCoE access plans addressed procedures and protocols for accessing training areas to conduct RCW population and habitat monitoring and management in addition to timber and fire management.

The consolidation of previous access plans is also in response to the emergency consultation with the USFWS regarding the May 2011 DMPRC/K37 wildfire incident. This plan addresses check-fire procedures for downrange access and fulfills the USFWS informal consultation requirement to update an Access Plan for the entire post.

Fort Benning environmental management and monitoring emphasizes RCW population management and monitoring, and ultimately recovery, as required by the USFWS and Army. The RCW management and monitoring requirements are detailed in the following environmental documents:

a. Endangered Species Management Plan, Recovery Plan, Management Guidelines and Endangered Species Management Component (Draft)

   (1) Management Guidelines for the Red-cockaded Woodpecker on Army Installations (1996)

   (2) Endangered Species Management Plan (ESMP) for the Red-cockaded Woodpecker (RCW) on Fort Benning (2002)

(3) Recovery Plan for the Red-cockaded Woodpecker (*Picoides borealis*) Second Revision (2003)

(4) Management Guidelines for the Red-cockaded Woodpecker on Army Installations (2007)

(5) Fort Benning Red-cockaded Woodpecker (*Picoides borealis*) Endangered Species Management Component (ESMC) (2014) (The draft 2014 ESMC will supersede the 2002 RCW ESMP when finalized.)

b. Biological Opinions (BO)

(1) Biological Opinion on the Review of the Endangered Species Management Plan (ESMP) for Fort Benning, Georgia (2002)

(2) Biological Opinion on the Digital Multi-purpose Range Complex (DMPRC) at Fort Benning, Georgia (2004)

(3) Biological Opinion on the Proposed Base Realignment and Closure (BRAC) 2005 and Transformation Actions at Fort Benning, Georgia (2007)

(4) Biological Opinion on the U.S. Army Maneuver Center of Excellence (MCoE) at Fort Benning, Georgia (2009)

(5) Supplemental Biological Opinion for the U.S. Army Maneuver Center of Excellence (MCoE) at Fort Benning, Georgia (2011)

(6) Biological Opinion on the Ordinance Impacts from the Malone Small Arms Range Complex at Fort Benning, Georgia (2013)

c. Biological Opinion Related Monitoring Plans (to include BRAC and MCOE Demographic Monitoring Plans, Cluster Shift Plan, Relict Trillium Plan, BRAC and MCOE Translocation Monitoring and Implementation Plans, Land Management Plan)

(1) Endangered Species Management Plan for the Red-cockaded Woodpecker on Fort Benning (2002) (2002 ESMP implemented after 2002 BO was issued)

(2) Red-cockaded Woodpecker Monitoring and Management Plan for the Fort Benning Digital Multi-Purpose Range Complex (2004) (2004 DMPRC BO requirement)

(3) Red-cockaded Woodpecker Habitat Impact Assessment Plan (2009) (2007 BRAC BO and 2009 MCoE Jeopardy Biological Opinion (JBO) requirement)

(4) Monitoring Plan to Evaluate Effects of Heavy Maneuver Training on the Red-cockaded Woodpecker Population on Fort Benning, Georgia (2009) (2009 MCoE JBO requirement)

(5) A20 Red-cockaded Woodpecker Management Plan (2010) (2009 MCoE JBO requirement)

(6) The A20 Wildfire Suppression Plan (2010) (2009 MCoE JBO requirement)

d. MCoE Related Biological Evaluations (BE)

(1) Biological Evaluation of Potential Impacts From the Proposed Multi-Purpose Training Range (MPTR) at Hastings Range (2010)

(2) Biological Evaluation of Potential Effects From the Proposed Changes to the Program of Instruction (POI) for the Army Reconnaissance Course (ARC) Training (2011)

e. Informal Consultations. Additional RCW monitoring is often required as a result of specific Army training or construction projects (or modifications made to ongoing training and construction) not covered in existing BOs, Monitoring Plans, and Guidelines specified above. Fort Benning, through the informal consultation process, often will negotiate minimization efforts with the USFWS in the form of special monitoring in order to demonstrate that a proposed action will not negatively impact RCW habitat, specific RCW groups, the population as a whole, and/or its ability to meet recovery. Minimization monitoring efforts are often the only way the Army can fulfill unanticipated mission requirements on short notice while maintaining compliance with the Endangered Species Act (ESA).

2. FORT BENNING CONSERVATION BRANCH (CB) AND LAND MANAGEMENT BRANCH (LMB) ACCESS REQUIREMENTS

The FB CB and LMB need to access various training areas on the Installation to conduct specific RCW population monitoring and habitat management activities during specific time frames throughout the year.

a. The 2004 DMPRC BO requires monitoring impacts to all clusters/groups within 0.5 miles and annual breeding season and dispersal/spatial monitoring of all clusters/groups within 3.0 miles of the DMPRC boundary. The 2007 Transformation/ BRAC BO and 2009 MCoE JBO requires FB to monitor 100% of the RCW clusters directly impacted by Transformation projects (i.e. experiencing habitat removal and/or cavity tree loss) as well as all clusters indirectly impacted (i.e. clusters within 0.5 miles of range projects or 200 feet of road projects). The 2003 RCW Recovery Plan, 2007 Management Guidelines for RCW on Army Installations and the draft 2013 FB RCW Endangered Species Management Component (ESMC) list eight

population and habitat management techniques that are used to manage the RCW population on the Installation.

(1) RCW monitoring and management involves demographic and habitat monitoring and management during breeding season and non-breeding season periods. RCW clusters are visited frequently to confirm activity status, perform nest and fledge checks, band nestlings and adults, identify band combinations of individuals, and document RCW movements and habitat use. Management practices include herbicide application, mechanical vegetation removal, prescribed burning, artificial cavity Installation, cavity tree maintenance, and various RCW habitat surveys. Additionally, existing BOs and BEs require nondiscretionary habitat surveys that must be conducted at regular intervals (i.e. daily, weekly monthly and/or annually) to monitor and assess potential impacts from military training operations, particularly those areas that are situated downrange.

(2) During the RCW breeding season, nest checks must be performed on a 7 to 10 day interval until a nest is found and the age of the nestlings determined. Nestlings must be banded 7-8 days after hatching. Nest checks and banding average 30 minutes to 1 hour per event. Fledgling checks should be conducted at approximately 26 days after hatching and no later than 40 days after hatching. Fledge checks can take from 1 to 3 hours and may require multiple trips to the cluster.

b. FB must continue to monitor RCW groups as a routine element of on-going demographic monitoring requirements. The Installation's current RCW population size as of 2012 is 337 potential breeding groups (PBG). Annual RCW monitoring includes monitoring 100% of the clusters for activity and breeding status (i.e. cluster inspections and nest checks). The Installation's current number of RCW clusters that are managed and require monitoring is 368. Recruitment clusters (RC) must be monitored for a minimum of 5 consecutive years after initial activation (USFWS, 2003). Of the total 368 RCW clusters that are managed on the Installation, 103 are identified as RCs.

c. CB personnel must access RCW clusters in the A20 Impact Area for compliance monitoring and management purposes in order to meet minimization requirements listed in the 2004 DMPRC BO and reasonable and prudent alternatives (RPAs) in the 2009 MCoE JBO. Currently there are 59 RCW clusters in the A20 that require monitoring.

d. CB personnel must access training areas Installation wide and systematically survey all existing RCW habitat for new cavity trees/clusters at least once every ten years. Additionally, RCW habitat must be surveyed within at least one year prior to any proposed actions that will directly impact habitat (i.e. construction or timber management).

e. CB personnel must also access training areas in order to conduct soil erosion and sedimentation control measures. The 2002 Endangered Species Management Plan (ESMP) BO and 2007 BRAC BO require control of soil erosion and sedimentation in all RCW habitat. Although soil erosion and sedimentation control measures are managed by the CB, the Natural Resources Conservation Service (NRCS) is typically contracted to implement the larger soil erosion and sedimentation control projects since these projects require more personnel and equipment resources than the CB can provide.

f. LMB and CB personnel require access to training areas so that prescribed burns may be conducted. The FB RCW ESMC requires that all forested habitat managed for RCWs (~79,000 acres) be burned at a minimum of once every 3 years for mid-story control. Prescribed burns will be conducted primarily from November - June. In some areas, dormant season burns (1 September - 16 March) will be used to reduce fuel so that growing season fires (17 March - 31 August) can be conducted. Winter burns may also be used to "catch up" areas that were scheduled for growing season burning, but could not be burned due to training activity, weather, etc., and fuel accumulation is too heavy to conduct the burn in the next growing season.

g. CB and LMB personnel must access training areas to assess and manage wildfires and other emergencies that may occur in order to protect all manageable RCW clusters and cavity trees in addition to other sensitive habitats, personnel, assets, or for smoke management. This includes obtaining emergency downrange access using the DPW-EMD Check-fire/Access Standard Operating Procedures found in the March 2013 MCoE Regulation 350-19.

h. The LMB is required to manage pine stands on the Installation in order to maintain and create sufficient habitat (current and future) to perpetuate RCW population management and recovery. This is achieved through commercial timber harvesting (thinning and regeneration) and planting longleaf pine seedlings.

(1) Prior to timber harvesting for RCW habitat improvements, LMB personnel must have access to complete a forest inventory, mark timber for harvest and collect data for the RCW foraging habitat analysis calculations.

(2) Areas selected for pine regeneration or under-planting require site preparation including chemical herbicide application and prescribed burning. Longleaf pine seedlings are hand planted during the winter following site preparation.

3. ACCESS LIMITATIONS.

Increased training activity resulting from DMPRC, BRAC and MCoE actions may limit training area access by CB personnel conducting time specific RCW monitoring and management activities. The LMB however experiences minimal or no scheduling challenges when they coordinate forest management activities directly with Range Operations Center (ROC) as opposed to the Range Facility Management Support System (RFMSS) to avoid

conflicts with military training. The LMB's work schedule changes so much that it is often impractical to use RFMSS.

Training areas including non-dudded impact areas affected by range fans or SDZs associated with live-fire ranges such as the DMPRC, Stationary Tank Ranges, MPTR and Alpha, Oscar and Malone Range Complexes increase the difficulty of current and future access for RCW management by the CB.

Access to dudded impact areas is restricted. CB personnel however must access dudded impact areas such as A20 due to DMPRC and BRAC BO and MCoE JBO related RCW impact minimization requirements. CB personnel will be escorted by EOD when accessing dudded impact areas unless other access arrangements have been previously made through ROC and EOD. For example, EOD may clear an area of duds so that CB personnel may access RCW clusters for breeding season and cluster maintenance purposes without an escort.

Access to RCW clusters and habitat potentially impacted by Transformation BRAC/MCoE activities may also become limited as a result of transportation and maneuver convoys on main roads.

Additionally, sections of major roads may be covered by SDZs associated with training on ranges in the area.

Lack of access to critical areas may impede the ability of CB and LMB to carry out all BO and other required RCW monitoring and management activities within regularly scheduled work hours during available daylight hours afforded by military training operations.

Access to any training area to conduct environmental compliance monitoring should be done through RFMSS more than 13 weeks in advance so Range Division can determine if conflicts with training exist. Furthermore, CB and LMB can coordinate co-locations with training units at the weekly range and terrain coordination meeting or meet in-person with ROC personnel to plan out access issues.

4. SCHEDULING PRIORITIES.

Scheduling access to training areas, ranges, and facilities on FB requires approval by the Directorate of Plans, Training, Mobilization, and Security (DPTMS), Range Division (RD), ROC. All access requests to these training areas (including air space) will be consolidated at the major unit or branch level (i.e. LMB and CB) and submitted to the ROC through RFMSS. (See March 2013 MCoE Regulation 350-19, Chapter 4 for details about scheduling of ranges and training areas). Note: In some cases, requesting/scheduling access to training areas may not be possible via RFMSS (see sections: 3. **ACCESS LIMITATIONS** and 5. **SCHEDULING PROCEDURES**).

a. Power Projection Platform missions have preemptive scheduling priority over all other activities on Fort Benning. These priorities are valid until 13 weeks prior to the

event in the scheduling process. Within this 13 week period, no priorities exist and remaining unscheduled ranges, training facilities and training areas are scheduled on a first come first serve basis. During this 13 week period, units are "locked-in" to the dates they have scheduled for training. LMB and CB should schedule access to ranges/facilities, and training areas whenever possible into RFMSS beyond the 13 week scheduling lock-in period. Furthermore, scheduling should be updated in RFMSS on a weekly basis by CB and LMB personnel.

b. Military units desiring to schedule training areas already scheduled by CB and LMB will be required to secure a co-location approved through the ROC before the unit can be scheduled in the training area(s). Units will not be allowed to schedule over CB/LMB without a co-location or agreement with CB/LMB.

c. In the event that environmental compliance related RCW and/or forest management actions are not being completed, priority scheduling may be given to CB/LMB. If approved at the Installation G3/DPTMS level, CB/LMB environmental compliance activities will be given priority over unit training, except for units training for deployment, to the point that minimal environmental compliance requirements can be met within designated time frames. Furthermore, the USFWS should be notified in accordance with BO/JBO compliance reporting terms if any BO/JBO requirement cannot be accomplished due to a training conflict.

5. SCHEDULING PROCEDURES.

The use of training areas (to include cantonment area drop zones), ranges, facilities, and associated airspace on Fort Benning for any purpose requires approval by the DPTMS, RD, ROC. All requests to schedule access to these areas will be consolidated at major units and or branch levels (i.e. LMB and CB) and submitted to the ROC using RFMSS (See March 2013 MCoE Regulation 350-19, Chapter 4 "Scheduling of Ranges and Training Areas" and Appendix E "DPW-EMD Check-fire/Access Standard Operating Procedures" for details about scheduling of ranges and training areas).

a. In general, LMB and CB personnel should schedule access to ranges/facilities and training areas whenever possible into RFMSS prior to the 13 week scheduling lock-in period (See 4.a. for details on 13 week scheduling lock-in period). Scheduling should always be updated in RFMSS on a weekly basis by CB and LMB personnel. After submitting training area access requests in RFMSS, LMB and CB personnel should use green marker to outline areas to be accessed on the Installation training area map at the ROC. Note: Scheduling conflicts are identified (flagged) during the scheduling process in RFMSS prior to marking on the Installation training area map at the ROC. If it is not possible to submit and receive approved access requests through RFMSS the same day that access is needed (e.g. when immediate/emergency access is required), LMB and CB employees must still contact ROC and arrange access to training areas (see March 2013 MCoE Regulation 350-19, Appendix E. DPW-EMD Check-fire/Access Standard Operating Procedures).

b. LMB and CB personnel may coordinate co-locations with training units at the weekly range and terrain coordination meeting (day: Thursday; time: 1330; place: ROC Center, building 5510) or through the RFMSS. This allows CB and LMB personnel and military units to occupy the same training areas without conflict.

c. Ranges will not be allowed to open prior to 0900 from 1 October to 30 April and prior to 0800 from 1 May to 30 September in order to allow pre-operation checks on the automated ranges and threatened and endangered species monitoring. CB and LMB personnel will have clearance to enter downrange areas or training areas affected by SDZs before ranges open for training in order to conduct environmental compliance activities. In the event a safety hazard exists, the ROC may deny downrange access or require CB and LMB personnel to vacate downrange areas prior to the aforementioned times. CB and LMB personnel must schedule downrange activities via RFMSS prior to accessing the areas whenever possible (see g. below). If the ROC does not receive a RFMSS and radio request for downrange access by CB and LMB personnel before the aforementioned range opening times, military units may be granted permission to start training on ranges early.

d. CB and LMB personnel are required to contact the Radio Room at the ROC via radio, prior to accessing and must be clear of downrange areas before scheduled range opening times. All personnel must contact the Radio Room at the ROC via radio immediately after exiting to avoid training delays.

e. The ROC may grant CB and LMB personnel additional downrange access time upon request in order to complete time sensitive environmental compliance activities. CB and LMB personnel must contact the Radio Room at the ROC requesting the extra time, and must exit the training area at the time specified in order to avoid training delays (see section 6.a. regarding downrange access).

f. CB and LMB may request the ROC to place military units on check-fire from 1200-1300 to allow access to training areas to complete time sensitive environmental compliance activities. If access is approved, personnel must contact the Radio Room at the ROC immediately after exiting the training areas so the check-fire can be lifted and units can resume training.

g. The ROC may grant CB and LMB access to a specific location within a training area affected by a SDZ if the specified location does not fall within an established SDZ so that environmental compliance activities may be conducted. Generally, CB and LMB personnel should coordinate in person with the ROC at least 24 hours prior to accessing a training area under this condition. In addition, all personnel must maintain at least a 150 meter Minimum Safe Distance (MSD) from the established SDZ as depicted for each range and training event on the Range Map located at the ROC.

h. Access to RCW clusters in the A20 Impact Area for compliance monitoring and management purposes is scheduled during December and January (Christmas Block Leave) and the RCW breeding season (1 April through 31 July).

(1) CB personnel must coordinate and schedule access to RCW clusters in the A20 Impact Area in person at the ROC (building 5510) at least 13 weeks in advance. If necessary, CB and LMB will send an authorized representative to coordinate A20 access with RD personnel and military units during the weekly range and terrain coordination meeting.

(2) Access to the A20 Impact Area usually requires explosive ordinance disposal (EOD) escort. The need and level of EOD support will be determined based on a risk assessment made by the Chief of RD during the annual coordination for access to those specified cluster areas.

(3) The CB conducted aerial surveys of the A20 impact area in 2009 and 2010, and K15 Impact Area in 2010 to identify locations and activity status of RCW clusters and cavity trees and to confirm habitat corridors. Any subsequent aerial surveys conducted by the CB in the future will be coordinated in advance with RD and scheduled more than 13 weeks in RFMSS prior to the planned survey dates.

i. Access to RCW clusters and habitat covered by SDZs resulting from live-fire training on the DMPRC was addressed in the 2004 DMPRC BA and BO. At a minimum, the CB must currently access RCW clusters and associated habitat adjacent to the DMPRC three full days per month (during regular work days whenever possible) to successfully complete RCW home range and habitat use follows, habitat impact surveys, and cluster/cavity tree activity/suitability inspections. The CB RCW Section utilizes between five and seven RCW Technicians to conduct all DMPRC related monitoring in order to complete all monthly requirements.

j. Emergency access such as for RCW cluster evaluation/protection resulting from a down-range wildfire in the area will proceed as defined in the March 2013 MCoE Regulation 350-19, Paragraph 5-21: Control of Forest Fires and Appendix E: DPW-EMD Check-fire/Access Standard Operating Procedures Operating Procedures.

k. CB and NRCS personnel will coordinate with the ROC to access training areas to control soil erosion and sedimentation issues. For example, access to portions of training areas is usually scheduled in-person at the ROC when soil erosion control projects are small in scale (i.e. small areas are drawn on the Range Training Map at ROC), whereas entire training areas are scheduled for access using RFMSS if the scale of a soil erosion control project is too large to allow for co-location with military units.

l. Forest operations such as timber harvests, site preparation and tree planting are typically scheduled more than three months in advance by LMB. In cases where the training areas are scheduled for military training, CB/LMB may coordinate a co-use

with the scheduled unit and the ROC at the weekly range and terrain coordination meeting. If the scheduled unit grants a co-use, forest operations must not interfere with training or pose a safety hazard to the training unit. Furthermore, forest operations will not be scheduled in those portions of training areas covered by Surface Danger Zones (SDZs) when the ranges are firing.

6. CB/LMB STEPS TO ALLEVIATE ACCESS CONFLICTS.

The CB and LMB will continue to change and adapt monitoring and management practices whenever possible in order to maintain regulatory compliance, while responding to increased training needs in order to minimize access conflicts.

a. In all cases where range opening times are restricted to support downrange environmental requirements, personnel will make a reasonable attempt to vacate the areas as quickly as possible in order to allow training to commence.

b. In an effort to increase forest management capabilities and facilitate the training mission, the LMB has streamlined the timber harvest contract process.

c. Currently, the CB is annually monitoring 100% of the manageable RCW population for cluster activity status and PGBs. When access limitations become a significant issue, CB personnel will continue to arrange their work schedules accordingly when possible, in order to complete all monitoring and management requirements.

   CB and LMB personnel can adjust work schedules that correspond with available daylight access. Both branches are willing and capable of providing services anytime, including outside normal duty hours, as permitted by budget and overtime administrative regulations

d. Additional CB and LMB personnel will be utilized when necessary to concentrate manpower for monitoring and management efforts during peak periods when the amount of time to access training areas is time limited for any one individual to complete their missions

7. REVISION.

This plan will be updated/ changed as necessary to ensure all training missions are met while simultaneously meeting the requirements of all regulatory monitoring and management requirements. Any changes to this plan will require coordination and approval from the USFWS and the DPTMS before implementation.

APPENDIX 10

5.1 LAND MANAGEMENT PLAN

(MAINTENANCE OF ROADS, RANGES AND TRAINING AREAS)

5.1.1 Executive Summary

Base Realignment and Closure (BRAC) actions such as relocation of Ft. Knox to Ft. Benning and other Transformation initiatives have added many new soldiers, civilians, and infrastructure to the Post. New missions and associated military training have added additional stress to the natural landscape and watersheds. The potential impact of these future missions on some watersheds could be adverse, potentially resulting in widespread erosion and water quality degradation from sedimentation which may have impacts to the habitat of the Red-cockaded woodpecker (RCW) and other Federally-listed threatened and endangered species. Ft. Benning will establish and maintain about 80,000 acres of pine forest, primarily longleaf, suitable for RCW habitat in order to reach Ft. Benning's recovery goal of 351 potential breeding pairs of birds located within 421 total RCW clusters. Ft. Benning is conducting many activities to develop this forest including longleaf pine planting, invasive species control, reduction of the hardwood understory, and ground cover restoration. These activities are addressed in other plans and guidelines presented in this INRMP.

The Land Management Plan focuses on the soil stabilization aspect of military training in order to control soil erosion/sedimentation and provide the substrate in which the forest will grow. A map showing the RCW foraging habitat is shown in Figure 2. Therefore, Fort Benning is developing a proactive approach to land management across the Installation by using structural and non-structural controls, landscape design, effective monitoring and detection, and timely response. If soil erosion control measures are successful there will be future benefits such as lower costs and less impact on the military mission at Fort Benning.

Fort Benning leadership has developed and implemented a strategy and structure for design, development, oversight, monitoring, and maintenance of soil erosion and storm water run-off control measures. The Directorate of Plans, Training, Mobilization and Security (DPTMS) and the Directorate of Public Works (DPW) are responsible for training lands and mission sustainability. DPTMS and DPW personnel must have a close working relationship that may require daily coordination with each other in order to accomplish tasks related to sustaining the Fort Benning training mission. DPTMS and DPW must make sure that sufficient funds are available (accounted for and are funded) to plan, design, develop, monitor, and implement all control measures for soil erosion. Funding needs will be identified and requested through the proper command authority (Garrison Environmental Requirements Build) for Conservation and Land Management

Branch funding, Sustainable Range Maintenance (SRM), and for the Integrated Training Area Management (ITAM) program. DPTMS and DPW personnel will work as a team to address funding areas of responsibility for proactively managing soil erosion and water quality by integrating training concerns and environmental compliance in support of a sustainable training environment.

The strategies to control soil erosion and sedimentation include the following: hiring additional staff, refining areas of responsibility for roads, trails and maneuver areas, facilitating periodic coordination meetings, initiating monitoring programs conducted by Conservation Branch, ITAM and Range Division, requesting annual funding, ensuring efficient rehabilitation capability and enhancing future off road maneuvering with sufficient National Environmental Policy Act (NEPA) documentation and Endangered Species Act (ESA) consultation.

5.1.2 Introduction

On October 1, 2009 Fort Benning became the Maneuver Center of Excellence (MCoE) and will accomplish 3 broad missions: 1) provide the nation with the world's best trained Infantry and Armor Soldiers and adaptive leaders imbued with the Warrior Ethos, 2) provide a power projection platform capable of deploying and redeploying Soldiers, civilians and units anywhere in the world on short notice, and 3) define required capabilities for the Infantry and Armor to meet the needs of the Future Force. Additionally, the MCoE will maintain Infantry and Armor branch integrity within the new MCoE model and ensure that it meets or exceeds the training standards for all Soldier and leader development instruction currently taught at the schools, while continuing to provide the best trained Soldiers in the world to our operating force.

Off-road vehicle training damages vegetation and causes soil disturbance that has the potential for increasing erosion and sedimentation. To mitigate environmental impacts, Fort Benning has developed a Land Management Plan that integrates the efforts of the various Installation organizations with training land sustainability and environmental protection responsibilities.

For example, the movement of the Armor School from Fort Knox to Fort Benning required the development of the Good Hope Maneuver Training Area (GHMTA). The GHMTA includes erodible soils and steeply sloped areas that were previously forested and used for dismounted training. To mitigate the potential environmental impacts of heavy maneuver training, Fort Benning implemented Best management Practices, such as, hardened roads, engineered low water crossings, and a marked training boundary that provides a vegetated buffer for wetlands and surface waters.

The units currently stationed at Fort Benning are diverse and consist of varying combinations of mechanized (tracked/ wheeled military vehicles) infantry task forces with task organized armor, mechanized infantry, field artillery and combat engineer assets utilizing both mounted and dismounted elements for offensive and defensive engagements.

Fort Benning provides ranges and maneuver training areas principally designed to support the Training and Doctrine Command (TRADOC) mission of initial entry training (IET) for Infantry Soldiers and Officers, Basic and Advanced level Noncommissioned Officer (NCO) and Officer training courses, home station training facilities for Forces Command's (FORSCOM's), the Army's Airborne and Ranger schools, and the continued study, testing and development of future joint and combined infantry doctrine, weapon systems, weapons tactics, techniques and procedures. Other units include the Special Operations Command's (SOCOM's) 75th Ranger Regt; 362nd ENG Company (Multi-Role Bridge); Western Hemisphere Institute for Security Cooperation (WHINSEC); Army Marksmanship Unit (AMU); Dental Activity (DENTAC); Logistic Assistance Office; Medical Department Activity (MEDDAC); U.S. Customs; U.S. Army Reserve; U.S. Air Force and the Army Research Institute. Fort Benning also has the U.S Army Armor School (USAARMS) units to include: the 16th Cavalry Regt, the 194th Armored Bde and the NCO Academy, as well as the following additional tenant units: 81st Regional Readiness Command, 43rd; Equipment Concentration Site; 3rd MP Group (CID); 86th MP Detachment; U.S. Army Audit Agency; 286th MP Det (CID); Explosive Ordnance Disposal Company; and Movement Control Team. USAARMS trains Armor and Cavalry Soldiers, NCOs and Officers to fight in full spectrum operations in order to meet the requirements of the Army in the contemporary operational environment. The USAARMS serves as the trainer for the current mounted force and develops the tools for the future mounted force. The USAARMS also trains Marines as M1A1 Tank Crewmen and Tank Mechanics. This training includes basic Military Occupational Specialty training as well as advanced Military Occupational Specialty training for Senior NCOs and Officers.

Due to Transformation actions (as analyzed in the 2007 Base Realignment and Closure (BRAC) Environmental Impact Statement (EIS) and 2009 MCoE EIS) and the resultant training doctrine accumulation and increase in daily training throughput, Fort Benning is faced with a significant challenge in maintaining training land integrity and sustainability.

Fort Benning has designated 4 areas and/or corridors (Northern, 19K/D OSUT, Southern, and Good Hope) for the most frequent, concentrated or intense off-road heavy maneuver use by the U. S. Army Armor School (USAARMS). Accordingly, these will be the areas that could potentially experience substantial impacts to the existing landscape and will require the greatest amount of resourcing and mitigation for soil erosion control, water quality maintenance and endangered species protection. In addition to the 4 maneuver corridors, training activities within the Vehicle Recovery Course and Drivers Training Course requires sustainability resourcing, impact mitigation, and soil erosion control measures.

The Northern Maneuver Corridor (NMC) and 19 K/D OSUT has the least severe soil erosion potential because off-road heavy maneuver training will only occur within 25 ft. of roads and trails. Additional maneuver training outside of the 25ft. corridor will require approval through the Fort Benning National Environment Policy Act of 1969 (NEPA) process and ESA consultations.

The Southern Maneuver Corridor (Armored Reconnaissance Course, formerly the Scout Leaders Course) has heavier damage to the landscape than the NMC or 19K/D OSUT but the damage is light. Armor School Humvees, Strykers and administrative personnel vehicles are maneuvering in the Southern Maneuver Corridor approximately 40 days per year.

The Good Hope Maneuver Area has greater impacts on soil erosion than the other three major training areas used by USAARMS. This is a result of the location, size, type of vehicles and type of off-road heavy maneuver training. Other than State and Federal mandated Erosion, Sedimentation and Pollution Control Plans (ESPCPs) for infrastructure construction (new and/or improved roads and tank trails), no other soil erosion control measures and/or landscape level best management practices (BMPs) have been funded or incorporated into the design of the Good Hope area. As a mitigation measure for erosion control, the Environmental Management Division has erected signs that mark the wetland buffer in the maneuver boxes of the Good Hope Area. The plan is to eventually mark all the wetland buffers within the maneuver boxes at Good Hope with Seibert Stakes.

The Vehicle Recovery Course and Drivers Training Course also have soil erosion concerns as the other heavy maneuver areas in regard to soil erosion potential and storm water run-off. Designs are currently underway for the addition of low water crossings and other landscape level BMPs in the Maneuver Areas through the Military Construction Funding allocation (MILCON). Table 5.1.1 shows a breakdown of the road acreages and maneuver area acreages for maneuver areas.

As a result of BRAC/Transformation actions and establishment of the MCoE, Fort Benning has recently constructed approximately 208 miles of new training roads and repaired or upgraded existing training area roads and/or tank trails (not including Main Post, Kelly Hill, or Sand Hill Cantonment Areas). A significant portion of the training road upgrades and additions (approximately 145 miles) occur within the Northern, 19D/K OSUT, Southern, and Good Hope Maneuver Areas (data extracted from the 2007 BRAC EIS and 2009 MCoE EIS Geographic Information System (GIS) polygon files.)

Table 5.1.1 Road and Maneuver Area Acreages

Project	Roads (acres)	Off-Road Heavy Maneuver Area Im (acres)
Northern Training Area Infrastructure	1304	--
19 D/K OSUT	258	--
Good Hope Maneuver Training Area	1521	2663
Southern Maneuver Training Area (Army Reconnaissance Course)	228	2698

Vehicle Recovery Course	--	135
Tracked Vehicle Drivers Course	--	72

In summary, BRAC and MCoE activities and initiatives have added many new soldiers, civilians, and infrastructure to the Post. New missions and associated military training have added additional stress to the natural landscape and the watersheds. The potential impact of these missions on some, if not many, watersheds could be severe, potentially resulting in widespread erosion and water quality degradation from sedimentation which could have impacts on the Red-cockaded woodpecker (RCW) and other Federally-listed threatened and endangered species if not mitigated. Therefore, Fort Benning has developed a proactive approach to land management, storm water run-off and erosion control issues across the Installation by using structural and non-structural controls, landscape design, effective monitoring and detection, and timely response. If soil erosion control measures are successful there will be future benefits such as lower costs and less impact on the military mission at Fort Benning.

5.1.3 Challenge

It is Federal policy that watershed management is the preferred approach to land management when impacts to surface waters are the primary concern. Currently, Watershed Management is only incorporated into the regulatory structure for streams used to supply drinking water. The implementation of Federal watershed management policy is difficult in the absence of regulatory requirements.

Currently, Fort Benning does not have the capability to respond in a timely manner to soil erosion issues and must use outside contractors, sometimes resulting in delays and worsening of the problems. Typically, the only source for repair is soil erosion control plan implementation by the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) through a Memorandum of Understanding (MOU) and the US Army Corps of Engineers (USACE). The repair services provided by the NRCS and USACE include: solicitation of bids, developing contracts, performing surveys, preparing plans and the implementation of those plans. This method of repair could take approximately 1 year from the time the money is sent from Fort Benning to the receiving agency until project completion (i.e. BMP construction). However, projects can be completed sooner depending on the backlog of projects that exists with the NRCS. The primary responsibility for NRCS is the counties that make up the Pine Mountain Soil and Water Conservation District in Georgia so Fort Benning is not their only client or priority.

Historically, 10 to 15 sites on Fort Benning have been rehabilitated each year by the NRCS, covering approximately 50 acres. The Fort Benning Soil Conservation Program (SCP) provided approximately $300,000.00 to the NRCS and $300,000.00 to the USACE annually for construction of BMPs. This $600,000 per year benefits approximately 5 clusters and their foraging habitat. Today the SCP is receiving $300,000 per year and works with NRCS and the Base Ops Contractor to implement erosion control plans. In past years the ITAM program has been under funded.

Therefore, a new strategy for design, development, oversight, monitoring, and maintenance of soil erosion and storm water run-off control measures will be implemented on Fort Benning. To further support a new Fort Benning strategy, the 2007 BRAC BO states “a new Installation strategy should include the ability to remediate some soil erosion problems in-house, thereby shortening response time and reducing environmental impacts”.

5.1.4 Background

The USFWS 2007 BRAC Biological Opinion (BO), Reasonable and Prudent Measure number 3, states that Fort Benning must “develop the Installation’s Land Management Plan that focuses on the Soil Conservation Program and Sustainable Ranges.” Additionally, Term and Condition number 3 states that the “Land Management Plan” should include: 1) organizational structure that can support this initiative, 2) strategies to abate significant training impacts in highly erodible soils, 3) a management system with protocols that specify areas for training rotation when erosion impacts breach thresholds in the maneuver areas, and 4) specific roles and protocols for the ITAM program and how the Range Training and Land Program (RTLP) will be implemented. Specifically, the BRAC BO states “avoidance and minimization of impacts to RCWs must be accomplished by a combination of institutional and engineering controls, and the programming of adequate resources necessary to proactively manage the impacts of the Transformation actions.”

The 2007 BRAC BO also states, “One key issue that this strategy will need to address is the lack of resources for personnel to effectively respond to land maintenance issues”. Another shortfall as stated in the 2007 BRAC BO “is the lack of enough heavy maneuver area to allow rotation of heavy maneuver training from one area to another in order to rehabilitate and maintain the maneuver areas”. In areas with high training exercise volumes and throughputs, soil erosion problems have the potential to escalate quickly and potentially cause substantial damage to the landscape if not repaired. As a result, typically minor disturbances have the potential to quickly escalate into substantial environmental impacts.

5.1.4.1 Goals and Objectives

The overall goal of this Plan is to provide a suitable environment, focusing on soil stabilization to establish and maintain approximately 80,000 acres of pine forest, primarily longleaf, suitable for RCW habitat in order to reach Ft. Benning's recovery goal of 351 breeding pairs of birds. To accomplish that goal Ft. Benning has adopted the following objectives:

1) Develop an organizational structure that can support this initiative.

Maintaining sustainable training lands through storm water management, soil erosion control, and avoidance and minimization of impacts to RCWs will be accomplished by a combination of institutional and engineering controls. The programming of adequate funds necessary to proactively manage the impacts of the MCoE actions is also

required. Contained in this Plan is a management system along with the appropriate organizational structure to proactively manage the impacts of MCoE training activities, which will be continued and/or enhanced over time, as lessons are learned and training impacts are fully realized and assessed on the landscape. One key function of this strategy is to attain resources for land maintenance personnel to effectively respond to issues.

2) Determine strategies to abate significant training impacts in highly erodible soils.

Fort Benning has implemented a proactive approach to land management, storm water run-off and erosion control issues across the Installation by using structural and non-structural controls, landscape design, effective monitoring and detection, and timely response. In the Northern Maneuver Area off-road vehicles are restricted to areas within 25 feet of the road. Other off road maneuvers are concentrated in the maneuver boxes of the Good Hope Training Area and portions of the Southern Maneuver Area. Additional off road maneuvers will be coordinated through ESA consultations and the NEPA processes. If soil erosion control measures are successful there will be future benefits such as lower costs and less impact on the military mission at Fort Benning.

3) Design a management system with protocols that specify areas for training rotation when erosion impacts breach thresholds in the maneuver areas.

Sites will potentially be marked as temporarily off-limits to digging/driving, and recovery will be monitored. Closed areas may possibly be added on a quarterly or as needed basis to a “No Dig/No Drive” map used to help military trainers for planning purposes. Sufficient time will be coordinated in and around training events to accomplish specific tasks related to maneuver damage inspection and repair. Updated protocols for scheduling of maneuver damage inspections, repairs and other resource management needs will provide enhanced opportunities for damage inspection, corrective actions, and monitoring.

4) Identify specific roles and protocols for the ITAM program.

The Land Rehabilitation and Maintenance (LRAM) component of the ITAM program is the Army’s premier program for land rehabilitation, restoration, maintenance and sustainment of training lands.

5) Develop in-house capabilities for ITAM, DPTMS and Conservation Branch, DPW

FBRD will establish in-house maintenance capability to respond rapidly to the heavily used areas in order to maintain the areas in a safe and usable condition. In the past several years, based upon the level of funding received, ITAM has completed 47 water crossings and restored approximately 300 acres of the Southern Maneuver Area to safe and usable training land.

Long term the plan is for ITAM to hire a staff to rehabilitate three maneuver training areas. The three areas are the Northern Maneuver Training Area and One Station Unit

Training Area (19K/D OSUT), Southern Maneuver Area and the Good Hope Maneuver Area. The 3 teams that will rehabilitate these areas will consist of 12 individuals at the Good Hope Maneuver Area, five individuals at the Northern Maneuver Training Area and five individuals at the Southern Maneuver Area. The individuals will operate equipment and provide monitoring and maintenance of erosion control best management practices. The equipment used to rehabilitate areas will be staged in the three training areas. Equipment will include small bulldozers, excavators and farm tractors with agricultural implements. Equipment and personnel required may increase depending on the condition of the land.

Conservation Branch has developed some in-house rehabilitation capabilities also. A new soil conservation technician was hired in Jan 2011, and is the primary responder to soil erosion issues affecting RCW foraging habitat, especially in clusters. This allows a shorter response time on smaller projects that need immediate attention.

5.1.4.2 Responsibilities

5.1.4.2.1 Responsibilities of the Directorate of Plans, Training, Mobilization and Security (DPTMS):

The Sustainable Range Program (SRP) is the Army's roadmap for how it designs, manages and uses it ranges in order to ensure the capability, availability and accessibility of its ranges to meet its training mission. It is the Army's response to the increasing challenges brought about by incompatible land uses and meeting the ever increasing need for ranges and training land brought about by the Global War on Terrorism (GWOT), the Army Campaign Plan, BRAC and Global Defense Posture Realignment (GDPR). Because many programs and functions affect the management of the ranges and training lands, the SRP is the Army's overarching guidance for integrating operational, training, facility, safety and environmental requirements to improve the management of its ranges and ensure their sustainability to support mission requirements now and into the future.

The Army's SRP consists of its 2 core programs, under the direction of Fort Benning Range Division: the Range and Training Land Program (RTLP), which includes the day-to-day management of its ranges as well as new range construction and the ITAM program for the repair and maintenance of its maneuver lands. AR 350-19 defines and prescribes policies for implementing the SRP on Army controlled training ranges and training lands. A description of this program, termed the Fort Benning Sustainable Range Program is discussed below.

Range and Training Land Program (RTLP) – Fort Benning's RTLP provides for the central management, programming, and policy for modernization of Benning's ranges and their day-to-day operations. Objectives include: 1) integrate mission support, environmental stewardship, and economic feasibility and define procedures for determining range projects and training land requirements to support the MCoE's live-fire and maneuver training; 2) define the quality assurance and inspection milestones for range development projects and the standard operating procedures to safely operate

military training ranges and support Commanders Mission Essential Task List and Army training strategies; and 3) establish the procedures and means by which the Fort Benning range infrastructure is managed and maintained on a daily basis in support of the training mission.

The RTLP identifies current training facilities and forecasts training needs and requirements in the future. Current training facilities are identified and compared to training requirements in the future. If an additional training facility is required e.g. in 2016, a program objective memorandum is written to request the new facility.

Integrated Training Area Management Program (ITAM) – ITAM sustains the Army's live maneuver training capability by integrating Senior Commander training needs and ARFORGEN unit proficiency levels with terrain capability assessments, land condition requirements, and sustainable range awareness. ITAM ensures the home station training environment supports ULO by repairing maneuver damage and creating a realistic training land base (Land Repair and Maintenance). ITAM managers manage maneuver training loads and land carrying capacity. This results in proactive land management that avoids non-compliance with environmental law that can stop training (Training Requirements Integration and Geographic Information System). The program provides capability to monitor and assess maneuver impact and increase training load capacity under normal and surge conditions (Range and Training Land Assessment). Additionally it provides Soldier awareness that reinforces techniques to avoid damage (Sustainable Range Awareness).

The ITAM Program provides Fort Benning's Range Officers with the capability to manage and maintain training land by integrating mission requirements with environmental requirements and sound land management practices. This requires understanding and balancing of Army training requirements and land management practices.

The effective integration of stewardship principles into training land and conservation management practices ensures that Army lands remain viable to support future training and testing mission requirements. Training mission goals and ITAM supporting objectives include:

Goal 1: Support Maneuver Training for the Armor School, Infantry School and tenant units (i.e.,3rd HBCT, 3/75 Ranger). Support light and heavy maneuver training in order to meet the training requirements of the Armor, Infantry Schools and tenant units.

Objective A:
Project 1 Good Hope Maneuver -AO East Maneuver Trail Maintenance: Maintain .18 miles of maneuver trail throughout the training cycle. Maintenance efforts will include restoring draining ditches (cleaning debris and reshaping) along each side of the trail, and stabilizing soils within the trail bed through routine grading. If the extent of

maneuver damage requires efforts beyond grading and shaping, surge stone will be applied to the trail and its drainage ditches where needed.

Project 2 Good Hope Maneuver Training Area Stabilization: Maintain and stabilize 2900 acres in the Good Hope Maneuver Area. These acres are divided into five separate areas, they are as follows:
AO West 345 acres
AO Center 316 acres
AO East 656 acres
AO South 271 acres
AO Company South 1332 acres

These areas are heavily used by the Armor School. Because Good Hope Maneuver Training Area will experience extremely high throughput over a relatively small amount of acreage (due to maneuver box size restriction resulting from environmental constraints) constant maintenance will be required. The soils within Good Hope are loosely bound and will quickly become erodible during training exercises. To control sediment run-off; rip rap check dams, and strategically placed swales, turn-outs, silt fence, geo-textile fabrics, and rock lined channels will be required. To maintain stable surfaces for safe maneuver training; ruts, rills, and uneven surfaces will need to be graded, and surge stone will need to be applied over heavily damaged areas. Maps showing work effort will be prepared and submitted with RECs.

Objective B:
Project 1: AO East Bivouac Site Vegetation Management and Soil Stabilization: Mow eight acres and associated one mile of maneuver trail twice annually. AO East Bivouac site is used heavily and as result experiences loss of ground vegetation. The lack of vegetative cover creates loose soils subject to heavy erosion. Grass seed must be planted to stabilize these soils. Due to sandy soil conditions, seed also must be fertilized (fertilization includes lime applications). In addition to planting grass, scrub brush and briers must be removed/mowed to allow for safe line of sight along the trail leading to the bivouac. Other tall brush within the bivouac will also need to be mowed.

Objective C: Good Hope Planning Areas I-IX. (See Figure 5.1.1)

Project 1 Vegetation Management/Timber Removal: Planning Areas I-IX collectively account for 4,887.28 acres (Figure 5.1.1). Trees and vegetation need to be removed in order to create open maneuver space. ITAM will coordinate with Forestry/Land Management Branch for the removal of merchantable timber and will be responsible for removing non-merchantable timber and reducing maneuver hindering vegetation using rotary head mulchers, bush-hogs, and hand clearing field crews. Forestry timber sale maps and ITAM vegetation reduction maps will be prepared collaboratively and will illustrate total acres managed within each planning area. These project maps and associated design plans will accompany RECs tiered from this INRMP's EA.

Project 2 General Soil Stabilization Activities: Repair land damaged by heavy maneuver. Project will entail grading and shaping damaged surface areas, applying gravel and stone to stabilize soils, planting grass to minimize erosion, and hardening trails that support heavy maneuver training. These actions are required to reduce sediment run-off and provide stable and safe maneuver training surfaces. Stabilization efforts will be dictated by location and frequency of maneuver damage. Following land damage assessments, ITAM will prepare detailed projects maps that illustrate land stabilization locations and acreage. These maps will accompany the RECs tiered from this INRMP's EA. General soil stabilization activities are not construction projects. Project efforts do not include the development of permanent erosion control structures or engineered land features.

Project 3 Tactical Maneuver Trails (Located outside open maneuver areas): These trails are located outside of the Planning Areas but support maneuver to and from the planning areas. Trails will provide rudimentary maneuver training experiences, and maneuver will be restricted to the trails. Trail widths = 24 feet with an Area of Potential Effect (APE) of 44 feet. Total trail mileages = 4.81. Trail development will consist of removing trees/vegetation to accommodate the specified measurements. Tree removal will be coordinated through the Land Management Branch. Trail maintenance will entail applying gravel (serge stone) to the surface for stabilization and creating water bars, turnouts, check dams, and broad based dips consistent with Georgia BMP manuals. Maintenance efforts will take place depending on frequency of maneuver damage. Maintenance efforts will be conducted for the purpose of reducing sediment run-off and providing safe maneuver training surfaces. Project maps and associated design plans will accompany RECs tiered from this INRMP's EA. Note: maintenance efforts do not entail construction projects or include the development of permanent erosion control structures. Level of effort required for BMPs will not exceed what is documented as "common-sense" efforts in "Georgia's Best Management Practices for Forestry".

Project 4 Develop Low Water Crossings (LWCs): Locations for LWCs will be dependent on how maneuver training in Good Hope materializes, and the creation of LWCs will be determined on a case by case basis as part of Records of Environmental Consideration (RECs). Design plans illustrating the exact locations and number of LWCs will be provided with RECs. The Potential Development Areas (PDZs) identified on Figure 5.1.1 illustrate likely LWC locations. LWCs will enhance tactical training by providing a safe, reliable, hardened surface for tank maneuvers while minimizing sediment discharge into waterways. LWC development projects will be consistent with Georgia BMP manuals. Project maps and associated design plans will accompany RECs tiered from this INRMP's EA.

Goal 2: Support indirect fire for 3rd HBCT and other tenant units.

Support indirect fire for 3rd HBCT, 3/75 Ranger Battalion, and TRADOC (e.g., Infantry and Armor Schools) located at FT Benning.

Objective A:
Project 1 Cactus Road Firing Point Soil Stabilization: Stabilize 36.5 acres 14 times annually. Stabilization activities will include: restoring rock-line channels damaged during maneuver training, grading uneven surfaces, filling ruts formed by tactical vehicles, and reshaping existing berms around the firing point. Rock-filter dams, small gulley plugs, turn-outs and water bars will be applied to the firing point and its associated .6 mile of interior maneuver trail to minimize erosion. Stabilization efforts will also include planting grass seed (fertilizer and lime will be applied to grass to promote a healthy growth rate).

Project 2 Bush Hill Firing Point Soil Stabilization: Stabilize 54 acres 10 times a year. Stabilization efforts will include reshaping soils disturbed by maneuver damage and planting grass seed. Fertilizer and lime will be applied to grass to promote a healthy growth rate and erosion control blankets will be used to maintain stable soils. Rock lined channels damaged by maneuver training will also be repaired by applying rip rap, crushed/modified stone, and geo-textile fabric.

Project 3 Firing Point 602 Soil stabilization and Restoration: Stabilize 44.5 acres. Stabilization activities will include: restoring rock-line channels damaged during maneuver training, grading uneven surfaces, filling ruts formed by tactical vehicles, and reshaping existing berms around the firing point. Rock-filter dams, small gulley plugs, turn-outs and water bars will be applied to the firing point and interior maneuver trails as needed to minimize erosion. Stabilization efforts will also include planting grass seed (fertilizer and lime will be applied to grass to promote a healthy growth rate).

Project 4 Firing Point 603 Soil Stabilization: Stabilize 20 acres 10 times annually. Stabilization activities will include: restoring rock-line channels damaged during maneuver training, grading uneven surfaces, filling ruts formed by tactical vehicles, and reshaping existing berms around the firing point. Rock-filter dams, small gulley plugs, turn-outs and water bars will be applied to the firing point and interior maneuver trails as needed to minimize erosion. Stabilization efforts will also include planting grass seed (fertilizer and lime will be applied to grass to promote a healthy growth rate).

Goal 3: Airborne and Air Assault Operations

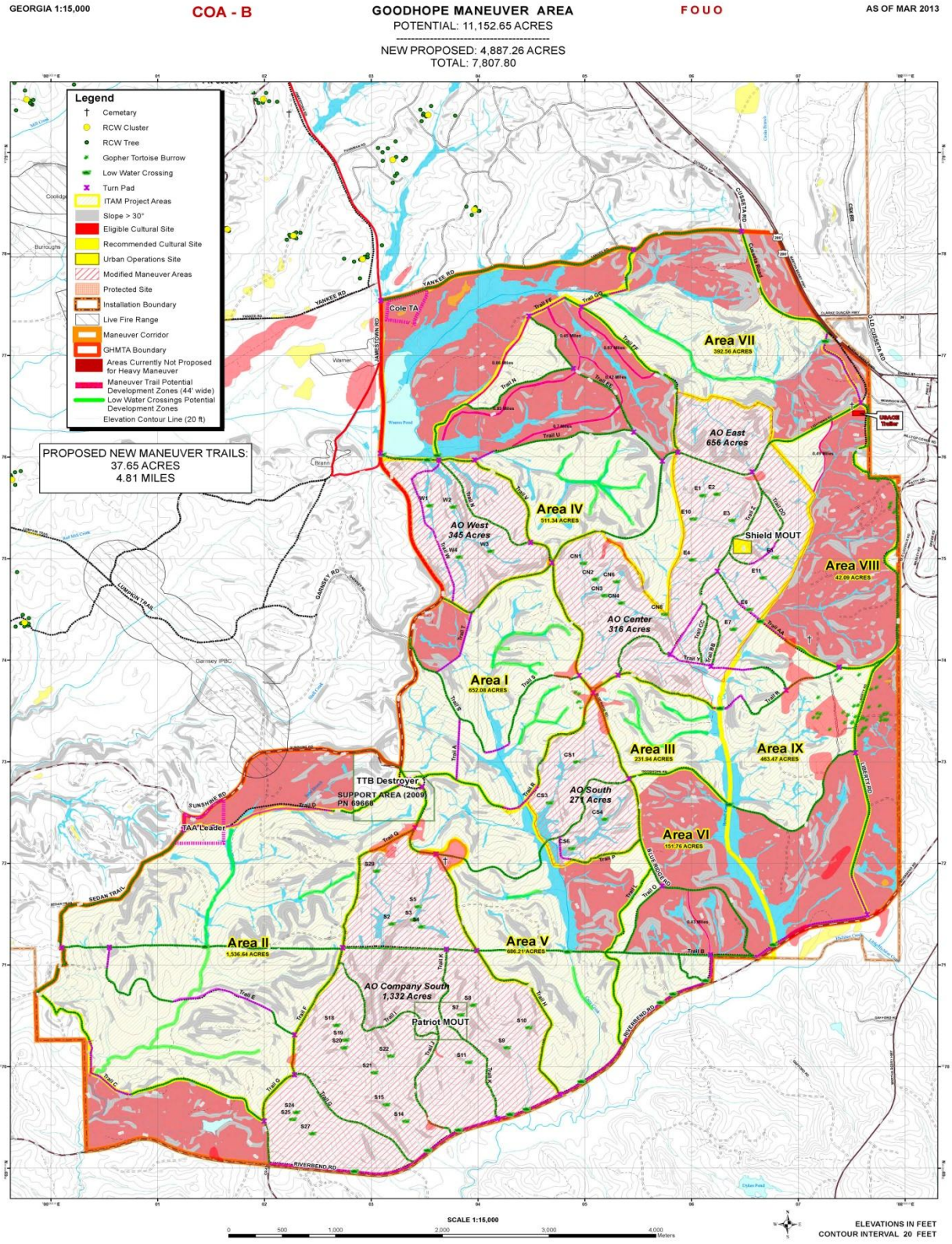
Support Airborne and Air Assault operations primarily for 75 Ranger Regiment, Ranger Training Brigade and 507 Airborne Battalion.

Objective A: Maintain 32 LZs/PZs and 17453 meters of perimeter Drop Zone twice a year (Collectively LZ/PZ equal 362 acres). Vegetation management efforts For LZs/PZs will include bush hogging, mowing, and hand clearing. Soil stabilization efforts will entail grading, seeding, and applying rock and gravel where needed. Fort Benning has 4 Drop Zones totaling 1190 acres. ITAM is responsible for maintaining 17453 meters of the drop zone perimeter (the drop zone is maintained by DPW). Safety requirements dictate vegetation management requirements. Woody vegetation will be cut (rotary head

mulcher/hydro ax) to ensure stems stay within safety requirement thresholds. Grasses will be mowed and bush hogged at a level that promotes clear line of sight and to ensure DZs are absent of holes, rills, and gullies. Where needed, gullies and rills will be graded and holes filled. Bare ground will be tilled and seeded.

The ITAM Program relies on its four components and integrated management from HQDA, MACOM, and IMCOM down to the installation level to accomplish its mission. The four components are: 1) Training Requirements Integration (TRI); 2) Range and Training Land Assessment (RTLA); 3) Land Rehabilitation and Maintenance (LRAM); and 4) Sustainable Range Awareness (SRA). These components, further discussed below, combine to provide the means to understand how the MCOE training requirements will impact land management practices, what the impact of training is on the land at Benning, how to mitigate and repair the impacts, and communicate the ITAM message to soldiers and the public. Geographic Information Systems (GIS) is a foundational support element that provides location information that assists land managers in making their decisions.

Figure 5.1.1 Good Hope Planning Areas



Training Requirements Integration (TRI) – TRI is the component of the Fort Benning ITAM Program that provides a decision support procedure that integrates training requirements with land management, training management, and natural and cultural resources management processes and data derived from RTLA and Army Conservation Program components. Army Training and Testing Area Carrying Capacity (ATTACC) is the standard methodology for estimating training land carrying capacity by relating training load, land condition, and land maintenance practices. HQDA uses ATTACC to estimate land maintenance requirements for the ITAM program and is integrating it into the Army's Training Resource Model. At Fort Benning, the ATTAC methodology and its automated decision support tools are being integrated into their training land management systems and will be used in the TRI process. The integration of all requirements occurs through continuous consultation between the Directorate of Plans, Training, Mobilization, and Security (DPTMS), Directorate of Public Works (DPW), Environmental Management Division (EMD), natural and cultural resources managers, and other environmental staff members, as appropriate. The Fort Benning Integrated Natural Resources Management Plan (INRMP) is developed and updated with TRI input and is an implementing document foundational to the TRI process. TRI supports range modernization project sighting and training event scheduling and allocation.

Land Rehabilitation and Maintenance (LRAM) – LRAM is a key enabler for sustaining realistic training conditions and supporting personnel, weapons, vehicles, and the mission requirements for the units using the installation. It provides a preventive and corrective land rehabilitation and maintenance procedure to reduce the long-term impacts of training on an installation. It includes training area redesign and/or reconfiguration to meet training requirements.

LRAM uses technologies such as re-vegetation and erosion control techniques to maintain soils and vegetation required to support the military mission. Other engineering controls may include maneuver area hardening, seibert stakes, etc. These specifically designed efforts help installations maintain quality military training lands, minimize long-term costs associated with land rehabilitation and manage impacts to natural resources. LRAM includes programming, planning, designing, and executing land rehabilitation, maintenance, and reconfiguration projects based on requirements and priorities identified in the TRI and RTLA components of ITAM.

Sustainable Range Awareness (SRA) – SRA is the component of the ITAM Program that provides a proactive means to develop and distribute educational materials to users of range and training land assets at Fort Benning. Materials relate procedures that reduce the potential for inflicting avoidable impacts on range and training land assets, including the local natural and cultural resources. The SRA component addresses specific environmental sensitivities at the installation level, to inform land users of restrictions and activities to avoid so as to prevent damage to natural and cultural resources. The SRA component applies to soldiers, other services using Army lands, installation staff, other land users, and the public. The SRA component also includes

efforts to inform environmental professionals of Army and installation mission and training activities.

Range Training Land Assessments (RTLA) – RTLA is accomplished at Fort Benning through a cooperative effort between ITAM Staff, Range Staff, DPW Environmental Staff, and Units training at Fort Benning. Land management requirements identified through RTLA are incorporated into the ITAM Work plan based on training requirement priorities.

Sustainable Range Program Geographic Information Systems (SRP GIS) – The Sustainable Range Program Geographic Information Systems (SRP GIS) provides support to the elements of the (SRP) and its two core programs, the Range and Training Land Program (RTLP) and the Integrated Training Area Management (ITAM) Program, which focuses on the doctrinal capability of the Army's Ranges and training land. The SRP GIS mission is to create, analyze, manage and distribute authoritative standardized geospatial information, products and services for the execution of training strategies and missions on U.S. Army ranges and training lands. The SRP GIS Program is the foundation and thread that all ITAM programs are built upon and ties them together.

5.1.4.2.2 Responsibilities of the Directorate of Public Works

Conservation Branch

The Soil Conservation Program addresses erosion and sedimentation in RCW habitat as required by the BO for the RCW Endangered Species Management Plan (ESMP) (USFWS 2002) and the BO for BRAC (USFWS 2007). The ESMP BO requires Fort Benning to repair existing, and prevent future, erosion that threatens individual RCW cavity trees and the integrity of the cluster. BMPs employed to prevent erosion and rehabilitate eroded areas include the construction and maintenance of rock channels, rock check dams, sediment basins, diversions and silt fencing. Vegetative measures include temporary and permanent grassing, mulching and the installation of erosion control blankets. Longleaf pines are planted to further stabilize the project sites and to provide habitat for the RCW. Conservation and Land Management Branch technicians will report erosion and sedimentation as a part of their normal duties. A reporting form will be developed to record the location and severity of the erosion and sedimentation. If the erosion is not located in an area that can be addressed by the Soil Conservation Program the information will be passed along to attendees at the periodic meeting with BASOPS Contractor, LMB and ITAM.

Land Management Branch

The Land Management Branch (LMB) is responsible for maintaining firebreaks in the training areas of Fort Benning. Firebreaks are used to aid in prescribed burning and wildfire suppression. Most firebreaks are maintained every 2-4 years cycling with the prescribed burn

sequence. Some firebreaks such as the impact area firebreaks in M-6, A-20 and K-15 are maintained every year due to the high probability of the occurrence of wildfires. The Land Management Branch currently works anywhere from 100 to 300 miles of firebreaks each year. Firebreaks are not constantly maintained for vehicular traffic. A very small number of trails are worked each year in support of harvesting operations and for natural resources management activities. Firebreaks are often used by hunters, military trainers, and natural resource managers.

Environmental Programs Management Branch

The Fort Benning DPW EMD Environmental Programs Management Branch (EPMB) ensures that all Installation activities comply with Federal and State environmental regulations. Many of these permits cover activities in the training area.

The Installation storm water permit requires documentation of the effectiveness of surface water protection measures and establishes a duty to report any compliance failures to the State. This effort includes the review of construction project erosion and sediment control plans, monitoring of the implementation of construction land disturbing activity permits, and the effectiveness of post-construction erosion and sediment control measures. The storm water permit also requires monitoring of impaired streams, the identification and elimination of illicit discharges and the implementation of a spill prevention, control and countermeasure plan.

EPMB also monitors the implementation of State permits for industrial facilities that include some training area facilities where potential pollutants are exposed to rain, such as permanent re-fueling and maintenance sites. Other EPMB programs that monitor compliance for Installation permits covering the training areas are; Hazardous Waste, Air Quality and NEPA and Cultural Resources.
Land Disturbance Activities (LDA) requires some type of documentation (e.g. plan) to address soil and hydrology components when construction and/or maintenance activities are implemented to meet CWA requirements. Projects involving LDA larger than 1 acre require coverage under NPDES permit with a site specific Erosion, Sedimentation Pollution Control Plan (ESPCP). These plans utilize BMPs to reduce erosion and sedimentation. Additional information about NPDES permit requirements are described in Section 5.2.3.1.2 for project in the State of Georgia and Section 5.2.3.1.3 in the State of Alabama.

Base Operations Contractor

The prime base operations contractor on Ft. Benning is responsible for road and trail maintenance. They will maintain paved and unpaved roads and trails that have a real property category code. The Base Operations Contractor (BASOPS) performs maintenance under the direction of Operations and Maintenance Division, DPW. Detailed information on how this Contractor maintains the roads are available in Figure

5.1. The BASOPS Contractor will also implement erosion control plans for the Conservation and Land Management Branches depending on requirements.

5.1.4.2.3 Responsibility for Maintenance of Roads, Trails and Firebreaks

The BASOPS and the Land Management Branch are responsible for sustainment and maintenance of most of the roads, trails and firebreaks on Fort Benning. Generally speaking BASOPS will maintain all named roads or roads that have a real property category code. The roads and trails BASOPS is responsible for are highlighted in red on the map in Figure 5.1.2. Anyone can report maintenance needs on roads via a work request. This work request goes to BASOPS who prioritizes it. In addition, maintenance needs on range course roads are reported by the Range Maintenance Coordinator to BASOPS by a work request. The Range Maintenance Coordinator also prioritizes road maintenance and meets with BASOPS representatives weekly. The Land Management Branch will maintain unimproved roads and firebreaks depicted in green on the map in Figure 5.1.2.

5.1.4.2.4 Responsibility for Maintenance of Ranges, Maneuver Corridors and Training Lands

The ITAM program is responsible for off road maneuver trails and disturbed areas within maneuver areas. The funding guidance which lists areas ITAM are funded to work on is in Appendix B.1.11.1. The Conservation Branch will rehabilitate training area damage within RCW habitat in all areas of Ft. Benning, as indicated in Figure 5.1.2. Responsibilities of organizations that perform maintenance are shown in Table 5.1.2.

Table 5.1.2 Organizational Maintenance Responsibilities

Organization	Road/Trails	Training Areas/Ranges*
BASOPS Contractor	Named Roads and Trails with category codes and trails/land not assigned to others	N/A
Land Management Branch	Unnamed unimproved roads and firebreaks	N/A
Conservation Branch	Construct BMPs associated with sediment from dirt roads impacting habitat	Acres considered RCW habitat (80,000 ac)
ITAM, DPTMS	Off-road maneuver trails	Maneuver areas excluding course roads in Training Areas such as Southern and Northern Maneuver Areas and Good Hope.
Range Division, DPTMS	Range Maintenance Coordinator inspects and reports road maintenance needs on ranges	N/A

*Excludes Roads, Trails and Firebreaks

5.1.4.3 Funds Requested

Funding needs will be identified and requested through the proper command authority. The sources of funding are listed below:

- ITAM - Land Rehabilitation and Maintenance - Funded by the G-3,5,7
- BASOPS Contractor – IMCOM SRM Funding – Sustainment, Restoration and Modernization
- Land Management Branch – Garrison Environmental Requirements Build and/or IMCOM SRM Funding
- Conservation Branch – Garrison Environmental Requirements Build

Table 5.1.3 summarizes estimates of requested funding for training area rehabilitation in the FY 14 - FY 18 time period. Although ITAM requests 3 million annually funding varies from year to year and has been inconsistent throughout the history of the program. In the event ITAM does not receive any funding they will not be able to rehabilitate any training areas, however most tank trails and roads will be maintained by the BASOPS Contractor. In Appendix B.1.11.1 there is an excerpt from the ITAM funding guidance memorandum that lists structures that ITAM can and cannot fund. All rehabilitation activities are funding dependent.

Table 5.1.3 Requested Funding for FY 14 – FY 18

	FY14	FY15	FY16	FY17	FY18
BASOPS Contractor	$600K	$600K	$600K	$600K	$600K
LMB	$160K	$166K	$170K	$174K	$180K
ITAM	$3M	$3M	$3M	$3M	$3M
Cons Branch	$300K	$300K	$300K	$300K	$300K

5.1.5 Integration of Installation Elements

Two major Directorates at Fort Benning are responsible for training lands and mission sustainability. The Directorate of Plans, Training, Mobilization, and Security (DPTMS) is responsible for training aspects of sustainability, to include scheduling, management and enhancement of ranges/maneuver areas. The Directorate of Public Works (DPW) is responsible for the training area connectivity and post-wide management aspects of sustainability, to include compliance.

DPTMS and DPW personnel will work as a team to address areas of responsibility, and structural options for proactively managing soil erosion and water quality by integrating

soil conservation measures, training concerns, and environmental compliance in support of a sustainable training environment. This work is best accomplished with integration and coordination among all responsible Installation elements. The funding, technology, and personnel components of these actions will most likely remain fluid.

Fort Benning has developed and implemented a strategy and structure for design, development, oversight, monitoring, and maintenance of soil erosion and storm water run-off control measures for abatement of non-compliance and direct impacts to threatened and endangered species in support of sustainability of training lands and missions.

The Environmental Management Division, Range Division, and BASOPS Contractor meet to discuss current and future projects in training areas, roads and RCW habitat and how to work together more efficiently. Fort Benning will continually develop a strategy for watershed protection and training land sustainability as future missions dictate. Data integration, data analysis, remote sensing and GIS, and data management are crucial to this strategy.

5.1.6 Work Plans

5.1.6.1 Maneuver Damage Inspection and Monitoring

Training lands will be inspected for maneuver damage to soils, vegetation, streams and wetlands, and sensitive environmental resources. Corrective actions will be taken as required. See Example Standard Operating Procedure for Maneuver Damage Inspection (Appendix B.2.3.1). Corrective actions such as grading, seeding and fertilizing to reestablish vegetative cover will be monitored and evaluated for effectiveness.

The Fort Benning Watershed Program

A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place. As the water moves, it carries any pollutants and sediment from the land area into the stream where it impacts stream biology and downstream water quality. The rate at which the storm water drains into the stream can also impacts the stream due to hydrologic

Figure 5.1.2. Fort Benning Roads and Trail Responsibilities

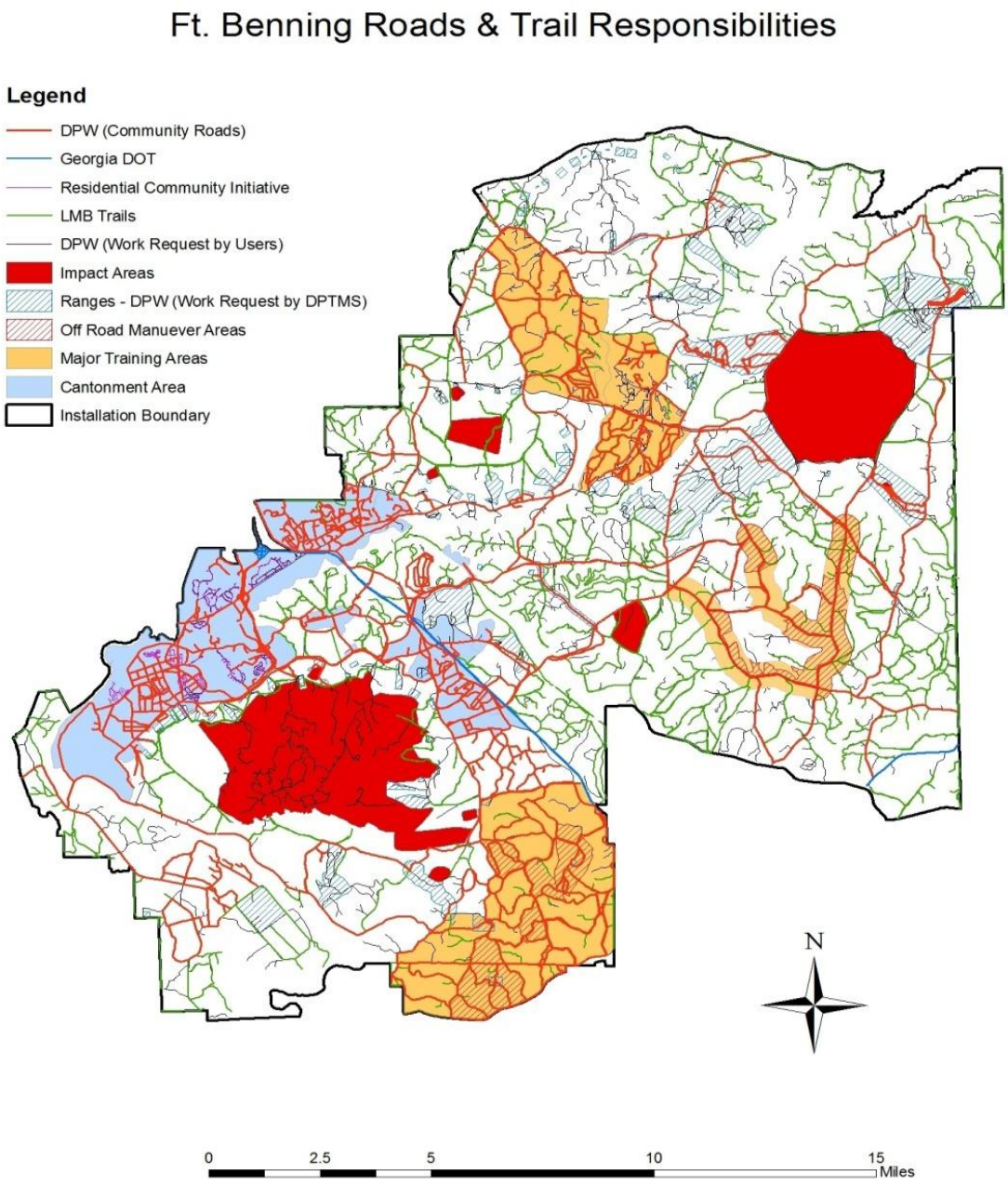


Figure 5.1.2 Ft. Benning Roads and Trails Map

* Due to map scale and the absence of GIS shape files, maneuver trails are not included on the map

alterations that result in stream channel instability during high flows and reduced base flow required for biological stability. Any effort to maintain stream water quality must address land use impacts in the watershed area.

Watersheds are the only appropriate delineation for surface water quality issues, but watersheds frequently cross political and ownership boundaries. Watershed Management is the approach that enables multiple organizations with different responsibilities and land use requirements to work collaboratively to protect streams. In this process, Stakeholders, such as regulators, land managers and land users, develop a watershed management plan that serves as a common instrument for sharing knowledge, prioritizing efforts and leveraging resources. The “Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management” (FR V.65 N.202) directs the Army to adopt Watershed Management for all land and land management activities. Watershed Management Plans are the basis for agreements recognized by Federal agencies.

In order to implement Federal watershed policy, AR 200-1 establishes watershed management as Army policy for evaluating all projects and planning, specifically where Clean Water Act requirements are concerned. Fort Benning contracted USACHPPM (now MEDCOM USA Public Health Command) to produce a Watershed Protection Master Plan (USACHPPM 2008). This conceptual plan describes the requirement and utility of Watershed Management, identifies the Stakeholders, presents an overview of the Installation surface water system and knowledge base, and describes the path forward to implement watershed management. Public Health Command also produced a Watershed Protection Quality Assurance Program Plan (USAPHC 2010) that specifies the methods and resources necessary to implement the Watershed Protection Master Plan.

Fort Benning established a Watershed Program within the EPMB in 2008. The Watershed Program conducts monitoring and reports watershed and steam assessments throughout the Installation (FBSAP 2012). The Program interacts with and provides expertise to all Stakeholders by participating in planning and management efforts affecting water. The Watershed Program coordinates watershed research in order to increase the knowledge base and to educate Stakeholders on the most effective land management practices5.1.6.2 Stream and Water Quality Monitoring

The Watershed Program has conducted stream assessments throughout the Installation, and conducts required monitoring of streams on the Installation that have an established Total Maximum Discharge Limit. In response to land use changes due to creation of the GHMTA, the Watershed Program produced a monitoring plan (GHMTAMP 2012) and a GHMTA Watershed Assessment (GHMTAWA 2013). The Monitoring Plan describes a credible monitoring effort that is transferable to other areas where operational impacts are a concern.

5.1.6.2.1 Mapping, Monitoring, and Annual Maintenance of Soil Erosion Structural Controls

All soil erosion structural controls (temporary and permanent) to include: storm water basins, bioretention swells, stream bank fences, and riprap will be digitally mapped and inspected to insure that they are functioning properly. Structure maintenance will be prioritized based on need. Excess sediment will be removed from erosion control structures, applied to upland areas and stabilized. DPW and EMD will digitally map and inspect all current and future soil erosion structural controls (temporary and permanent) to include: rock lined channels, rock check dams, diversion ditches, sediment basins, earthen berms, terraces, filled gullies, storm water basins, bioretention swells, stream bank fences, and riprap to insure that they are functioning properly. See Appendix B.2.3.2 Standard Operating Procedure for Surveying Stream Crossing Sites and Appendix B.2.3.3 for Standard Operating Procedure for Identifying and Inspecting Sediment Basins.

The type and location of the existing BMPs, temporary and permanent Erosion and Sediment Pollution Control Plan (ESPCP) structural controls, and any future BMPs will be mapped in their respective WMU to create an overall BMP GIS layer for use in the watershed protection effort. This will provide data to identify factors that influence BMP selection, determine the appropriate type, size, and location of BMPs, and to select an approach that quantifies BMP effectiveness. In conjunction with other existing data, an assessment of the WMUs can then be conducted to determine if water quality monitoring stations need to be placed downstream of these BMPs.

5.1.6.2.2 Keys to development of the Fort Benning BMP GIS layer

The GPS coordinates, hard copy, electronic drawing, and written description of BMPs (check dams, silt fences, catch-basins, etc.) that were installed in 2002 within the Red Diamond Road/Box Springs Road intersection area (also called the Underwood Road Maneuver Corridor) will be obtained from the NRCS (POC: Jim Bramblett).

Each BRAC and MCoE construction project was covered under a GA DNR EPD National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit requires an Erosion and Sediment Pollution Control Plan (ESPCP) for each construction site. The ESPCP specifies design and location of permanent and temporary BMPs for each site to control erosion. These site specific BMPs are based on proper design, runoff calculations, slope factors, soil types, topography, construction activities involved, and proximity to water bodies. It will be necessary for EMD to digitally map the storm water control structures in the project areas. The purpose of creating a BMP GIS layer is to monitor BMPs and perform maintenance as needed.

5.1.6.3 Monitoring, and Maintenance of Structural Storm Water Controls

Structural storm water controls are constructed BMPs designed to prevent erosion and sedimentation. They must be monitored and maintained in order to assure effectiveness and to prevent failure. In general, the organization responsible for the construction of

structural BMPS is responsible for the monitoring and maintenance of their BMPs. Monitoring of BMPs constructed for BRAC/MCOE is conducted by t he EMD NEPA program. The BMPs constructed to support RCW conservation requirements are monitored by the Conservation Branch of EMD.

The Watershed program is required to monitor the storm water system in the cantonment areas. The maintenance of BMPs constructed for infrastructure projects is the responsibility of DPW Operations and Maintenance Division.

5.1.6.4 Mapping and Monitoring of Unstable Stream Banks

The GHMTA Watershed Assessment provided an update of existing data and an assessment of the current conditions. This effort included monitoring of hydrology, stream morphometry, bank stability and sediment deposition.

5.1.6.5 RCW Cluster Monitoring

FB Conservation Branch and FB Range Division will monitor RCW clusters on Fort Benning. RCW clusters will be inspected for maneuver damage and soil erosion following training exercises and during annual training land inspection events and corrective action to protect RCW clusters will be implemented as appropriate.

5.1.6.6 Scheduling of Non-Training Activities

Non-training activities such as land rehabilitation, maintenance, maneuver damage repair, prescribed burning, forest thinning, and other forest management activities will be scheduled at the weekly Range Operations Activities meeting. This will ensure that damage repair and forest management activities will be coordinated with scheduling for training activities, and opportunities for resource management, including thinning of upland pine stands will be maximized and that restoration and maintenance activities occur according to schedule. Changes to the existing Installation protocols for scheduling of non-training activities will be addressed with Range Division as the need arises. For example, maneuver damage inspectors will identify sites on the Installation needing protection to facilitate recovery from maneuver damage to soils, vegetation, streams and wetlands, and sensitive environmental resources. Sites will potentially be marked as temporarily off-limits to digging/driving, and recovery will be monitored. Closed areas may possibly be added on a quarterly or as needed basis to a “No Dig/No Drive” map used to help military trainers for planning purposes. Sufficient time will be coordinated in and around training events to accomplish specific tasks related to maneuver damage inspection and repair. Updated protocols for scheduling of maneuver damage inspections, repairs and other resource management needs on the Installation will be incorporated into Fort Benning Regulations. These protocols will provide enhanced opportunities for damage inspection, corrective actions, and monitoring.

5.1.7 Regulatory Compliance with Federal and State Laws

The Clean Water Act and The Georgia Water Quality Act establish regulations to protect surface waters. The Fort Benning storm water permit requires quarterly monitoring of

stream segments on Fort Benning that have been listed as impaired under Section 303(d) of the CWA.

As currently written, the Federal Clean Water Act (CWA) and the State of Georgia laws and regulations governing surface water quality and erosion control are applicable to Fort Benning. Key minimum provisions of this Act are: (1) it requires a detailed ESPCP to be prepared and submitted with an application before land disturbing activities take place; (2) a permit is needed to conduct land disturbing activities; and (3) the technical feasibility of the ESPCP (assessed through permit processing) determines whether a permit is issued. The act specifies several exclusions or exemptions, which include: individual homes, surface mining, granite quarrying, agricultural and forestry practices, and projects carried out by the NRCS (GA SWCC, 2000). A discharge of storm water runoff that increases the turbidity of receiving waters by more than 25 Nephelometric Turbidity Units (NTUs) (for warm water streams) or 10 NTUs (for trout streams) may result in an Notice of Violation (NOV) (GA DNR EPD, 2005a). The only complete defense against an enforcement action is the proper design, installation, and maintenance of BMPs (GA DNR EPD, 2005a).

Over the last several decades, Federal, State of Georgia, and DOD efforts have resulted in somewhat different approaches to watershed protection. Of the three, the most comprehensive and holistic approach appears to be the USEPA approach. It is supported by a significant amount of research, and it is the most technically sound and economically efficient means of addressing water quality problems. Several state efforts have resulted in significant advancement of water resources protection in the Fort Benning area. They include the Chattahoochee River Basin Management Plan, the TMDL program, development of water quality standards, and the Erosion and Sediment Control Act.

Appendix 1. Example Standard Operating Procedure for Maneuver Damage Inspection

Standard Operating Procedure for Maneuver Damage Inspection at Fort Benning, GA

Responsibilities

Maneuver Damage Inspectors shall be responsible for identification of maneuver damages and physical evidence of violations; identification of monitoring requirements and corrective actions, as needed; and delivery of inspection and monitoring reports to the Data Manager(s).

PURPOSE

Establishes responsibilities for identification, monitoring, and reporting of maneuver damages and violations.
Identifies requirements and procedures for field inspections.
Defines standards for categorizing maneuver damages and training violations applicable to the US Army and USFS Lands.

References

The following documents provide background information on the need and purpose of the goals of the Maneuver Damage Program

i. Army Regulations
    1. AR 200-1 Environmental Protection and Enhancement.

ii. FP and JRTC Regulations
    1. FP200-1 Installation Environmental Performance Requirements.
    2. FP350-4 Training Joint Readiness Training Center (JRTC) and Fort Polk Installation Clearance Procedures.
    3. FP350-10 Operations Joint Readiness Training Center (JRTC) and Fort Polk Training Land Sustainment Program.

iii. NEPA Regulatory Documents
    1. US Army, 2004. *Final Environmental Impact Statement for 2nd Armored Cavalry Regiment Transformation and Installation Mission Support, Joint Readiness Training Center (JRTC) and Fort Polk, Louisiana, and Long-Term Military Training Use of Kisatchie National Forest Lands.* Prepared by Tetra Tech, 10306 Eaton Place, Fairfax, Virginia.
    2. US Army, 2004. *Environmental Assessment for the Temporary Stationing for the 4th Brigade, 10th Mountain Division Brigade Combat Team Unit of Action (BCT/UA) at Fort Polk, Louisiana.* Prepared by Directorate of Public Works, Environmental and Natural Resources Management Division.

iv. Other documents and agreements
    1. Special Use Permit and Plan of Operation for JRTC/FT POLK Military Training Use of the Vernon Unit, Calcasieu Ranger District and Kisatchie Ranger District Kisatchie National Forest.

Procedure:

GENERAL

Inspections shall be conducted after all Joint Readiness Training Center (JRTC) rotational and after home station training exercises where ground disturbance, violations, or damage to structures occurs (e.g. buildings, fences, etc.).

The Maneuver Damage Inspectors will attend semi-annual training for conducting maneuver damage inspections. This training will be held during months when rotations are not scheduled (traditionally in July and December).

A flow diagram of the Maneuver Damage Inspection and Reporting Process is provided in Maneuver Damage Compliance and Tracking System Overview (Appendix A).

INSPECTION PREPARATION

1. The Maneuver Damage Program Manager shall assign each inspector his or her inspection area and help to coordinate the use of equipment necessary for conducting inspections (item 5 below).

2. The Maneuver Damage Program Manager will plan inspections following all rotational training events and coordinate with the Maneuver Damage Data Manager for notifying the Maneuver Damage Inspectors of inspection dates and times. These inspections shall be conducted during Cleanup after every JRTC rotational training and after home station training when damages occur.

3. The Data Manager will keep a data folder/binder for each inspector that contains all appropriate forms and reports needed for inspection. This includes:
    1. Blank Initial Maneuver Damage Assessment Forms (Appendix B)
    2. Blank Maneuver Damage Detail Forms (Appendix C)
    3. Open Actions Report and map of open action locations (see sample in Appendix D).

4. Maneuver Damage Inspectors will prepare for inspections on the last day an area is scheduled for training. Preparations for inspections should include:
    A. Determining the availability of vehicle
    B. Determining the availability of 4-wheeler (if needed)
    C. Data binder for the appropriate inspection area which contains needed forms and reports
    D. GPS with vehicle power supply and/or extra batteries
    E. Digital camera
    F. Two-way radio
    G. Maps
    H. Any additional equipment that is necessary

SAFETY

1. Maneuver Damage Inspectors should avoid contact with all items left by the trainees including simulated munitions and wire.

2. Maneuver Damage Inspectors should follow all basic safe operating guidelines dictated for use of a government vehicle, being aware of special safety hazards associated with using a 4-wheel drive vehicle and all-terrain vehicles (ATV)s during off-road maneuvers.

INITIAL MANEUVER DAMAGE INSPECTION

1. After training exercise is complete, the Maneuver Damage Inspectors shall survey all training areas that were scheduled for training and record ALL damages on the provided forms. This includes damages that do not need to be repaired (e.g., a pivot steer on the shoulder of a maintained road). One hundred percent coverage is imperative in identifying maneuver damage. For this reason, the Maneuver Damage Inspectors will travel and inspect all roads and trails. Additionally, any area showing signs of off-road traffic will be inspected.

2. Prior to entering the training areas to conduct inspections, all Maneuver Damage Inspectors shall contact Range Control to determine if the training area is safe to be entered and can be inspected without interference to training. If the training area can be

inspected, the Maneuver Damage Inspector shall contact Range Control via radio (Range Talk group) or telephone (337-531-5445) upon entering and exiting the training area.

3. To ensure that all areas have been inspected, it may be necessary for Maneuver Damage Inspectors to inspect portions of the training area by foot or by ATV.

4. The area around all clearance items should be flagged and the locations should be communicated to the Range Control Safety Technician for that area. If the clearance items are not removed after the first day of inspection, record the appropriate information about these items in the initial maneuver damage inspection form for reporting to the data manager.

5. While inspecting for new damages, the Maneuver Damage Inspector will re-visit locations that are detailed on the "Open-Action Report" and update the condition of the damage.

6. Maneuver Damage Inspectors shall record all damages on the ENRMD Initial Maneuver Damage Assessment form as outlined in Appendix B. Maneuver Damage Inspectors shall specify necessary corrective actions for all Category 2 or 3 damages or if monitoring is needed on the Maneuver Damage Detail Form (Appendix C).

NOTE: Although damages and repairs must be reported by inspectors, repairs may or may not be completed as suggested or recommended.

7. Physical evidence of violations shall also be recorded on the Initial Maneuver Damage Assessment Form (Appendix B). A list of these violations can be found in Appendix E.

8. When any trenches, berms, defilades, or any other earth work that was constructed with heavy equipment is found, the Inspector will contact the Maneuver Damage Repair Coordinator to facilitate repairs.

9. Upon finding trash and/or damages that are the result of civilian activity, Maneuver Damage Inspectors shall record their findings on the ENRMD Initial Maneuver Damage Assessment form as outlined in Appendix B, noting that the trash and/or damages were the result of civilian activity.

10. All hasty foxholes and other ground disturbances in need of repair should be marked by Maneuver Damage Inspectors with flagging only in the case that the damage was not previously marked by Range Safety Technicians.

11. If a Maneuver Damage Inspector determines that an area needs to be protected to allow recovery, the appropriate box on the Maneuver Damage Detail Form (Appendix C) should be checked and any additional comments should be made in the comments section of the form. Inspectors will keep in mind that recording these locations will be reviewed by the Program Manager and discussed with the training liaison for recovery.

12. Any violations recognized by the US Fish and Wildlife Service biologists during RCW inspections shall be recorded on the Initial Maneuver Damage Assessment Form

(Appendix B) and forwarded to the Maneuver Damage Inspectors. A list of these violations can be found in Appendix E.

13. The Program Manager shall provide support to the Maneuver Damage Inspectors as necessary during inspections.

14. Maneuver Damage Inspectors shall contact the Program Manager with any problems during inspection.

15. The initial inspection shall not be concluded, nor be considered complete, until all inspection procedure requirements have been completed and post cleanup inspection field data has been provided to the Data Manager.

16. All maneuver damage inspectors will notify both Range Control and the Maneuver Damage Program Manager after clearing the training areas. If any Maneuver Damage Inspector fails to contact the Program Manager, the Program Manager will ensure that all Maneuver Damage Inspectors have returned from the field by contacting Range Control.

POST INSPECTION/RE-INSPECTION

1. All Maneuver Damage Inspectors will attend the E+1 briefing ("*the 0600"*) following the first day of inspection.

2. The Maneuver Damage Inspectors will request copies of the Range Safety Technicians' clearance/inspection sheets at the E+1 briefing.

3. If the clearance items are not removed during the first day of inspection, record the appropriate information about these items in the initial maneuver damage inspection form for reporting to the data manager.

4. After every day of inspection, the Maneuver Damage Inspectors shall provide copies of their field data sheets to the Data Manager. The originals should continue to be used to record additional damage found on the second day of inspection and used to "clear" previously recorded damage if repairs/cleanup has occurred before the inspection is completed.

5. After the inspection is 100% complete, the original forms should be placed in the inspection binder and given to the data manager.

6. The Data Manager shall enter all inspection data by the end of the second business following the inspection and shall be responsible for retaining the original field data sheets.

MONITORING

1. The Program Manager shall coordinate with parties responsible for making repairs to maneuver damage to assist in completing these tasks on an ongoing basis.

2. After the Program Manager has been notified that corrective actions have been taken, the Program Manager shall contact the Maneuver Damage Inspectors to re-inspect the site.

3. Regardless of whether or not the Program Manager has been notified that corrective actions have been taken to repair damages, the Maneuver Damage Inspectors shall re-inspect the damage sites at least monthly (if allowed by scheduled training) and report findings to the Data Manager until the action is deemed "closed".

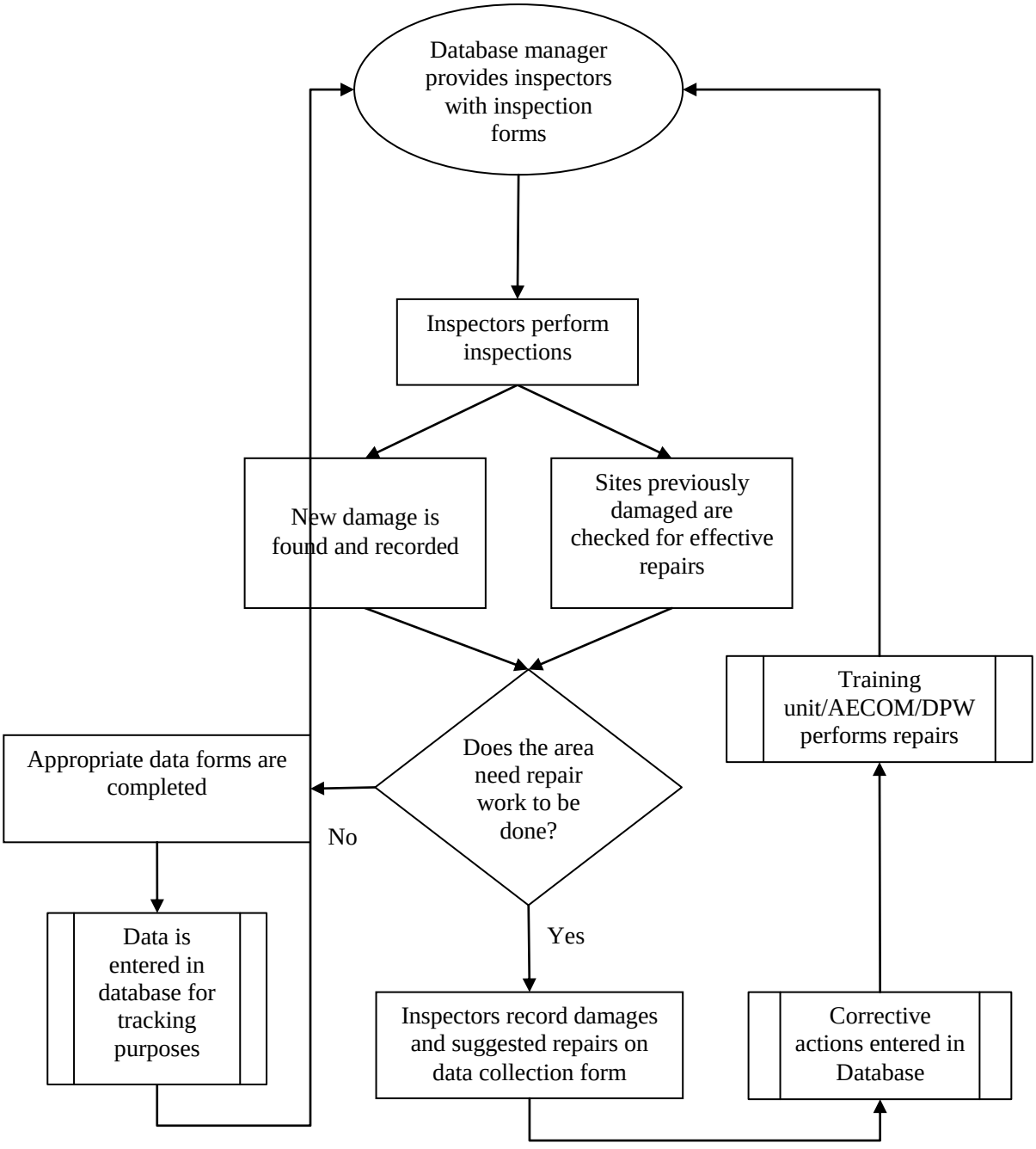
4. The re-inspection by the Maneuver Damage Inspectors should include a visit to each open action location to determine the current status of the site. The status of the site should be noted on the Open Action Report (Appendix D) and returned to the Data Manager.

5. The Data Manager will then enter all updated Open Actions into the Maneuver Damage Database. The determination of when an open action is sufficiently repaired or healed is the responsibility of the designated Maneuver Damage Inspector.

6. At the time of re-inspection, Maneuver Damage Inspectors shall also be responsible for recording any clearance items that have not been removed from the training area.

** This SOP will not be changed without the approval of the Branch Chief and/or Ecologist. If and when this SOP is changed, the Primary will provide a copy to the Alternate, Branch Chief, Ecologist, and Program Managers.*

Appendix 1a – Maneuver Damage Inspection Process Overview



Appendix 1b – Initial Maneuver Damage Assessment Form

INITIAL MANEUVER DAMAGE ASSESSMENT FORM

Inspection Date: / / **Inspector:** **RCNI:** **IA:**

JRTC: ☐ **Home Station Unit:** ☐ **Other:** ☐ **JRTC Rotation #:** **Unit:** **Training Event[a]:**

Seq #	Grid Easting (####)	Grid Northing (####)	Training Area	Land Type[b]	Mon./ Corr. Act.	Total Acres	Class IV	Class V	Trash	Foxholes (Quantity)	Trees (Quantity)	Violation (Code)[c]	Date Cleared	Comments/Observations

Notes: [a] Enter the appropriate code from the Training Activities List [b] Land Type: Army, IUA, or LUA. [c] If monitoring or any other corrective actions are recommended, then the Maneuver Damage Detail Form must be completed. [d] See Violation Codes List.

Appendix 1b (cont.) - Initial Maneuver Damage Assessment Form Instructions

Step 1 – Fill out the top row of the datasheet (the portion of the sheet between the two highlighted rows) as follows:

Step 1.a – **Inspection date** - 2 digit month/ 2 digit day/ 2 digit year
Step 1.b – **Inspector** - Inspector's first and last name
Step 1.c – **RCNI** - To be completed by Maneuver Damage Database Manager (no need to complete)
Step 1.d – **IA** - Inspection Area (Alpha, Bravo, Charlie, etc.)
Step 1.e – **Check** one of the three check boxes (JRTC, Home Station Unit, Other)
Step 1.f – **JRTC Rotation #** - Complete with the assigned JRTC rotation number (if applicable), the first two digits of this number are the year and the last two are the sequenTially numbered rotation for that year (i.e. the third rotation of FY 2002 is 02-03). This box will be left empty if not a JRTC rotation.
Step 1.g – **Unit** - the military unit that last trained in the area you are inspecting (if known)

Step 2 – **Seq. #** - sequential numbering for each location that damages or violations are found during an inspection event (e.g., the first location where damage/violations are found should be listed as "1", the second location where damage/violations are found should be listed as "2", etc. and should continuously be numbered for the duration of the inspection event.)

Step 3 – **Grid Easting** and **Grid Northing** - These numbers represent the location using an 8-digit grid. The Easting and the Northing will each consist of 4 digits and should be derived from a GPS unit. Making sure that the GPS unit is set to use the MGRS position format and WGS 84 map datum, navigate to the screen showing both the Easting Grid and the Northing Grid. The four digits that should be entered into the **Grid Easting** will be the first four digits in the first line of grid coordinates (drop the last digit from this line before entering into data sheet). The **Grid Northing** will consist of the first four digits in the second line of grid coordinates (drop the last digit from this line before entering into data sheet). If unsure of the order or which digits comprise the numbers needed, the **Grid Easting** should range from 6800 to 9999 or 0000 to 1300 and the **Grid Northing** should range from 2100 to 7500. The two sets of grid coordinates is called an eight-digit grid will be accurate to ten meters. This can also be done using the Fort Benning Military Installation Map.
Step 4 – **Training Area** - Enter the training area being inspected. (i.e. Slagle 3, Fullerton 7, etc.)
Step 5 – **Land Type** - Enter the owner of the land (Army, IUA, or LUA)
Step 6 – **Mon./Corr. Act.** - This box is to be checked if the site should receive ANY corrective action OR needs monitoring. If this box is checked, the only additional information that is required on the Initial Maneuver Damage Assessment Form is and you can proceed to the Maneuver Damage Detail Form, unless there are additional items to be recorded at that site. Note: if there are additional damages at the location record all damages as the same sequential number.
Step 7 – **Total Acres** - This number should be the total number of acres at this location that is damaged. For example, if there is 2 acres of ground disturbance that needs re-shaping, seed and fertilizer

and there is an additional 1 acre of ground disturbance that needs ONLY seed and fertilizer, then the total is 3 acres of damage.

Step 8 – **Class IV (only to be completed if missed by Range Safety Technicians during Cleanup) -** place a checkmark in the column if the Army has left these items after cleanup. (Class IV is defined as removable training items such as sandbags, wire, pickets, pallets, etc.)

Step 9 – **Class V (only to be completed if missed by Range Safety Technicians during Cleanup) -** place a checkmark in the column if the Army has left these items after the cleanup. (Class V is defined as munitions of any type, to include expended ordnance or simulated ordnance)

Step 10 – **Trash (only to be completed if missed by Range Safety Technicians during Cleanup)** – place a checkmark in this column if the Army has left these items after cleanup.

Step 11 – **Foxholes (only to be completed if missed by Range Safety Technicians during Cleanup or additional repairs are needed) -** insert number of fighting positions (NOT acreage). Maneuver Damage Inspectors should only record this if these damages were not repaired during the cleanup period or if additional repairs are needed.

Step 12 – **Trees -** insert number of trees damaged. All substantial damage to trees (at least 144 square inches) that are marketable (greater than 5-inches diameter at breast height) should be noted. Examples include skinning of the bark, exposing roots, and/or breaking of tops (shown in appendix C).

Step 13 – **Violation -** Put a code for the violation (see appendix D for a list of violations and descriptions)

Step 14 – **Date Cleared** – If the suggested corrective actions are completed before giving this form to the Maneuver Damage Database Manager, insert the date that the corrective action was completed.

Step 14 – **Comments/Observations –** This block is for comments.

Appendix 1c – Maneuver Damage Detail Form

Maneuver Damage Detail Form

Inspection Date: ___/___/_____ **Inspector:** _____ **IA:** _____ **Seq #:** ____

Historical Damage? ☐

Description of Damage	Acres	Category*		Corrective Actions: Earthwork	Reshape	Seed	Fertilize	Off-limits	Other	Monitor	Crossings: Repair	Crossings: New	Comments
☐ Foxholes			Required									X	
			Completed							X	X	X	
☐ Engineering Work			Required									X	
			Completed							X	X	X	
☐ Damage to existing road			Required									X	
			Completed							X		X	
☐ Damage to existing trail			Required									X	
			Completed							X		X	
☐ Rutting / new trail	X		Required									X	
			Completed							X		X	Start of Trail (grid) _____ End of Trail (grid) _____ Trail Length (meters) _____ Trail Width (meters) _____
☐ Ground disturbance / loss of ground cover			Required										
			Completed							X			
☐ Stream / wetland crossing damage - improved site			Required										
			Completed							X			
☐ Stream / wetland crossing damage - unimproved site			Required									X	
			Completed							X		X	
☐ Sensitive area / off - limits site damage			Required										
			Completed							X			
☐ Other damages			Required										
			Completed							X			

Notes: *Enter Category: 1=Low severity damages that require no corrective actions but that require monitoring to ensure that natural healing occurs; 2=Moderate severity damages that require routine corrective actions such as seeding, fertilizing and/or minor grading and filling; 3=High severity damages requiring more extensive, long-term or costly corrective actions, potentially to include marking the site as off-limits to training.

Appendix 1c (cont.) - Maneuver Damage Detail Form Instructions

For the Category 2 and 3 Maneuver Damage Detail Form:

Step 1 - Fill out the top portion of the form as follows.

Step 1.a – **Inspection date** = 2 digit month/ 2 digit day/ 2 digit year

Step 1.b – **Inspector** = inspector's first and last name

Step 1.c – **IA** = Inspection Area

Step 1.d – **Historic Damage** = this block is to be checked if the damage was not created by the current training exercise, but needs to be corrected.

Step 2 - Fill out all applicable rows as follows:

Step 2.a – Description of Damage - Nine choices are given. Choose all that apply.

Step 2.b – **Acres** - Fill out the acreage column for each row checked, noting that 1 acre = 43560 sq. ft. or approximately a 200 ft x 200 ft area. Use the acreage chart below for reference.

Step 2.c – Category – Fill in the severity column for each row checked. (This will be 1, 2, or 3, as defined in the notes at the bottom of the inspection sheet.)

Step 2.d – **Corrective Actions -** Check corrective actions required to correct the damage. If the action has already occurred (i.e. a trench needed to be filled and the work was already done) check both the required and completed boxes.

Step 2.e – **Comments -** Fill out with any applicable comments. If a trail is being discussed give both the beginning and ending coordinates and if "off-limits" is checked, provide description of area and why it is suggested.

Sample Plot Size	Sq. Feet	Acreage
10 x 10	100	0.0023
15 x 15	225	0.0052
20 x 20	400	0.0092
25 x 25	625	0.0143
30 x 30	900	0.0207
40 x 40	1600	0.0367
50 x 50	2500	0.0574
75 x 75	5625	0.1291
100 x 100	10,000	0.2296
200 x 200	40,000	0.9183
500 x 500	250,000	5.7392
1000 x 1000	1,000,000	22.9568

Appendix 1c (cont.) – Standard Damage Categories and Suggested Corrective Actions for Maneuver Damage Inspectors

Examples of the types of damages to be recorded by Maneuver Damage Inspectors include:
All damages that are in need of monitoring

1. Damage that is already in the process of being repaired or has been repaired before inspection could occur.
2. Damages that have occurred during a past exercise but are just being found/recognized (historical).
3. Damages that have progressively gotten worse and are now in need of remediation (historical).
4. Clearance Items that remain after Cleanup.

Category 1: These damages are minor and in no need of corrective action, but will need to be re-inspected and monitored to determine if the area/damage is healing naturally. This category of damage may include:

1. Minor rutting
2. Hasty Foxholes that may be in an environmentally sensitive location
3. Other minor ground disturbances

Category 2: Moderate soil disturbances that will require routine corrective action. Corrective actions may include:

1. Minor grading
2. Seeding and fertilizing
3. Disking up soil in newly tracked area
4. All substantial damages to trees (at least 144 square inches) that are marketable (greater than 5-inches DBH).

Category 3: Extensive damaged areas where long term or costly corrective actions are needed. These are damages that cannot be permanently corrected with the limited use of machinery and/or reseeding.
Clearance items (to be recorded by Maneuver Damage Inspectors only if not removed during Cleanup):

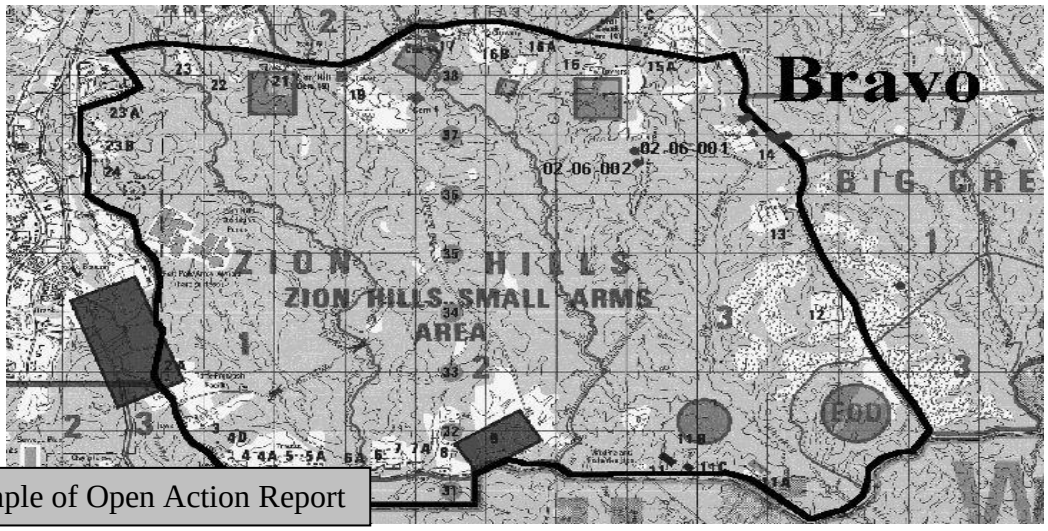
1. Trash– items left behind by Army that can include MREs, loose paper, and garbage already bagged
2. Class IV debris – removable training items such as wire, sandbags, pickets, pallets, etc.
3. Class V debris – actual or simulated ammunition including brass
4. Hasty Foxholes – small one or two man fighting positions

Category 1 Damage – Stream
Minor rutting that only needs long-term monitoring

Category 2 Damage –
Major rutting that needs reshaping, re-seeding and monitoring

Category 3 Damage –
crossing that needs a solution (e.g. low-water crossing)

Appendix 1d- Sample Inspection area map and Open Actions Report



Example of Open Action Report

Appendix 1e – Maneuver Damage Violations

GENERAL VIOLATIONS. The following violations apply to all training areas.

CODE	VIOLATION	REFERENCE
1	**RCW Violations – Any activity or evidence of activity inside the 200 foot RCW buffer should be reported to the Maneuver Damage Program Manager for follow-up. Maneuver Damage Inspectors are not responsible for determining RCW Violations.**	
	(Violation codes 1A – 1I are no longer valid due to the implementation of the 1996 RCW Army Guidelines)	
2	**Wildlife Violations.** Destruction or harassment of wildlife is not authorized.	Range Safety SOP §6-3.b.
3	**Tree Violations.**	
3A	Cutting or felling of live trees, of any size, for camouflage. *(Note: dead or down timber may be used in connection with*	SUP/OP §3.3.8(6); Range Safety SOP

CODE	VIOLATION	REFERENCE
	training activities. Limbs from the lower portion of live pine and hardwood trees, along with shrub species, may be used for camouflage. Removal of boughs must not be done within sight of any public road. After use the brush shall be scattered.)	§6.3.a
3B	Cutting or carving on trees.	SUP/OP §3.3.8(7)
3C	Nailing signs on trees.	SUP/OP §3.3.8(14)
4	**Maneuver and Mobility, Counter-Mobility, Survivability Violations. (Further definition of the violation can be shown with the following set of the most frequently encountered activities.)**	
4A	Driving on seeded fire lines and wildlife food plots where grass or wildlife plantings have been established.	SUP/OP §3.3.8(13)
4B	Driving or digging through marked sensitive sites, "no drive/no dig" areas, and recently rehabilitated areas.	Range Safety SOP § 3-2 and §6-4.b; SUP/OP §3.3.8(5)
4C	Vehicle traffic through designated pine regeneration areas, including seedtrees and shelterwood regeneration areas.	SUP/OP §3.3.8(15) and FP 350-1
4D	Vehicle crossing of streams at non-designated crossing sites or destruction of improved crossing structure.	SUP/OP §3.3.8(17); Range Safety SOP §6-4.a.
4E	Mass expenditure of blanks and pyrotechnics after End of Exercise of any exercise is prohibited.	Range Safety SOP §6-7.
4F	Cutting the road. (Construction of counter-mobility or survivability positions across existing road, or so as to disturb the surface, shoulder, road base, or compromise the integrity of bridges, culverts, headwalls, wing walls or drainage areas. Burying of communication wire across roads.)	Range Safety SOP §6-14.b.
4G	Blocking or closure of public roads or operation of military vehicles on public roads in violation of applicable Army, state and federal regulations.	SUP/OP §3.3.8(18); Range Safety SOP §6-14
4H	Blackout driving on public roads.	Range Safety SOP §6-5.b.
5	**Solid Waste Disposal and Combat Support/Combat Service Support Operations Violations.**	
5A	Burying or burning of solid waste. Solid waste will only be disposed of in authorized solid waste containers.	SUP/OP §3.3.8(8); Range Safety SOP §6-18.b.(1)
5B	Disposal of food scraps in streams, rivers, or open bodies of water.	Range Safety SOP §6-18.b.(1)
5C	Siting/construction of field shower/laundry facilities without prior coordination through Range Control and DPW	Range Safety SOP §6-18.c.(2)

CODE	VIOLATION	REFERENCE
	(facilities may not be located within 50 meters of a waterway, in areas subject to flooding, or in marshy soils).	
5D	Siting/construction of soakage pits without prior coordination through Range Control and DPW (soakage pits may not be located within 50 meters of a waterway).	Range Safety SOP §6-18.b.(2)
5E	Use of Reverse Osmosis Water Purification Units at sites that are not pre-approved through Range Control and DPW.	Range Safety SOP §6-19.
5F	Improper disposal of restricted items, such as MRE heaters, lithium batteries, ordnance/brass, aerosol cans, Class VIII (medical waste), and used POL containers. These items must be separated and disposed of at designated collection points.	Range Safety SOP §6-21; SUP/OP §3.3.8(11)
6	**POL Dispensing and Handling Violations.**	
6A	Siting of POL field storage facilities without prior coordination through Range Control and DPW. POL may not be stored within 100 meters of any waterway or in areas with a slope greater than 1 foot to 20 feet.	Range Safety SOP §6-20.a-b.
6B	Failure to notify Range Control of reportable spills.	Range Safety SOP §6-20.c.
6C	Improper disposal of waste POL products	Range Safety SOP §6-20.d; SUP/OP §3.3.8(12)
7	**Fire Safety Violation.**	
7A	Improper use of tracers, pyrotechnics, incendiaries and explosives during periods of high fire hazard, as specified in Range Safety SOP §5-5.	Range Safety SOP §5-5.
7B	Failure to report a fire to Range Control.	Range Safety SOP §5-6.a (1).
7C	Burning or open fires.	SUP/OP §3.3.8(9).
8	**Non-Lethal Chemical Agent and Biological Stimulant Violations.**	
8A	Use of non-lethal chemical agents (CS) in close proximity to public roads and private residences, or livestock.	Range Safety SOP §6-16; SUP/OP §3.3.8(20)
8B	Use of biological stimulant agents outside approved areas as described in JRTC and FP Biological Integrated Detection System (BIDS) SOP.	Range Safety SOP §6-17.
10	**Field Latrine Violation.** Digging of field expedient latrines is not authorized.	**Range Safety SOP §6-22.**
11	**Vehicle and Equipment Washing Violation.** Washing of vehicles in the training land is prohibited. Vehicles will only be washed at designated wash racks.	**Range Safety SOP §6-23.**

Appendix 2. Standard Operating Procedure for Surveying Stream Crossing Sites at Fort Benning, GA

Primary: Directorate of Public Works, Environmental Management Division (DPW, EMD)

Purpose:

The purpose of this SOP is to define the process and procedure for maintaining an up to date Fort Benning approved Stream Crossing Site Map.

Definition of Stream Crossing Site: A Stream Crossing Site is defined as a location where a road or trail crosses a stream or creek and water could flow over the road following excessive rainfall.

Common misidentifications of crossing sites include where:

Severe rutting in the road causes water to pond
Road dead-ends at a creek and crossing is not possible by 4WD truck
Road crosses a draw between two ridges and there is no distinct water channel
The road crosses the stream via a bridge with guard rails

Background: All available known crossing site data will be collected by DPW, EMD Maneuver Damage Inspectors, ITAM, and G3. The crossing site data will be combined and each potential crossing will be physically surveyed. Duplicate data and sites that do not qualify as Stream Crossing Sites will be removed from map.

Methodology:

1) All Environmental Inspectors will be given a current crossing site map and if an inspector encounters a crossing that has not been recorded they will record the grid location and provide the location to the primary of this SOP who will survey the crossing as in (2) by completing the data form and provide a copy to the Natural Resource GIS/data analyst.

2) Data collected from each crossing will include:

- Inspector's name
- Training area
- Inspection date
- Photograph of crossing
- Grid location (full 13 digit UTM grid)
- stream type: (perennial, intermediate, or ephemeral)
- crossing condition: (vented, paved, blocks, rocks, culvert, crossable, or uncrossable)
- road type: (hardened, or trail)
- status of usage: (minimal, moderate, or intensive)

3) As additional crossing sites are located and surveyed as in (2), the map will be updated by the Natural Resource GIS/data analyst.

4) If any extensively used and unimproved crossing sites are located, the primary or secondary of this SOP will complete a report for the Maneuver

Damage Coordinator who will notify DPTMS and DPW for possibility of the hardening crossing.

Reporting:

Updated maps of current Stream Crossing Sites will be distributed to G3, DPW, EMD, and Range Division by February 15th of each year or as needed.

* This SOP will not be changed without the approval of the Environmental Program Management Branch (EPMB) Chief. If and when this SOP is changed, the Primary will provide a copy to the Branch Chief and all appropriate Program Managers in DPTMS and DPW.

Appendix 2a. Fort Benning Stream Crossing Site Inspection Data Form

Inspectors Name:_____ Inspection Date:___/___/_____

Training Area:_____

Photograph Name and Description:_____

Grid: X ___ ___ ___ ___ ___ ___ Y 3 4 ___ ___ ___ ___ ___

Example of UTM grid coordinates (intersection of 2nd Armored Division Rd. and Buena Vista Rd.):

X 7 0 9 0 2 0 **Y** 3 5 9 2 4 2 3

Physical Characteristics (check one of each):

Crossing Condition if Improved:

↑**Vented – hardened surface with pipes beneath surface**
↑**Paved – continuously paved surface**
↑**Blocks – interlocking block**
↑**Rocks – crossing lined with rocks**
↑**Culvert – concrete or metal outlets under roads**

Crossing Condition if Unimproved:

↑**Crossable**
↑**Uncrossable (by 4WD truck)**

Status of LWX Usage:

↑**Minimal**
↑**Moderate**
↑**Intensive**

Stream Type:

↑**Perennial stream (retains water 90% of the time)**
↑**Intermediate stream (retains water seasonally)**
↑**Ephemeral stream (holds water only after rainfall)**

Road Type: Hardened
↑**Trail**

Appendix 3. Standard Operating Procedure for Identifying and Inspecting Sediment Basins at Fort Benning, GA

Primary: Directorate of Public Works (DPW), Environmental and Engineering Divisions

Introduction:

Many areas of Fort Benning have soils which are highly erodible and as training occurs in these areas, there is a need to protect the water quality by utilizing structures such as sediment basins. In the near term, there will be many existing sediment basins located on Fort Benning. Most of the basins will be constructed around intensely used training areas and construction sites to capture soil that moves down slope, which could be carried downstream and enter the waterways. The existing and future basins are in need of evaluation to determine if maintenance is required.

Purpose:

The purpose of this SOP is to define the process and procedure for identifying and inspecting sediment basins on Fort Benning. This data will be utilized to provide adequate information to determine maintenance requirements for existing basins.

Definition of a Sediment Basin:

A sediment basin is defined as a structure consisting of an embankment across drainage, with or without an outflow pipe, which is designed to slow and/or retain storm water. This slowing of runoff allows suspended solids to settle out of suspension, thereby capturing sediment and preventing it from being carried downstream. These basins may or may not be designed to hold water depending on the nature of the training area.

Goals:

- Locate and collect baseline data for all existing and future sediment basins on Fort Benning.
- Develop and execute a schedule of inspections to provide information for required maintenance; to include cleanout, repair, and general routine maintenance (mowing, etc.)

Methodology:

- **For Goal 1 (above):**

2. **Existing Sediment Basins**
   Systematically inspect training areas for existing sediment basins after researching all existing data sources including construction information.

2.1. Photograph, collect GPS data, and complete inspection data form (Appendix A) for each basin.

2.2. Enter acquired information into GIS system for support of Goal 2.

3. **Newly constructed or newly excavated sediment basins:**

3.1. DPW, EMD NEPA staff will provide information associated with proposed sediment basin construction.

3.2. The first business day of each quarter, the primary division for this SOP will contact ITAM and NEPA proponents to determine the status of sediment basin construction.

3.3. Survey proposed sediment basins and record necessary topographical features so that capacity can be calculated.

3.4. Photograph, collect GPS data, and complete inspection data form (Appendix A) for each basin.

3.5. Enter acquired information into GIS system for support of Goal 2.

- **For Goal 2 (above)**

- Each sediment basin will be visited annually to determine maintenance needs. At the time of this site visit, an inspection data form will be completed.
- Enter acquired information into GIS system.
- Utilize maps and data to determine maintenance priority based upon numerical values derived from:
  - Training Intensity
  - Ground cover loss of the sediment basin watershed
  - Extent of sediment in basin
- Convene Sediment Basin Team to finalize a one to end list. At a minimum, this team will consist of the Primary for this SOP, Maneuver Damage Coordinator, GIS Specialist, and ITAM. The Primary will be the team lead.

General Calendar:

Year Round – Goal 1
1 April - 30 June – Annual Visits
July – Annual Sediment Basin Team Priority Meeting

Data Management:

1. GIS data, digital photographs, and electronic copies of the inspection forms will be submitted to the Natural Resource GIS specialist within a week of inspections. Hard copies of the data sheets will be maintained by the Primary.

2. All Electronic data will be maintained by the Natural Resource GIS specialist and will be backed up on a weekly basis.

Reporting:

An annual report and map will be delivered to Chief EMD and the Installation ITAM Coordinator on an annual basis no later than 15AUG of every year. The core element of this report is to provide a detailed list of the sediment basins which are prioritized as to the greatest need of maintenance and/or cleanout.

All data collected on each basin will be given to the Natural Resource GIS specialist who will update status information and provide additional maps of status upon request of the EMD and the Installation ITAM Coordinator.
*This SOP will not be changed without the approval of the Branch Chief. If and when this SOP is changed, the Primary will provide a copy to the Branch Chief, and DPTMS and DPW Program Managers.

Appendix 3a. Fort Benning Sediment Basin Inspection Data Form

Inspector:_____ Inspection Date:___/___/_____ Photo Number_____

Is Sediment Basin number imprinted on riser? Yes No

Sediment Basin Location: To be taken at peak of dam near center of outflow pipe

Grid: X ___ ___ ___ ___ ___ ___ **Y** 3 4 ___ ___ ___ ___ ___

Physical Characteristics:

Status of basin: Existing / New Construction

Is the basin designed to hold water? Yes / No

Comments_____

Does riser have holes to prevent basin from ponding water? Yes / No

Are there trees or shrubs growing in the basin or on the dam? Yes / No

Is the basin designed for water to flow through the riser? Yes / No

If not describe the situation: _____

Height of riser in feet (estimated) _____

Name of GPS data file (area of sediment basin water retention area)_____

How much sediment is contained in the sediment basin? (1=empty, 10=full)_____

How much sediment is being deposited at the outflow (1=none, 10=extensively) ____

Amount of training or villages upstream of the basin? (1=none, 10=extensively) ____

Is the area upstream denuded and eroding (1=not at all, 10=extensively) _____

Are there more basins upstream? Yes / No **Number?_____**

Are there more basins downstream? Yes / No **Number?_____**

Describe_____

Does the basin require excavation or other maintenance? Yes / No

Describe recommended action _____

Comments (e.g., basin is newly constructed and functioning properly)

_____

Post inspection information:

Basin Name (TA) _____

If new construction, what is volume of the basin

Appendix 4 MOU with NRCS

STATE: GEORGIA

AGREEMENT NO.: 65-4310-1-278

MEMORANDUM OF UNDERSTANDING
BETWEEN
FORT BENNING MILITARY POST
UNITED STATES DEPARTMENT OF THE ARMY
AND
NATURAL RESOURCES CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

THIS MEMORANDUM OF UNDERSTANDING (MOU), made and entered into this 30th day of March, 2001, by and between Fort Benning, Georgia, United States Department of the Army, hereinafter called the "Army" or "Post" and the Natural Resources Conservation Service of the United States Department of Agriculture, hereinafter called the "Service".

AUTHORITY: PUBLIC LAW 74-46, 16 U.S.C. 590a. the ECONOMY ACT 31 U.S.C. 1535, and the SIKES ACT, 16 U.S.C. 670c-1 Sec. 103a

WHEREAS, the parties to this Memorandum of Understanding pursuant to their respective statutory authorizations, are seeking ways to reduce soil erosion and control sediment at Fort Benning, to prevent or severely curtail further erosion problems, and to install practices that will enhance the environment while at the same time accomplish the objectives; and

WHEREAS, the parties recognize the expertise needed to prescribe and install the practices which will preserve and recover the land and to further develop it into the significant ecosystem that it can be; and

WHEREAS, the parties to this MOU wish to join in a common effort to promote the wise use of renewable resources, to increase environmental awareness of persons at the Post, and to rehabilitate and restore Fort Benning mission lands that are being degraded by erosion and sedimentation which also may have detrimental effects on the quality of the soil, air, and water.

NOW, THEREFORE, for and in consideration of the promises and mutual covenants herein contained, the parties hereto do agree with each other as follows:

I. The Army Agrees:

a. To furnish rights to Service personnel and private contractors as necessary to enter upon lands for the purpose of surveying, planning, and constructing practices to slow or eliminate soil erosion and sediment, improve water and air quality, and evaluate results.

b. To implement reasonable best management practices as planned by the Service.

c. To be responsible for coordination of meetings with Fort Benning Directorates whose input is required for completion of plans.

d. To perform reviews of documents and furnish them to the Service in a timely manner.

e. To designate an individual to serve as liaison officer between the Army and the Service, whose duties, responsibilities and authorities will include working with the Service liaison to fulfill the terms of the MOU.

Name: John J. Brent
Address: Environmental Mangement Division; Bldg 6
Directorate of Facilities Engineering and Logistics
Ft. Benning, GA 31905
Telephone No. (706) 545-2180

f. To furnish any Post restrictions to Service personnel for compliance by Service and contractor personnel.

g. To designate access to be used by Service and contractor personnel for each segment of work identified to meet the objective.

h. To review and approve plans and specifications prepared by the Service.

i. To make funds available through executed MIPRs for designated projects for work by contractors performing under federal contracts awarded by the Service and for actual administrative and technical cost incurred by the Service in the planning, administration and inspection of projects. Under a continuing process, projects will be identified, funded, planned and carried out through executed MIPRs.

j. It is the intent of the Army to fulfill its obligations under this MOU. However, commitments cannot be made beyond the period for which funds have been appropriated by Congress. In the event funds from which the Army may fulfill its obligations are not appropriated, the MIPR will automatically terminate. Reimbursement will then be for work completed.

II. The Service Agrees:

a. To perform surveys, carryout extensive planning for reduction of soil erosion and sediment, prepare plans for rehabilitation of land, prepare plans that enhance the water quality, air quality, and stabilize the land through use of proven practices, and generally build a balanced ecosystem to meet applicable Federal and State laws. Plans and specifications will address any Post mission impacts.

b. To provide the Army liaison with a draft of plans and specifications for review, and to incorporate revisions based on the Army's review as appropriate.

c. To furnish technical and administrative personnel to produce a complete product. Service personnel will survey, plan, award and administer contracts when needed, inspect, and accept installation on behalf of the government.

d. To furnish inhouse expertise of the Service.

e. To designate an individual to serve as liaison officer between the Service and the Army. Lewis Fokes, District Conservationist, located at Buena Vista Field Office, 111 Baker Street, Suite D, Buena Vista, Georgia 31803 (Phone 229-649-3131) will serve as the liaison officer. His duties, responsibilities, and authorities include being the primary contact with the Army, providing coordination of the surveying, planning, and review process, verifying time spent locally for Services at the Post, recommending practices to be installed, and assuring compliance with terms and conditions of this agreement on behalf of the Service.

Other Service POCs:
POC Admin.: Carolyn Adams - Contract Spec. 706-546-2280
POC Fin.: Elaine Stephenson - Budget Officer 706-546-2270
Fax For POCs: 706-546-2157

f. To provide invoices for services rendered by the Service and Service contractors.

III. It is Mutually Understood and Agreed:

a. This MOU is in effect beginning on the date of execution by the Service and the Army; and will remain in effect indefinitely. It may be terminated at any time by either party giving the other party thirty days notice in writing. Payment will be due for unpaid Service personnel time, equipment, contractors, and other costs resulting from the termination.

b. This MOU may be modified by mutual consent of both parties, in writing, agreed to thirty days prior to the effective date of the modification or such lesser time as may be mutually agreeable. This agreement is not to be construed as an instrument to exchange funds for any purpose.

c. The Army must issue MIPRs to the Service, with an attached cover letter, stating the authority, work to be accomplished, ending date, and the administrative and financial points of contact with telephone numbers. MIPRs may be modified in writing with documented mutual consent of each party.

d. The furnishing of funds, equipment, supplies, and services by the Service and the Army is contingent upon the continuing availability of appropriations by Congress from which payment may be made and shall not obligate the Service or the Army upon failure of Congress to so appropriate.
Nothing in this agreement shall be interpreted to require obligation or payment of funds in violation of the Antideficienty Act, 31 USC § 1341.

e. Reimbursement from the Army to the Service will be at actual cost for services furnished.

f. The Program or activities conducted under this agreement or Memorandum of Understanding will be in compliance with the nondiscrimination provisions contained in the Titles VI and VII of the Civil Rights Act of 1964, as amended; the Civil Rights Restoration Act of 1987 (Public Law 100-259); and other non discrimination statutes; namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, and the Age Discrimination Act of 1975. They will also be in accordance with regulations of the Secretary of Agriculture (7CFR-15, Subparts A & B), which provide that no person in the United States shall on the grounds of race, color, national origin, age, sex, religion, marital status, or handicap be excluded from participation in, be denied the benefits of, or be otherwise

subjected to discrimination under any program or activity receiving Federal financial assistance from the Department of Agriculture or any agency thereof.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as indicated below.

U S DEPARTMENT OF THE ARMY
FORT BENNING MILITARY POST

BY: Jose A. Torres

TITLE: Garrison Commander

DATE: 27 Mar 01

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

BY:

TITLE: Assistant State Conservationist -
Acting for Acting State Conservationist

DATE: 3/30/01

5.11.3 SCHEDULED TASKS
5.11.3.1 Grading of Course and Range Roads
The Contractor shall grade course and range roads on a quarterly/semi-annual schedule IAW TE 5.11-007, allowing for weather conditions, (i.e. excessive moisture, cold weather where the ground is frozen). The Contractor shall execute this requirement with two Tractor Operators. As part of this requirement, the contractor shall submit CDRL 511R002, one week prior to the beginning of each month describing the work need (i.e. severe roadside erosion, sinkholes or other problems) with locations, for the upcoming month, for KO approval.
Gravel/stone/rock will be utilized as required up to a maximum of 5,000 tons per quarter. Recycled material may be used where appropriate. It is assumed that this will be a full-time effort involving two Tractor Operators. A map of Ft. Benning identifying locations of the Range Roads and Access Roads listed in TE 5.11-007 is provided in the Technical Library.

5.11.4.2 Grounds Maintenance and Repair
5.11.4.2.1 Roads and Trails. The Contractor shall be responsible for maintaining all roads and trails to and from ranges and other training areas. The Contractor shall maintain access and entrance roads and trails of each range so that the wheeled and tracked vehicles are able to fully use trails in a safe and efficient manner at all times. Responsibilities shall include, but not be limited to, providing gravel in areas suffering from erosion, and grading gravel and dirt roads to and from the range. The Contractor shall maintain roads and trails to ensure that they are free from potholes, cracks, and obstacles and that the surfaces are well drained and in a high state of repair. Additionally, the Contractor shall be responsible for:

5.11.4.2.1.1 Sufficient and Proper Drainage. The Contractor shall maintain surfaces, ditches, culverts, and other water conveyances to adequately drain the ranges, roads, and other associated range areas to permit wheeled and tracked traffic to fully use the ranges safely. The Contractor shall repair surfaces, culverts, and other damaged water conveyances and remove debris from them to ensure proper drainage.
5.11.4.2.1.2 Erosion Control. The Contractor shall inspect and remediate erosion of all ranges and associated areas, in consultation with and under the direction of the Environmental Management Division (EMD). This includes, but is not limited to, ranges, contiguous areas, roads, trails, parking areas, turn pads, bivouac areas, target pits, and rail systems.
5.11.4.2.1.3 Terrain Restoration. The Contractor shall be responsible for restoring terrain to its original condition by providing soil, grading, and re-planting. The Contractor shall provide the EMD with any and all plans to restore terrain in and around range areas. The Contractor shall follow all applicable Federal, State, local, and Army environmental regulations.

5.11.4.2.2 Retaining Walls. The Contractor shall maintain and repair retaining walls used on ranges.

5.11.4.2.3 Turn Pads. The Contractor shall maintain concrete, gravel, and earth turn pads to ensure that surfaces and curbs are free from cracking, potholes, and other obstacles and that the surfaces are maintained with concrete or gravel to allow the smooth turning of wheeled and tracked vehicles.

5.11.4.2.4 Obstacle Courses, Ropes, and Other Training Devices. The Contractor shall maintain the grounds in and around all obstacle courses as well as the equipment on the courses. The equipment includes, but is not limited to ropes, wooden obstacle courses, wooden structures, and rope ladders. The KO will provide rope and netting.

5.11.4.2.5 Tank Trails. The Contractor shall be responsible for the timely grading of tank trails and providing gravel to requested areas on a timely basis so not to detrimentally affect the training mission and general operation of all tank ranges and training grounds. This shall include, but not be limited to: repairing culverts; spreading gravel or clay; and cutting new trails.

5.11.4.2.6 Bridges, Fords, and Other Mobility Structures. The Contractor shall maintain bridges, bridge abutments, and spans so that they are able to safely and continuously carry tracked and wheeled vehicles in the weight class for which each bridge is designed. The Contractor shall inspect bridges upon request and record the results. Deficiencies will be reported within two hours to the KO. The Contractor shall fix and replace wood penetrated by ammunition.

ITEM	TATM FUNDED	NOT TATM FUNDED
Unmanned Aerial Systems (UAS): Construction of Flight Landing Strips		X
Unmanned Aerial Systems (UAS): Vegetation control on or around UAS Flight Landing Strips	X	
Forward Aerial Refuel and Rearm Points (FARRP): Creating, maintaining, control of erosion and vegetation on or around FARRP, including hardening helicopter pads in FARRP using gravel and rock materials, and creating berms for safe arming.	X	
Helicopter Pads: Construction, maintenance, and repair of paved and unpaved Rotary Wing Landing Pads		X
Helicopter Pads: Vegetation and erosion control in areas surrounding Helicopter Pads located in the training area	X	
Helicopter Landing/Pickup Zones (LZ/PZ): Creating, maintaining, and controlling erosion and vegetation on or around helicopter LZ/PZ	X	
Buildings and Structures: Constructing administrative buildings or work spaces		X
Buildings and Structures: Constructing storage sheds, pole barns, and other primitive structures strictly for use of LRAM equipment and field supplies; must have prior approval by IMCOM/ACOM ITAM manager	X	
Weather Stations: Installation-wide weather monitoring sites		X
Weather Stations: Instruments necessary to support RTLA and/or LRAM projects as specified in an approved ITAM plan	X	
Unexploded Ordnance (UXO): Clearance on operational ranges and training areas		X
Unexploded Ordnance: Clearing of inadvertent UXO discovered on LRAM projects, with approval by DAMO-TRS ITAM Program Manager	X	
MOUT Facilities and Shoot Houses: Site preparation, maintenance, or sustainment to include land within MOUT complex		X
MOUT Facilities and Shoot Houses: Repair trails through MOUT facility (not MCA-funded trails constructed as part of MOUT, or paved or unpaved Training Area Tank Trail or Training Area Road)	X	

DAMO-TRS
SUBJECT: Funding Guidance for Management Decision Package (MDEP) TATM

ITEM	TATM FUNDED	NOT TATM FUNDED
MOUT Facilities and Shoot Houses: Maneuver damage created by units maneuvering to facilities and/or repair of training land outside MOUT facility	X	
Live Fire Range Berm Construction and Maintenance		X
Fire Breaks: Creation, maintenance, or closure of Fire Breaks		X
Fire Breaks: Construction of maneuver trail from existing Fire Break	X	
Prescribed Burns and Wildland Fire Suppression and Management		X
Capping of Cultural Sites: Where site inhibits maneuver and capping of the site will provide unrestricted maneuver over the site	X	
Erosion: Repairing erosion directly caused by maneuver training or training activities, or erosion related to the use of Maneuver Trails in the training area	X	
Erosion: Paved or unpaved Training Area Tank Trails or Training Area Roads		X
Dust Control: To support training mission and training safety on Maneuver Trails, Ops, Artillery and Mortar Firing Points, UAS, FARRPs, Helicopter Pads, and Helicopter LZ/PZ	X	
Storm Damage: Repairing LRAM erosion control structures and Maneuver Trails damaged by storms, and removing storm debris from Maneuver Trails	X	
Invasive Species and Noxious Weed Management: Where species inhibits maneuver in the training area	X	
Marking of Threatened and Endangered Species Sites or Habitat, and Cultural Sites: Purchase and placement of Siebert Stakes to designate these sites as off-limits	X	

DAMO-TRS
SUBJECT: Funding Guidance for Management Decision Package (MDEP) TATM

ITEM	TATM FUNDED	NOT TATM FUNDED
Tactical Training Bases (TTB): Design, site preparation, construction, or maintenance to include erosion control		X
Tactical Training Bases: Repair of normal maneuver damage outside the TTB caused by units maneuvering to the facilities	X	
Bivouac Sites: Preparation and maintenance, including vegetation and erosion control	X	
Bivouac Sites: Construction of permanent structures in bivouac area, to include concrete pads		X
Maneuver Trails	X	
Training Area Tank Trails		X
Training Area Roads		X
Combat Trails		X
Live Fire Ranges: Repair of maneuver damage caused by units or vehicles off established trails and course roads on the range	X	
Combat Live-Fire roads and trails		X
Turn Pads and Road Crossings: construction and maintenance on maneuver trails where they intersect Training Area Tank Trails or Training Area Roads	X	
Turn Pads and Road Crossings: On intersections of two or more Training Area Tank Trails or Training Area Roads		X
Low Water Crossings: Construction and maintenance on Manuever Trails or other areas within the training area	X	
Low Water Crossings: Construction and/or maintenance on paved or unpaved Training Area Tank Trails or Training Area Roads		X
Observation Points (OP): Soil stabilization, hardening w/ gravel and other like materials, vegetation control on and around OP	X	
Artillery and Mortar Firing Points: Erosion control and clearance of vegetation on or around, and hardening of Artillery and Mortar Firing Points	X	
Amphibious Launch Sites: Maintenance and repair	X	
Airfields: Erosion and vegetation control		X
Flight Landing Strips: Construction		X
Flight Landing Strips: Vegetation control on or around Flight Landing Strips	X	

APPENDIX E2

ENDANGERED SPECIES MANAGEMENT COMPONENT

FOR

AMERICAN ALLIGATOR

(*Alligator mississippiensis*)

Fort Benning, Georgia

Updated by

Roderick Mark Thornton
Threatened & Endangered Species Biologist
Conservation Branch, DPW

APPROVAL PAGE

Approving Official:

_____ _____
INSTALLATION COMMANDER Date

Reviewed by:

_____ _____
DIRECTOR OF FACILITIES, ENGINEERING, AND LOGISTICS Date

_____ _____
DIRECTOR OF PLANS TRAINING MOBILITY AND SECURITY Date

_____ _____
STAFF JUDGE ADVOCATE Date

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EXECUTIVE SUMMARY

Background: Army Regulation (200-1) "Environmental Protection and Enhancement" requires the preparation of Endangered Species Management Components to the INRMP for Federally listed and proposed threatened and endangered species and critical habitat present on installations. All Army land uses are subject to these regulations. Failure to implement this management plan can lead to violation of the Endangered Species Act of 1973 (ESA) and result in the costly disruption of military operations.

Current Species Status: The American alligator (*Alligator mississippiensis*) is listed as threatened due to similarity of appearance to other crocodilians by the U.S. Fish and Wildlife Service (USFWS). From a range-wide perspective, the alligator is presently considered to be biologically secure and is no longer protected under the ESA. Any commercial or recreational hunting of alligators is determined under the management programs established by the individual states. However, Federal regulations, such as hide tagging requirements, are maintained on commercial trade to help control illegal taking of alligators, and to ensure that hides of other protected crocodilians are not illegally traded as alligators.

Habitat Requirements and Limiting Factors: Alligators prefer river systems, canals, lakes, swamps, bayous, and coastal marshes. Fort Benning is on the northern limit of the range for the American alligator. Therefore, there is a small but stable population. They can be found in most of the larger ponds on the Installation as well as the backwater areas of the Chattahoochee River around the River Bend area up to Uchee Creek.

Management Objectives: Management will be for the protection and enhancement of existing populations and their habitat on the Installation.

Conservation Goals: The conservation goal will be to maintain the existing populations found on Fort Benning and continue to monitor the population.

Actions Needed: The major steps needed to satisfy management objectives and achieve conservation goals are:

1. Protection of current and potentially suitable alligator habitat.
2. Annual spotlight survey to determine population levels.
3. Helicopter aerial survey to find nest sites.
4. Increase public awareness of species and its potential threats.

Total Estimated Cost of Conservation Actions:
Projected costs for five years of this plan are $3,000 per year.

INTRODUCTION

The purposes of this Endangered Species Management Component (ESMC) are: (1) to present information on the American alligator, a Federally listed threatened species present at Fort Benning; (2) to discuss threats it faces on the Installation; (3) to define conservation goals; and (4) to outline a plan for management of the species and its habitat that will enable achievement of conservation goals. Cost of the conservation efforts and impacts to other Installation activities will also be discussed.

The American alligator is a large aquatic reptile attaining lengths up to 16 feet. They feed on anything they can overpower and inhabit fresh and brackish marshes, ponds, lakes, rivers, swamps, bayous, and big spring runs. Alligators occur in all major river systems in the Southeast. Population decline was the initial reason for listing this species as endangered, now it is listed as threatened due to similarity of appearance to other crocodilians.

This ESMC is based on and is consistent with the following laws, regulations, and guidelines: Endangered Species Act of 1973 (ESA), as amended, and Army Regulation (AR) 200-1.

SPECIES INFORMATION

This section provides a description of the species, including distribution, habitat/ecosystem, life history, evidence for its decline, and conservation measures taken by various agencies or organizations.

DESCRIPTION

The American alligator is a very large aquatic reptile with a broad rounded snout. The fourth tooth on the lower jaw fits into a notch on the upper jaw, and is not seen when the mouth is closed. This distinguishes them from the American crocodile that is similar in appearance (USFWS 1992). The American crocodile's fourth tooth is visible when the jaws are closed and has a long slender snout. The range of the American crocodile does not extend into Georgia. Adult alligators are generally grayish-black and young have yellow bands, which may persist until they are adults. Males are much larger than females, sometimes twice the length of females.

DISTRIBUTION

The American alligator occurs from the Atlantic coastal plain of North Carolina, south through Florida and west to Texas (Figure 1). Alligators have extended their historic range and may be found as far north as the Mississippi River drainage in southeastern Oklahoma and Arkansas (USFWS 1992). Alligators occur in all major river systems in the southeast and have moved north into areas that are beyond their historic range. Most major river drainages in the southeast contain suitable habitat for alligators.

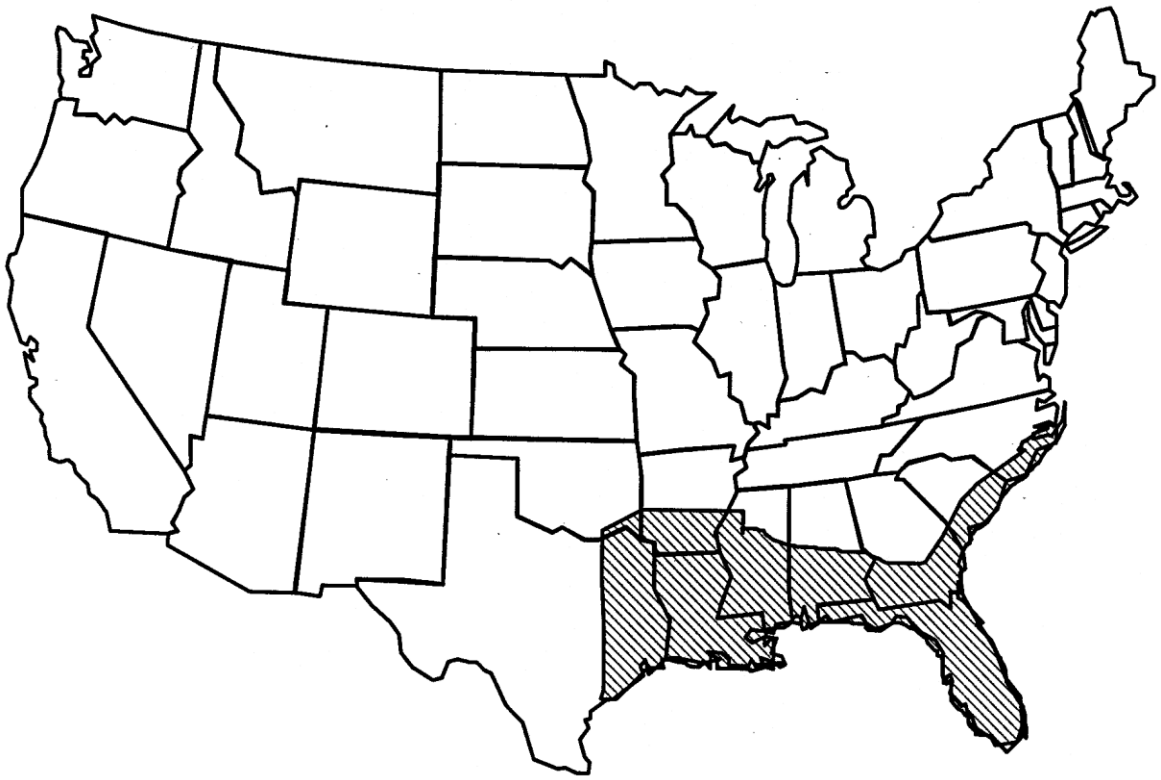

Figure 1
Range of the American Alligator

HABITAT/ECOSYSTEM

Alligators inhabit swamps, lakes, sloughs and sluggish streams and will use marshes and brackish waters as well. Adults can tolerate a higher level of salinity than young alligators but salinities of above 5 ppt are harmful to young hatchlings. Males seem to prefer more open water than females, which are often found in secluded areas with dense vegetation. The minimum home range size of adult males has been found to be 3,162 acres and females may use as little as 21 acres (USFWS 1992). Females construct large nests and usually remain near the nest and have been known to defend it until the young hatch. Alligators seem to have little food preference; they will eat anything of suitable size that is available in the habitat.

Fort Benning has varied suitable habitat to support alligators such as the Chattahoochee River and its backwaters, sloughs and major drainage creeks. Alligators have been found in most of the larger ponds on Fort Benning, including Weems, Records for the annual surveys are maintained by the Threatened and Endangered Species Biologist with an annual report submitted to the Garrison Command. All of the larger bodies of water on the installation to include the fishing ponds and the backwater area of the Chattahoochee River are known to have alligators present.

LIFE HISTORY/ECOLOGY

Most adults are between 6 and 12 feet in length and reach sexual maturity at about 6 or 7 years old, or 6 feet in length, in the southern portions of their range. In the northern part of their range it may take about 12 years to reach sexual maturity. Breeding occurs during the spring in open water and almost always at night. Alligators have no vocal cords but the male bellows by sucking air into his lungs and forcefully expelling it. It is thought that males bellow to attract females and warn other males of their presence (Mount 1975).

Nesting occurs in late spring or early summer throughout most of the historic range but this is somewhat variable. The female constructs a large cone or mound-shaped nest, often 6 to 7 feet in diameter and 2 to 3 feet high. Maximum clutch size may be from 60 to 70 but 40 is average. The female covers the eggs with grass or vegetation, mud and sticks. During the 43-45 day incubation period, the decomposition of the organic matter warms the eggs. As the eggs hatch, the young alligators begin to yelp or grunt, which seems to stimulate the female to uncover the top 6 to 8 inches of vegetation, allowing the babies to escape. The mortality rates for the first year are very high. At about two feet in length, the alligator has few natural enemies, except larger alligators. Young alligators eat mostly crustaceans, insects and small fish. Minnows are important to alligators during periods of low water. Adults, over 5 feet in length, will eat anything they can overpower. They consume vertebrates such as nutria, muskrats, ducks, beaver, turtles and snakes (Ensminger 1980).

2.5 REASON FOR LISTING

The species was listed as endangered in 1967 meaning it was considered in danger of extinction throughout all or a significant portion of its range. But, a combined effort by the USFWS and state wildlife agencies in the South saved these animals. The ESA prohibited alligator hunting, allowing the species to rebound in numbers in many areas where it had been depleted. As the alligator began to make a comeback, states established alligator population monitoring programs and used this information to ensure alligator numbers continued to increase. In 1987, the USFWS pronounced the alligator fully recovered and consequently removed the animal from the list of endangered species. Although the American alligator is secure, some related animals - such as several species of crocodiles and caimans - are still in trouble. For this reason, the USFWS still regulates the legal trade in skins, or products made from them, in order to protect these endangered animals with skin that is similar in appearance, but illegal in the commercial market.

CONSERVATION GOALS

The conservation goal will be to maintain a stable healthy population to the limit of the carrying capacity of suitable habitat on the Installation. Since the species is biologically fully recovered, there are no set population recovery goals.

MANAGEMENT PRESCRIPTIONS AND ACTION

Management efforts will be geared toward protection of alligator habitat. This will be aimed towards maintaining the water levels in the ponds and a NEPA review via the Form FB 144-R

(Request for Environmental Analysis), for any proposed project or activity that may affect alligator habitat. Signs warning people of the potential dangers of feeding alligators will be posted and maintained around the fishing ponds.

If a complaint about a nuisance alligator is filed, a complaint record will be filled out and then investigated. If necessary, small alligators will be relocated by Conservation Branch Personnel. In extreme cases, large aggressive alligators will be removed by Georgia Department of Natural Resources alligator control agents.

The Threatened and Endangered Species Educator will disseminate information to increase the awareness of the public to the alligator and its potential conflicts with people.

SURVEYS, INSPECTIONS, AND MONITORING

Night-light surveys will be conducted once each year during the month of August. The survey will be conducted within three days on either side of the first new moon so that it will be sufficiently dark to make observations easier. The surveys will begin 1/2 hour after the official sunset. The following ponds will be surveyed by vehicle: Kings, Headley's, Schley, Weems, Twilight, and Clear Creek Ponds. The observers will drive the edges of the ponds shining a spotlight (Q-Beam or similar) across the surface of the water and looking for the red eyes of the alligator. Data will be recorded on an alligator survey data sheet. The alligators counted will be put into general size classes (0-2', 2-4', 4-6', 6'+ or unknown). The surveys will be conducted when survey conditions are optimum (no wind or rain). The surveys will be canceled if wind or rain appear to be affecting counts. Surveys under poor conditions cause extreme variation and make it harder to detect trends. The River Bend area of the Chattahoochee River will be surveyed by boat following the route outlined in Figure 2. This route may have to be modified depending on water levels. If a helicopter is available, an aerial survey looking for nest mounds will be conducted in July or August to document alligator nesting on Fort Benning.

TIME, COST AND PERSONNEL

The planning and funding period for the implementation of this ESMC is 5 years, though some components of the plan extend beyond this time frame. Projected annual costs for implementation are shown in Table 1. Nothing in this plan shall be interpreted to require payment of funds in violation of the Antideficiency Act.

Table 1
Projected Annual Implementation Costs

FISCAL YEAR	ESTIMATED ANNUAL COST
2014	$ 3,000
2015	$ 3,000
2016	$ 3,000
2017	$ 3,000
2018	$ 3,000
5-YEAR TOTAL	$ 15,000

Figure 2
Route for American Alligator Boat Survey

CHECKLIST

Schedule	Activity	Implemented	
		Date	Signature
July-August 2014	Conduct night light surveys.		
May-June 2014	Conduct aerial survey.		
July 2015	Provide report to Commander on effectiveness of ESMP.		
July-August 2015	Conduct night light surveys.		
May-June 2015	Conduct aerial survey.		
July 2016	Provide report to Commander on effectiveness of ESMP.		
July-August 2016	Conduct night light surveys.		
May-June 2016	Conduct aerial survey.		
July 2017	Provide report to Commander on effectiveness of ESMP.		
July-August 2017	Conduct night light surveys.		
May-June 2017	Conduct aerial survey.		
July 2018	Provide report to Commander on effectiveness of ESMP.		
July-August 2018	Conduct night light surveys.		
May-June 2018	Conduct aerial survey.		
July 2019	Provide report to Commander on effectiveness of ESMP.		

References

Emsinger, A. 1980. The Fur Animals, The Alligator, and the Fur Industry in Louisiana. Louisiana Department of Wildlife and Fisheries. Wildlife Education Bulletin No. 109. Baton Rouge, LA, 1980.

Mount, R.H. 1975. The Reptiles & Amphibians of Alabama. Auburn University Agricultural Experiment Station. Auburn, AL, 1991.

U.S. Fish and Wildlife Service. 1992. Endangered and Threatened Species of the Southeastern United States (The Red Book). Prepared by Ecological Service Division of Endangered

APPENDIX E3

SPECIES MANAGEMENT COMPONENT

FOR

BALD EAGLE

(*Haliaeetus leucocephalus*)

Fort Benning, Georgia

Updated by

Roderick M Thornton
Threatened & Endangered Species Biologist
Conservation Branch, DPW

APPROVAL PAGE

Approving Official:

_____ _____
INSTALLATION COMMANDER Date

Reviewed by:

_____ _____
DIRECTOR OF PUBLIC WORKS Date

_____ _____
DIRECTOR OF PLANS, TRAINING, MOBILIZATION, AND SECURITY Date

_____ _____
STAFF JUDGE ADVOCATE Date

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EXECUTIVE SUMMARY

Background: In 1963 there were only 400 nesting pairs of bald eagles in the lower 48 states. By 2007 that number had increased to 10,000 nesting pairs. This increase is due largely to the protection that the species received through federal regulation. Due to the eagles great increase in breeding pairs in the lower 48 states it was removed from the Federal endangered species list in June of 2007. The species however is still federally protected. The major federal regulations that currently guide management for the protection of eagles in the United States are the Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, and the Lacey Act. "The Bald and Golden Eagle Act" prohibits anyone from taking, possessing, or transporting a bald eagle (*Haliaeetus eucocephalus*) or golden eagle (*Aquila chrysaetos*), or the parts, nests, or eggs of such birds without prior authorization. This includes inactive nests as well as active nests. Take means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb. Activities that directly or indirectly lead to take are prohibited without a permit. "The Migratory Bird Treaty Act" (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except as authorized under a valid permit (50 CFR 21.11). Additionally, the MBTA authorizes and directs the Secretary of the Interior to determine if, and by what means, the take of migratory birds should be allowed and to adopt suitable regulations permitting and governing take (for example, hunting seasons for ducks and geese). "The Lacy Act" was passed in 1900, and protects bald eagles by making it a Federal offense to take, possess, transport, sell, import, or export their nests, eggs and parts that are taken in violation of any state, tribal or U.S. law. It also prohibits false records, labels, or identification of wildlife shipped, prohibits importation of injurious species and prohibits shipment of fish or wildlife in an inhumane manner. Penalties include a maximum of five years and $250,000 fine for felony convictions and a maximum $10,000 fine for civil violations and $250 for marking violations. Fines double for organizations. Rewards are provided for information leading to arrest and conviction for violation of the Act. Due to this protection the management for bald eagles on Fort Benning will remain much the same as it did while the species was listed under the Endangered Species Act. This continued level of protection will help to ensure the continuation of the bald eagles recovery in the lower 48 states.

Current Species Status: Two nesting pairs are known to occur on Fort Benning. The current known nest locations are in Training Compartment AA-4 (Chattahoochee River) and E-01 (King's Pond). The southern populations of the bald eagle nest primarily in the estuarine areas of the Atlantic and Gulf coasts from New Jersey to Texas and the lower Mississippi Valley. The southern population of the bald eagle can be found throughout the lower 48 states as migrating or over-wintering birds. The species is vulnerable to several activities on the installation: low flying aircraft, timber harvest, human disturbance, and military training. On the installation it is believed that the nesting season begins near December 1st and continues until May 31st. Egg laying has historically occurred during the last week of December through the 1st week of January. If successful, juvenile eagles usually gain the ability of flight by mid April. On most years the adult eagles will migrate out of the nesting area by the end of May. Juveniles will usually be seen in the area until late June although they increasingly spend less time at the nest site from mid April until they also migrate.

Habitat Requirements and Limiting Factors: Bald eagles prefer forested areas adjacent to large bodies of water, such as lakes, rivers, and reservoirs. Limiting factors include habitat destruction and degradation, environmental contaminants, and illegal shooting.

Management Objectives: Management will be for the protection and enhancement of existing populations on the Installation and expansion into unoccupied suitable habitat.

Conservation Goals: The goal will be to maintain at least the current level of nesting and foraging habitat through forest management and habitat protection and to increase the number of nesting pairs to two with each nest producing at least one fledgling.

Actions Needed: The major steps needed to satisfy management objectives and achieve conservation goals are:

1. Protection of the current bald eagle nests and any future ones through buffer zone closures and restrictions.
2. Restrict hunting, training and other activities within 200 meters or direct line of site from the nest during December 1 to May 31, which is the nesting season for the southern population.
3. Restrict low level aircraft from around nests to at least 1000 feet above highest object or 1000 feet horizontal distance during nesting season. .
4. Manage selected clumps of trees within 1.5 km from Chattahoochee River to create dominant pine trees and to promote large tree growth through selective cutting.
5. Monitor nesting activities for information on productivity, human disturbance, and nesting season timing.

Total Estimated Cost of Conservation Actions: Projected costs for the first five years of this plan are $6,000 per year.

INTRODUCTION

The purposes of this Species Management Component (SMC) are: (1) to present information on the bald eagle, a federally protected species present at Fort Benning; (2) to discuss threats it faces on the Installation; (3) to define conservation goals; and (4) to outline a plan for management of the species and its habitat that will enable achievement of conservation goals. These purposes are consistent with the U.S. Fish and Wildlife Service (USFWS) Bald Eagle Recovery Plan (Exhibit 1). Cost of the conservation efforts and impacts to other Installation activities also will be discussed.

Adult bald eagles are large raptors that can be readily identified by their white heads and tails and huge yellow bills. They feed primarily on fish and nest in large dominant trees near a large water source. The species is distributed throughout the United States with 135 nests in Georgia.

Pesticides, indiscriminate shooting and habitat alterations have been the primary factors reducing the bald eagle population. Under the current management strategies the species has greatly increased in number in the lower 48 states.

SPECIES INFORMATION

This section provides a description of the species, including distribution, habitat/ecosystem, life history, evidence for its decline, and conservation measures taken by various agencies or organizations.

DESCRIPTION

The bald eagle is a large raptor with mature birds having a white head and tail, a large yellow bill, and yellow feet and eyes. Male eagles generally measure 36 inches from head to tail, weigh 7-10 pounds, and have a wingspan of about 6.5 feet. Females are larger, some reaching 14 pounds and having a wingspan of up to 8 feet. When first hatched, a bald eagle is covered with thick, silky down which is longest on the head. The coloration is smoke gray on the back, paler gray on the head and underparts of the body, and nearly white on the throat. When the eagle is about three weeks old, the light gray or whitish down is replaced by short, woolly thick down of a dark sooty-gray color. At the age of 5-6 weeks, blackish feathers begin to appear on the body and the wings. When the eaglet is 7-8 weeks old, it is fairly well feathered and only a small amount of down shows between the feather tracts. The flight feathers are half grown and have completed growth within another 2 weeks (Bent 1937).

The coloration of juvenile bald eagles varies. A first year bald eagle is entirely blackish, except for the underwing coverts and the tail feathers, which are mottled with buff or buff-white and subterminally banded with dark brown. Juveniles after this initial plumage acquire new feathers that have increasing amounts of white, most conspicuously on the underparts, until the brown adult plumage is attained. The amount and location of white blotchings are highly variable between individuals and between age classes. The head and tail gradually become white and are completely white when the eagle is five to six years old. Juvenile bald eagles are often confused with the golden eagle (*Aquila chrysaetos*), but the golden eagle is rarely found in Georgia during the winter.

Bald eagles can attain speeds in excess of 60 mph. The voice of the bald eagle is a series of weak high pitched squeaky cacklings often interspersed with a guttural, grunting sound.

The bald eagle has been protected under the Bald and Golden Eagle Protection Act since 1940 (16 U.S.C. 668-668d). The bald eagle below the 40th parallel was listed as endangered on March 11, 1967 and subsequently received protection under the Endangered Species Act of 1973 (16 U.S.C. 1531-1543) until its removal from the endangered species list in June 2007.

DISTRIBUTION

Historically, the bald eagle was a common nesting species throughout the coastal plain of the Southeast as well as along major lakes and rivers. The breeding range had been reduced to remnant populations in South Carolina, Louisiana, and east Texas, with apparently secure nesting only in Florida. Most breeding populations are now reported to have an adequate level of production and appear to have achieved stability (USFWS 1989). Burleigh (1958) reported eagles as once being common residents along the Georgia coast. They also nested in the Okefenokee (Wright and Harper 1913 and Hebard 1941). During the 2009-2010 nesting season, nearly 1/3 of the 159 counties in had at least one eagle nest resulting in 118 successful nests that produced 187 young. Nesting success has increased considerably in the past 23 years. During the 1986-1987 nesting season, there were only five successful nests out of 7 occupied territories, producing a total of nine young (J. Ozier, pers. comm.).

Since May 1993, there has been a pair of nesting bald eagles on Fort Benning. Over the years the eagle nest has moved three times but has remained within the same 1 kilometer stretch of the Chattahoochee River. Since the new nest is within the typical territory of the old nests it is believed to be the same nesting pair as previous years. From 1994 to 2010, the eagle pair has successfully produced at least one fledgling each year with the exception of 2008. During the summer of 2008 the nest tree which had been killed by a lightning strike fell. This caused the breeding pair to have to construct a new nest in another large pine tree about 100 meters from the old nesting tree. It is thought that this extra expenditure of energy prevented the pair from successfully nesting. At the new nest site the pair did successfully fledge chicks in 2009 and 2010. In 2011 a new nest was discovered in E-01 training compartment near King's Pond. The nest fledged one eaglet in late June. The new nest will now be protected and monitored for future nesting activities.

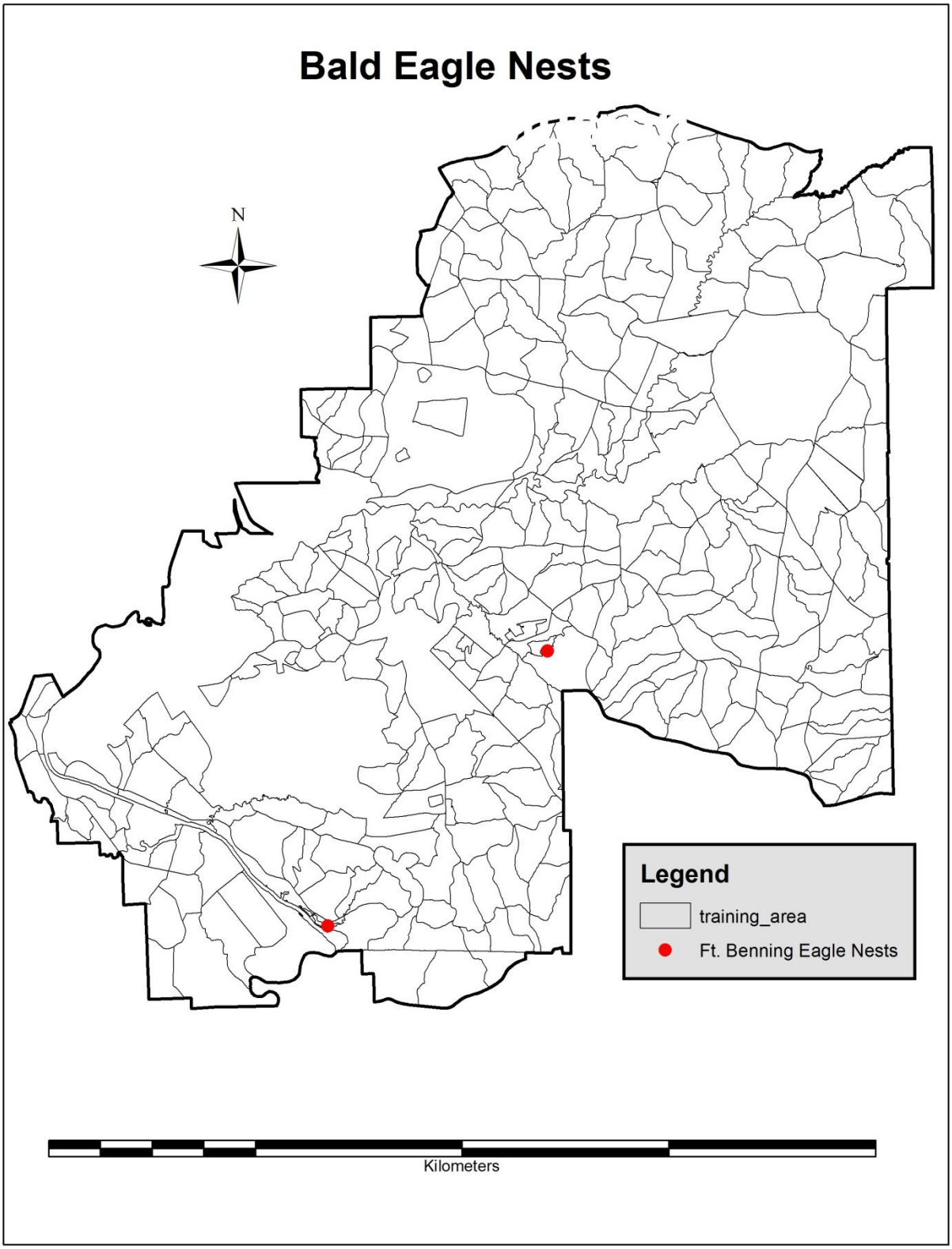

Figure 1
Location of Bald Eagle Nests on Fort Benning, GA

Nonbreeding eagles from the Southeast migrate northward, primarily along the coast, in late spring and early summer (Broley 1947). Migration endpoints (summering areas) for southern bald eagles range from South Carolina to North Carolina to the Chesapeake Bay to Canada's Maritime Provinces and the Great Lakes (Wood et al. 1990, Broley 1947). Wood et al. (1990) suggests that survival during summer migration may significantly affect recovery of southeastern eagle populations. Although the general trend is for southern eagles to migrate north, the migration chronology, pathways, and ultimate destinations remain largely unknown.

It is believed there may have been 25,000 to as many as 75,000 nesting bald eagles in the lower 48 states when the bird was adopted as our national symbol in 1782. Since that time the population has declined with a low in the 1960s of fewer than 450 bald eagle nesting pairs in the lower 48 states. Today there are over 789 nesting pairs and an unknown number of young and subadults in the conterminous United States.

HABITAT/ECOSYSTEM

Bald eagles prefer forested habitats near bodies of water. A great portion of an adult bald eagle's life centers around the nesting territory. Selection of nesting sites varies and depends on the species of trees growing in a particular area. In this area, nests are generally in living pines or bald cypress near bodies of water. There are many consistent factors involved in nest site selection. A clear flight path to a close point on a beach or river is one of those factors. The largest tree in a stand is chosen, even if the eagles are nesting in stunted timber. Most nests are located in the upper 30 feet of the tree with canopy cover above and a clear view of open water. An open view of the surrounding area is another common characteristic. Proximity to a body of water, usually a lake, river, or large stream appears to be another requisite since the major food item of eagles is fish. Most nest trees are within one half mile of water and many are considerably closer. Freedom from human disturbance or intervention is one of the most variable factors involved. (Robards and King 1966, Retfalvi 1965, Corr 1969).

Winter roosting habitat is similar, however, distance from a body of water is not critical. Roost sites are an important factor of wintering areas. Bald eagles may roost alone or within groups of up to 100 birds. No winter congregations occur in Georgia since winter is nesting season here.

LIFE HISTORY/ECOLOGY

Nesting areas are characteristically used on an annual basis and a strong fidelity to nesting territories is normal for the species. Hensel et al. (1964) defined territory as an area defended against competing members of the same species from the time of mating until the young are independent. Territories range from 28 to 112 acres and averaged 57 acres (Chrest 1964). These areas receive sustained use during the nesting season for courtship, incubation, nestling period, fledging of young, and post-fledging care. This requires a dependence on an area for over 6 months. Bald eagles reach sexual maturity when they are four to five years old. Adults mate for life and tend to use the same nest year after year. However, a pair of eagles may construct one to three nests over a period of years and often use alternate nests in different years. These nests are located usually in the same nesting territory. Although bald eagles may range over great distances, they usually return to nest within 100 miles of where they were raised.

The majority of nest sites are within 1/2 mile of water. Nests are often in the ecotone of forest and marsh or water, and are constructed in dominant or codominant living pines or bald cypress trees, although cliffs are occasionally used. Nests can become enormous, weighing more than a

ton. The cone-shaped nest may be 6 feet in diameter and 6-8 feet from top to bottom. The nest may be lined with Spanish moss, corn husks, or grasses.

Nesting activity here usually begins in November. The female does most of the nest building, but both birds bring in nesting material. Mating includes a spectacular aerial courtship including locking talons and descending in a series of somersaults. Usually two eggs are laid in a clutch with a range of one to three eggs. The eggs hatch after 35 days of incubation. The adults begin incubating after the first egg is laid. This results in asynchronous hatching which gives the first chick to leave the egg a head start at vigorously begging for food and successfully attracting parental attention. It is viewed as a parental strategy for raising the largest number of offspring that food resources will allow when the abundance of food for the chicks cannot be predicted at the time that the eggs are laid. If the first set of eggs is taken early enough, the female may lay a second set after an interval of four weeks or more (Bent 1937). During the first three to four weeks of the young eagle's life, one or both of the parents will be at the nest constantly. Both the male and the female feed the young birds, although the female broods them more frequently. Night brooding may last until the young are a month old (Herrick 1933). The eaglets are unable to feed themselves until they are around seven weeks old. The feeding method consists of the adult tearing off strips of food with their beak and holding these strips to the beaks of the eaglets. If two young hatch, the larger will usually get food first, and if food is in short supply it will receive the larger share if not all of it (Retfalvi 1965). The smallest chick will only survive in years of abundant food.

At about one month of age, the eaglets begin wing flapping and it becomes more frequent as the eaglets mature. During the last several weeks that the eagles are in the nest, the parents spend no more than fifty percent of their time around their young, and the eaglets themselves do not seem to be very interested in the adults. Young leave the nest after 70-98 days. When they first leave the nest, they frequently return to it at night, for up to 4 to 6 weeks, when the parents might bring in fresh prey (Herrick 1924a, 1924b, 1933; Retfalvi 1965). Young eagles are fully developed at the time of fledging.

Bald eagles feed on fish, waterfowl, and other birds, small mammals, and carrion. Fish comprise 65-90 percent of the eagle's diet. The bald eagle is an opportunist and dead and dying fish are eaten as readily as live fish which the eagle catches.

For an eagle in captivity, fifty years is not an unusual life span and thirty years or longer in the wild is common. The bald eagle has a 50 percent survival rate during its first year of life.

REASON FOR PROTECTION

Pesticides, indiscriminate shooting and habitat alterations were the primary factors for reduction of the bald eagle population. The Southeast has had a rapid rise in the human population in the last 30 years. This immigration has resulted in extensive alterations of land use. Compounding that situation is the fact that both man and eagle prefer waterfront locations. (Wood et al. 1990, Harris et al. 1987). However, the most precipitous decline in the eagle population resulted from environmental contaminants. Organo-chlorine compounds (DDT and its metabolites) inhibited calcium deposition, which resulted in eggshell thinning and ultimately reduced reproductive success (Radcliffe 1967; Hickey and Anderson 1968; Anderson and Hickey 1972; Krantz et al. 1970). Many eagle populations experienced almost total reproductive failures resulting from

pesticide contamination. Regulating the use of persistent pesticides has led to a gradual increase in the reproductive success in eagles.

Shooting has taken its toll on eagles since colonial times. During 1961-1982, 25 percent of the documented mortality was caused by shooting. With education and increased public awareness this trend is turning downward. Another significant source of mortality in eagles may be lead poisoning. Between 1966 and 1984, 109 bald eagles from across the country were diagnosed as lead poisoned (Feirabend and Myers 1984). Although lead poisoning ranks fourth behind shooting, electrocution, and impact injuries as the leading cause of death in bald eagles (Kaiser et al. 1980), sublethal lead contamination may contribute to mortality from these other sources (Redig et al. 1983). Chronic low levels of lead produce neurological dysfunction, behavioral and learning aberrations, anemia, and increased susceptibility to diseases and other mortality factors (Reiser and Temple 1981).

On major fishing lakes in northcentral Florida and North Carolina, the number of boats is significantly higher on weekends than on weekdays, whereas the number of eagles observed in these areas is significantly less on weekends (Wood et al. 1990). Whether foraging success or productivity is affected is unknown. Increasing human populations and increasing recreational use of lakes in the Southeast, however, may pose serious problems for eagles. Uncontrolled human disturbance can interfere with raptor foraging. People in raptor foraging areas may increase energy costs to raptors by repeatedly flushing them (Stalmaster and Newman 1978, Knight and Knight 1984) and can restrict raptors' access to foraging areas, thereby reducing the amount of available habitat (Clark and Niles 1986). Bald eagles are more sensitive to disturbance from people on foot than in a boat (Wallin and Byrd 1984). Disturbance at the nest site is most likely to be detrimental during courtship, nest building, egg laying, incubation and brooding (approximately the first 12 weeks of the nesting cycle). Embryonic mortality may result from chilling of eggs or from addling or breaking of eggs by the adults when they are disturbed on the nest.

CONSERVATION MEASURES

A recovery plan for the Southeastern States Bald Eagle was written by the USFWS in 1989. The plan calls for protecting and managing bald eagle habitat, protecting and managing bald eagle populations and improving and maintaining awareness, concern, and support for the recovery of the species. The State of Georgia monitors productivity on all known eagle nests in the State. Although the 1989 guidelines from the USFWS are no longer enforceable due to the delisting of the eagle in August of 2007, Fort Benning has considered them in developing the current management plan for eagles on the Installation. It is our belief that the following conservation measures are sufficient to ensure that Fort Benning's activities do not adversely affect bald eagles and their habitat on the installation. To protect the current nests on Fort Benning, primary and secondary zones have been established. These guidelines, including size of management zones, can be adapted to individual nests depending upon topography, vegetative cover, history of tolerance to disturbance, and the behavior of the individual bald eagles. Each zone has certain restrictions to limit human activities to prevent disturbance to the nest. The primary zone is the most critical area immediately around the nest and extends 200 meters radially from the nest. The following human activities are likely to cause disturbance to bald eagles and, therefore, will not occur within the primary nesting zone at any time except as specified below:

1. Land use changes - Timber harvesting operations, including road construction and chain saw and yarding operations, commercial and industrial development, construction, and mining during the nesting season within 660 feet (200 meters) of the nest. The distance may be decreased to 330 feet around inactive nests within a particular territory, including nests that were attended during the current nesting season but not used to raise young, after eggs laid in another nest within the territory have hatched.

2. Use of any chemicals toxic to wildlife. (i.e., persistent organochlorine pesticides, PCB, mercury, lead, etc.)

3. Human entry during the nesting period - (except authorized research and management activities). Human entry during the non-nesting period will be restricted to hiking, picnicking, and bird watching. Training is also excluded from the primary protection zone during the nesting period.

4. Prescribed Burning/Thinning – Selective thinning and other silvicultural management practices designed to conserve or enhance habitat, including prescribed burning close to the nest tree, should be undertaken outside the nesting season.

5. Low level aircraft operation - The current guideline agreed upon with Flight Operations at Lawson Army Airfield is 1000 feet above highest object or 1000 feet horizontal from either of the nest sites.

The secondary zone is to minimize disturbance that might weaken the integrity of the primary zone, protect important areas outside of the primary protection zone, and encompass lands that may provide suitable habitat in the future. The secondary zone is circular, extending one kilometer from the nest. There are certain human activities of a permanent nature that would likely disturb bald eagles and should be limited within the secondary zone. The activities include:

1. The development of new commercial and industrial sites.

2. The building of multi-story buildings and housing developments.

3. The building of new roads, trails and canals facilitating access to the nest.

4. The use of chemicals toxic to wildlife. (i.e., persistent organochlorine pesticides, PCB, mercury, lead, etc.)

5. Prescribed burning – burning within the secondary zone should primarily be conducted outside of the nesting season. If burning within the secondary zone during the nesting season is required, prescribed managers will coordinate with Endangered Species Biologist. Biologist will advise burn managers of the current status of the nest (eggs, fledglings, occupation status, etc.) and the precautions that need to be taken depending on status of nest and location of burn unit.

Prescribed burning in burn units within the 1000 meter secondary zones should be done in a manner that limit the amount of smoke the nest will receive, to keep eagles from having to leave the nest at a critical time during the nesting season.

In general, no major activities will occur in this zone during the nesting period. Acceptable minor activities the birds will tolerate if restricted to the secondary zone include hiking, bird watching, fishing, camping, picnicking, hunting, and use of firearms. Any bald eagle nest whether active or inactive will be afforded the same protection. Eagles often use alternate nests in different years and, therefore, even an unused nest should be protected in case it is to be used in upcoming years. Legally, as long as the nest still possesses those characteristics which make it suitable of occupation, it cannot be disturbed. Non-nest trees in the surrounding primary zone also should be protected, particularly those that are frequently used for perching or provide potential suitable future nest sites.

The USFWS' Management Guidelines for the Bald Eagle in the Southeast Region also provides guidance on foraging areas in the vicinity of both wintering and nesting habitats. These guidelines will enhance such feeding areas and eliminate or minimize human disturbance. These guidelines include:

1. Eliminate the use of toxic chemicals (i.e., persistent organochlorine pesticides, PCB, mercury, lead, etc.) in the watersheds of lakes and rivers where bald eagles feed.

2. Discourage the construction of buildings along shorelines where bald eagles feed.

3. Manage fish populations or other primary food supplies to sustain bald eagles.

4. Limit fishing, boating, and other human disturbances adversely affecting bald eagles.

5. Prohibit the use of clear-cut and high-grade logging along the shoreline of feeding waters. This will prevent the removal of large trees preferred by bald eagles for hunting, roosting, and loafing perches.

6. If possible, prevent or reduce shoreline erosion to protect roost or perch trees. These trees also help to prevent siltation.

The bald eagle is protected under the Bald and Golden Eagle Protection Act (16 U.S.C.) 668-668c), the Migratory Bird Treaty Act (16 U.S.C. 703-711), and “The Lacey Act”.

CONSERVATION GOALS

Suitable nesting habitat for the bald eagle can be found along both sides of the Chattahoochee River. The River Bend area has extensive backwaters that can provide necessary foraging habitat. By looking at available habitat and foraging base, it is estimated that Fort Benning can support two, possibly three nesting territories. The goal will be to maintain at least the current

level of nesting and foraging habitat through forest management and habitat protection and to increase the current number of nesting pairs with each nest producing at least one fledgling.

MANAGEMENT PRESCRIPTIONS AND ACTIONS

Management efforts will be geared toward protection of the existing bald eagle nests and creation of suitable habitat for future eagle nests. For protection, the nests will have a primary and secondary zone as outlined under Conservation Measures and can be seen in Figure 2 for the current nests.

To protect the nest in Training Compartment AA-4, the gates on Sedan Trail and the Shell Creek Boat Ramp will be closed during the nesting season (December 1 to May 31). A permanent exclusion area has been designated around the nest and the primary feeding area of the nest in training area AA-4. In addition to the exclusion area in AA-4, a section of AA-5 that is close proximity of the nest has been designated as a bow hunting area. This area also restricts military training during the nesting season to foot traffic only with no discharge of weapons within the protected zone. Buoys will be placed in the river to close off a small section of backwater as indicated on Figure 3. A written request must be provided to the U.S. Army Corps of Engineers prior to closing off the backwater area. This closure provides the eagle protection from disturbance while the eagles are nesting. In addition, signs will be placed on the perimeter of the closed section. The buoys and signs will remain in place until the eaglets have fledged, usually around mid to late May. The Georgia Department of Natural Resources (GADNR) Law Enforcement Division will be contacted in December, after the buoys are put in place, and request their assistance in monitoring and enforcing the "No Boats Allowed Zone" on the Chattahoochee River next to the AA-4 eagle nest.

The dates for opening the Training Compartments and gates can be extended if necessary to accommodate a renesting attempt or a late start. For both nests, (AA4 and E01)a low flying aircraft restriction will be implemented during the entire nesting season of 1000 feet above highest object and 1000 feet horizontal from the eagle nests (Figure 4).

During the first week in November, a memo will be sent to Chief, Range Division and Chief, Aviation Division to inform them of the upcoming bald eagle nesting season and the restrictions to be put in place.
At the time of this update the only restrictions for the E-01 (King's Pond) nests are those stated above for the primary and secondary protection zones.

HABITAT MANAGEMENT

Potential bald eagle nesting habitat can be found within one half mile of either side of the Chattahoochee River south of Uchee Creek. Selected areas will be managed to produce long lived and tall pine trees with clear paths to the river. Generally, a wide undisturbed buffer of trees will be left along the river corridor. Presently, there are sufficient natural trees for nesting that artificial platforms do not need to be constructed. If at some time there is a lack of suitable trees due to the effects of a hurricane or some other disaster, the use of nesting platforms will be evaluated at that point.

As part of the Threatened and Endangered Species Educator's program, information on the bald eagle will be disseminated to the military as well as to the general public to raise the awareness of this species and what can be done to help protect it.

Any unit that conducts a training exercise or construction activity on Fort Benning must complete a Record of Environmental Consideration (FB-144-R) detailing their proposed activity and location. Those activities that might affect the bald eagle or its habitat will be carefully coordinated to minimize adverse impacts.

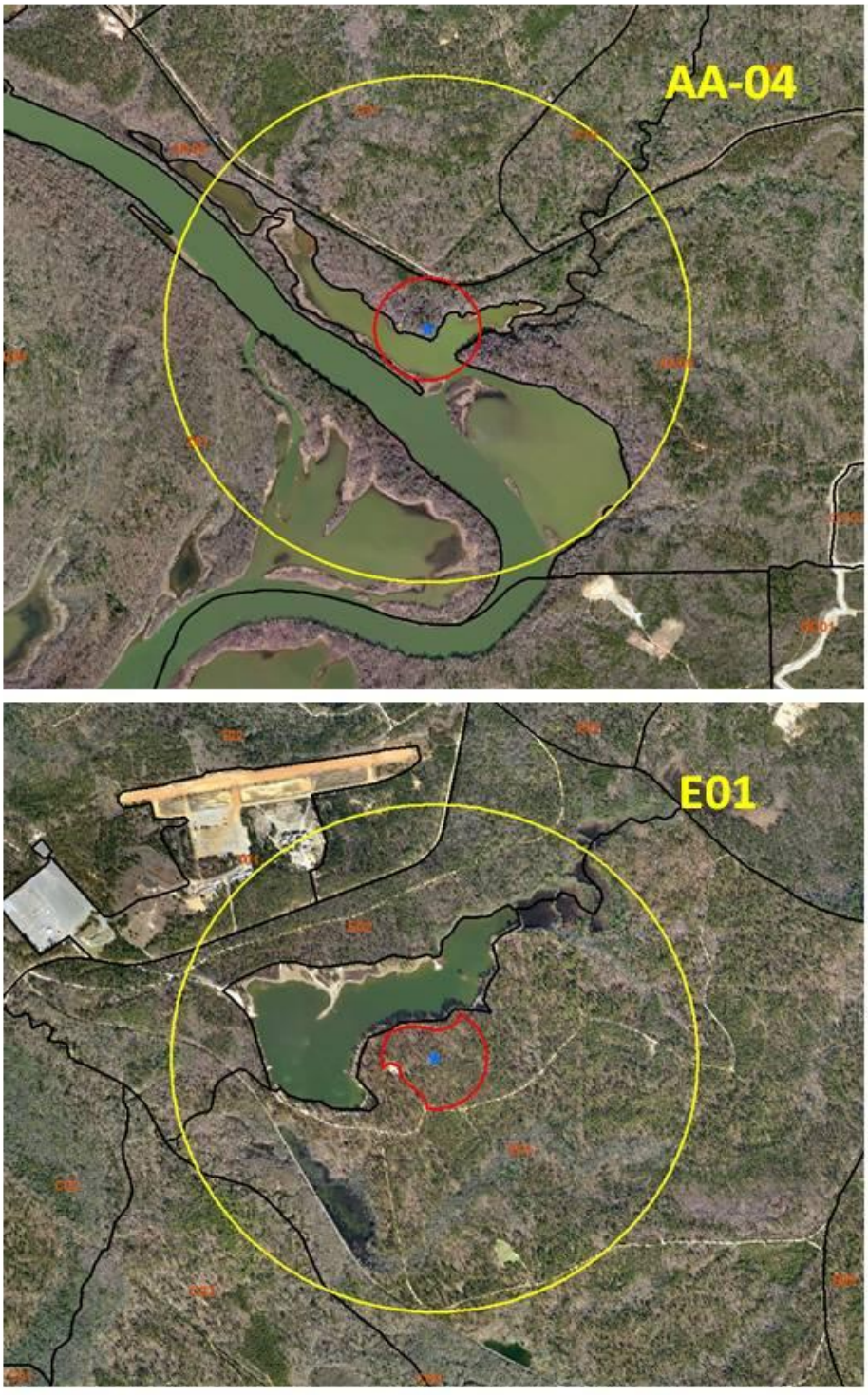

Figure 2.
Primary and Secondary Management Zones

Figure 3
Placement of Buoys for "No Boating Zone"

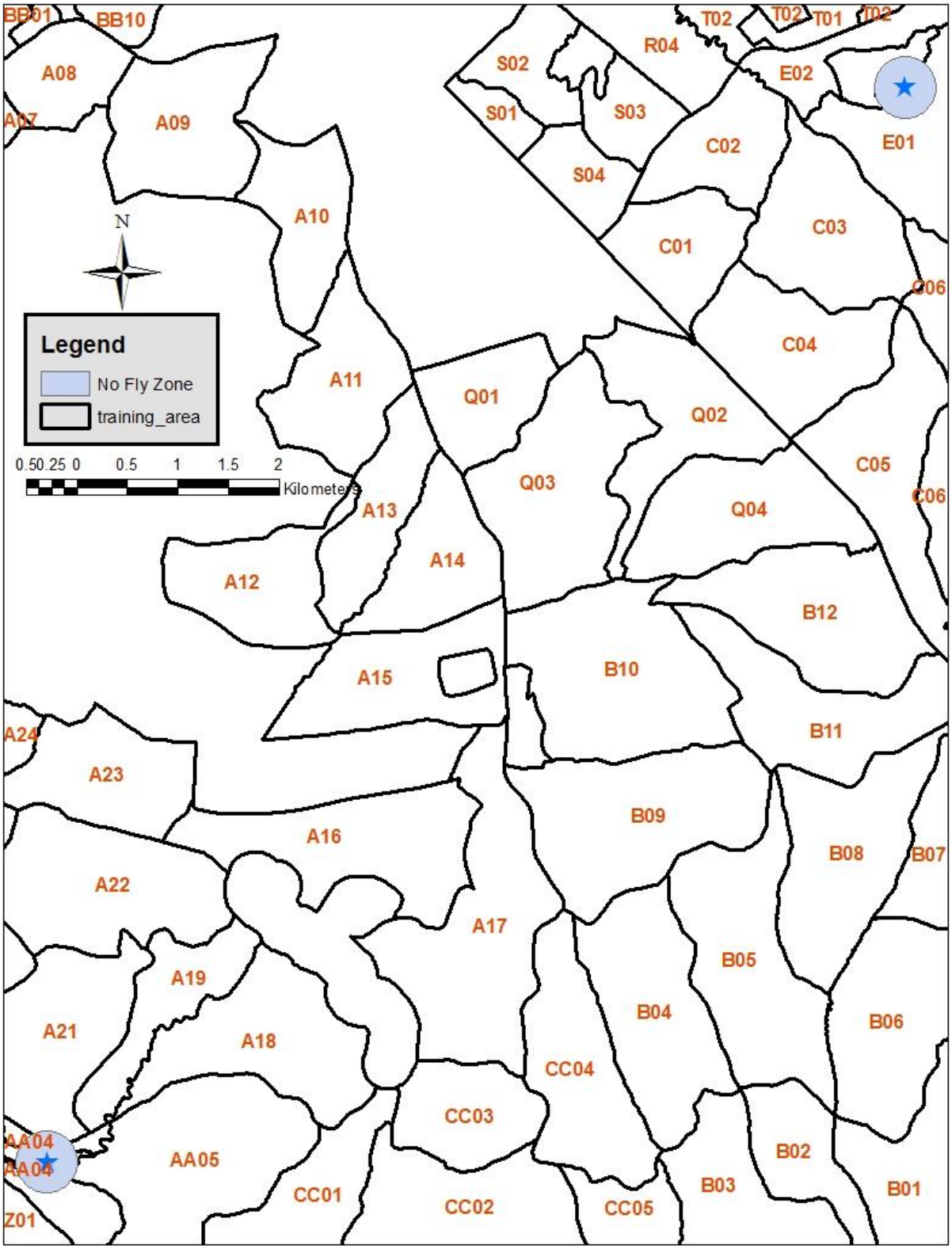

Figure 4
No-Fly Zone for Bald Eagle Nests on Fort Benning

SURVEYS, INSPECTIONS, AND MONITORING

With the help of the Georgia Department of Natural Resources, the area along the Chattahoochee River will be flown by helicopter each winter to try and spot any new eagle nests on the Installation. The two known nests will be checked starting in early November for any nesting activity. If there is activity the nest will be monitored on a weekly basis to check for productivity and disturbance. Periodically, the active nest will be observed for a 3-4 hour period of time to look for disturbance, low flying aircraft, predominant flight altitudes and directions, nesting/fledging success, feeding behavior, and dietary preferences. Aircraft overflights within the "No Fly Zone" will be reported immediately to Lawson Army Airfield Flight Operations Center and corrective actions will be taken to prevent future occurrences. The gates will be checked on a weekly basis to make sure they are locked and that there has been no trespassing. If a new nest is located, conferences will be held between the endangered species biologist and Chief, Range Division and Chief, Aviation Division to notify them of the nest location and make any modifications to the flight path of aircraft or to training activities as deemed necessary. Also, the USFWS and GADNR will be notified of the nest location.

Each winter, usually the first and second week of January, the Annual Midwinter Eagle Survey will be completed. This is part of a nationwide effort to monitor eagle population trends. A standardized route covering 10 miles of the Chattahoochee River (Figure 5) will be surveyed by boat with one observer and one boat operator. If possible, the same observer will be used each year to achieve consistent results.

Conservation Branch personnel who observe eagles in their daily activities will complete a T&E Observation Form (Figure 6) and give to the endangered species biologist who will then record it into the Threatened and Endangered Species Database.

TIME, COST and PERSONNEL

The initial planning and funding period for the implementation of this ESMC is 5 years, though some components of the plan extend beyond this time frame. Projected annual costs for implementation are shown in Table 1. Nothing in this plan shall be interpreted to require payment of funds in violation of the Antideficiency Act.

Table 1
Projected Annual Implementation Costs

FISCAL YEAR	ESTIMATED ANNUAL COST
2014	$ 6,000
2015	$ 6,000
2016	$ 6,000
2017	$ 6,000
2018	$ 6,000
5-YEAR TOTAL	$ 30,000

Figure 5. Route for Mid-Winter Bald Eagle Survey.

7.0 CHECKLIST

Schedule	Activity	Implemented	
		Date	Signature
November 2014	Begin monitoring eagle nest for activity.		
November 2014	Send memo to Range and Aviation Divisions notifying them of nesting season and brief 498th Air Ambulance Co.		
December 2014- June 2015	Close appropriate gates.		
January 2015	Conduct Mid-Winter Bald Eagle Survey		
November 2015	Begin monitoring eagle nest for activity.		
November 2015	Send memo to Range and Aviation Divisions notifying them of nesting season		
December 2015- June 2016	Close appropriate gates.		
January 2016	Conduct Mid-Winter Bald Eagle Survey		
November 2016	Begin monitoring eagle nest for activity.		
November 2016	Send memo to Range and Aviation Divisions notifying them of nesting season		
December 2016- June 2017	Close appropriate gates.		
January 2017	Conduct Mid-Winter Bald Eagle Survey		
November 2017	Begin monitoring eagle nest for activity.		
November 2017	Send memo to Range and Aviation Divisions notifying them of nesting season		
December 2017- June 2018	Close appropriate gates.		
January 2018	Conduct Mid-Winter Bald Eagle Survey		
November 2018	Begin monitoring eagle nest for activity.		
November 2018	Send memo to Range and Aviation Divisions notifying them of nesting season		
December 2018- June 2019	Close appropriate gates.		

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APPENDIX E4

ENDANGERED SPECIES MANAGEMENT COMPONENT

FOR

WOOD STORK

(*Mycteria americana*)

Fort Benning, Georgia

Updated by

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Threatened & Endangered Species Biologist
Conservation Branch, DPW

APPROVAL PAGE

Approving Official:

_____ _____
INSTALLATION COMMANDER Date

Reviewed by:

_____ _____
DIRECTOR OFPUBLIC WORKS Date

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DIRECTOR OF PLANS, TRAINING, MOBILIZATION, AND SECURITY Date

_____ _____
STAFF JUDGE ADVOCATE Date

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EXECUTIVE SUMMARY

Background: Army Regulation (200-1) Environmental Protection and Enhancement" requires the preparation of Endangered Species Management Component (ESMC) for listed and proposed threatened and endangered species and critical habitat present on Installations. All Army land uses are subject to these regulations. Compliance with AR 200-1 involves coordination with other Federal agencies responsible for the protection of these species. Failure to implement this management plan can lead to violation of the Endangered Species Act of 1973 (ESA) and result in the costly disruption of military operations.

Current Species Status: The wood stork (*Mycteria americana*) is listed as endangered by the U.S. Fish and Wildlife Service (USFWS). Wood storks are a transient species on Fort Benning occurring during their post-breeding dispersal. Wood storks breed in Florida, Georgia, Alabama, and South Carolina. In 2000, only one wood stork was sighted on Fort Benning. It was seen feeding in Weems Pond where water conditions were very low due to an extreme drought. This sighting is significant, as it is the first time a wood stork has been observed on the Georgia side of the Installation. In 1999, approximately 29 wood storks were observed in an oxbow pond in Training Compartment Z-3 on the Alabama portion of the Installation. In 1998, several observations of wood storks were made in Alabama in the X-5 Training Compartment. The most wood storks observed in 2002 were 43 birds. In August 1996, a roost was found for the first time on Fort Benning by the USFWS's Threatened and Endangered Species Survey in Training Compartment X-5 in Alabama. One evening 16 birds were seen and the next night nine birds were seen. Wood storks were first documented on Fort Benning in 1994 when a single bird was observed feeding in a shallow pond on the west side of Fryar Drop Zone in the X-3 Training Compartment. Wood storks were observed feeding in this same pond in 1995 and 1996. The biggest influence on wood storks being present on Fort Benning is the water level manipulations conducted by the U.S. Army Corps of Engineers on the Chattahoochee River. These water level manipulations influence the availability of forage fish for the wood stork to feed upon. The major threat on the Installation is the degradation of wetland habitat resulting in the loss of foraging areas.

Habitat Requirements and Limiting Factors: Wood storks use a variety of freshwater and estuarine wetlands for nesting, feeding, and roosting. Limiting factors include loss of feeding habitat, water level manipulations affecting drainage, predation and nest tree regeneration, and human disturbance.

Management Objectives: Management will be for the protection and enhancement of existing populations on the Installation.

Conservation Goals: To maintain an after breeding transient population and the necessary wetland foraging habitat.

Actions Needed: The major steps needed to satisfy management objectives and achieve conservation goals are:

1. Conduct annual surveys of potential foraging and roosting areas for wood storks to estimate population and identify habitats used by wood storks.
2. Monitor activities in known wood stork areas and limit any activity that would harm wood stork habitat.
3. Increase public awareness.
4. A preliminary assessment of sites suitable for water control that could be used for wood stork foraging areas will be made.
5. Maintain feeding and nesting areas as shallow open water areas. Annual herbicide treatments may be necessary to eradicate invasive aquatic vegetation.

Total Estimated Cost of Conservation Actions:

Projected costs for the five years of this plan are $ 25,000per year.

INTRODUCTION

The purposes of this Endangered Species Management Component (ESMC) are: (1) to present information on the wood stork, a Federally listed endangered species present at Fort Benning; (2) to discuss threats it faces on the Installation; (3) to define conservation goals; and (4) to outline a plan for management of the species and its habitat that will enable achievement of conservation goals. These purposes are consistent with the U.S. Fish and Wildlife Service (USFWS) Wood Stork Recovery Plan (Exhibit A). Cost of the conservation efforts and impacts to other Installation activities also will be discussed.

The wood stork is a large long-legged wading bird that feeds in shallow waters. They occur in freshwater and brackish wetlands and are found throughout Florida, Georgia, and coastal South Carolina.

This ESMC is based on and is consistent with the following laws, regulations, and guidelines: Endangered Species Act of 1973 (ESA); Army Regulation (AR) 200-1; and the USFWS Wood Stork Recovery Plan.

SPECIES INFORMATION

This section provides a description of the species, including distribution, habitat/ecosystem, life history, evidence for its decline, and conservation measures taken by various agencies or organizations.

DESCRIPTION

The wood stork is a large 33-45 inch long legged wading bird with a wingspan of 60-65 inches. The bird is white except for black flight feathers and a short black tail. They have a long stout downcurved bill that is black in adults and yellow in immature birds. Their heads are dark gray and bare, legs are dark, and feet are dull pink. Immature wood storks have a feathered light gray head with dingy white feathers over the rest of the body. Storks fly with necks and legs extended. During courtship and the early nesting season, adults have pale salmon coloring under the wings, fluffy undertail coverts that are longer than the tail, and toes that brighten to a vivid pink. The species was listed as endangered in accordance with the ESA by the USFWS February 28, 1984 (49 FR 7332).

DISTRIBUTION

The breeding range of the species extends from the southeastern United States south through Mexico and Central America, Cuba and Hispaniola, and through South America to western Ecuador, eastern Peru, Bolivia, and northern Argentina (Figure 1) (American Ornithologists' Union 1983). The U.S. breeding population of the wood stork occurs in the southeastern swamps and wetlands, breeding primarily in cypress swamps and also in mangroves. Presently, breeding occurs primarily in Florida with a few rookeries in South Carolina and Georgia.

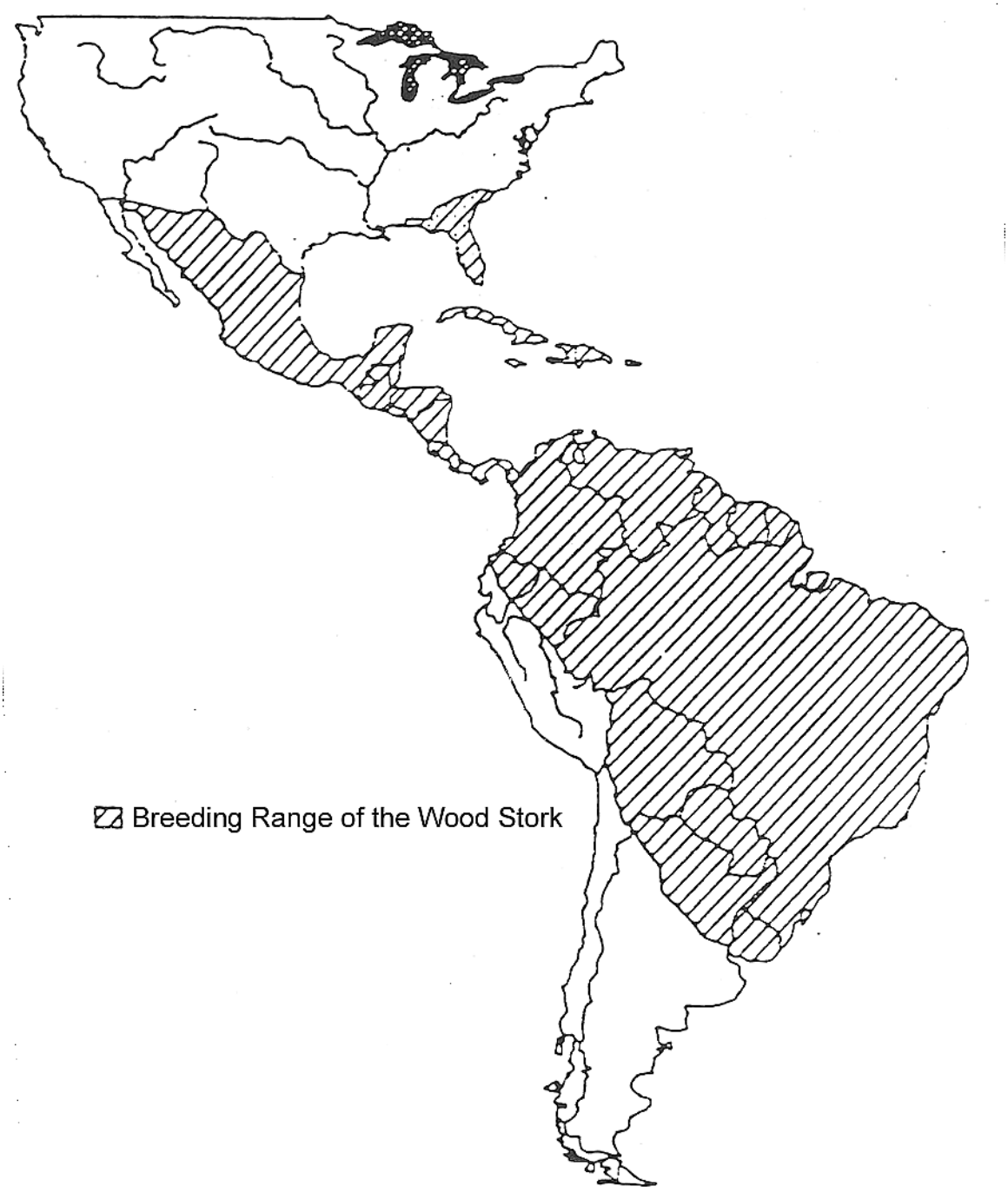

Figure 1
Wood Stork Breeding Range

However, the wood stork may be seen from Texas to South Carolina. The nearest nesting population to Fort Benning is in Thomas County, Georgia, approximately 115 miles to the southeast. Post-breeding storks from Florida, Georgia, and South Carolina disperse occasionally as far north as North Carolina and as far west as Mississippi and Alabama. Storks sighted in Arkansas, Louisiana, Texas, and points farther west may have dispersed from colonies in Mexico. The amount of overlap and population interchange is unknown. During the winter, storks nesting in north Florida, Georgia, and South Carolina move south (USFWS 1996).

Observations of wood storks at Fort Benning have all been on the Alabama side of the Installation, except for a single wood stork observed at Weems Pond. The first stork was observed in July 1994 feeding in a shallow pond on the west side of Fryar Drop Zone. A single wood stork was again observed in the same pond during the following two years. Also in August of 1996, four storks were observed flying over that same pond, and about 20 storks were seen flying over Leyte Field. The USFWS during their 100 percent Survey for Threatened and Endangered Species found a roost for the first time in August of 1996. It was found in Training Compartment X-5 (Figure 2) and one night 16 birds were seen and on the next night nine birds were seen.

It appears that the two shallow ponds and the beaver pond on the west side of Fryar Field are important foraging areas since the storks have been found in them for at least three years. These ponds typically exhibit the gradually drying wetland situation that is favorable for wood stork feeding and, therefore, should be protected from any habitat alteration.

HABITAT/ECOSYSTEM

Wood storks occur in freshwater and brackish wetlands, primarily nesting in cypress or mangrove swamps. They prefer medium to tall trees as nesting sites, which are located either in standing water (swamps) or on islands surrounded by relatively broad expanses of open water (Palmer 1962, Rodgers et al. 1987, Ogden 1991). Storks tend to use the same colony sites over many years, as long as the sites remain undisturbed and sufficient feeding habitat remains in the surrounding wetlands. They are dependent on freshwater and estuarine wetlands for nesting, feeding, and roosting.

Due to their tactile feeding behavior they require high concentrations of prey and shallow water (2-16 inches) and where the water column is uncluttered by dense patches of aquatic vegetation (Coulter and Bryan 1993). The preferred feeding sites are depressions in marshes or swamps where fish become concentrated during periods of declining water levels (USFWS 1991). Typical foraging sites throughout the species' range include freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments and depressions in cypress heads and swamp sloughs. Almost any shallow wetland depression where fish become concentrated either through local reproduction or the consequences of area drying, may be used as feeding habitat (USFWS 1996).

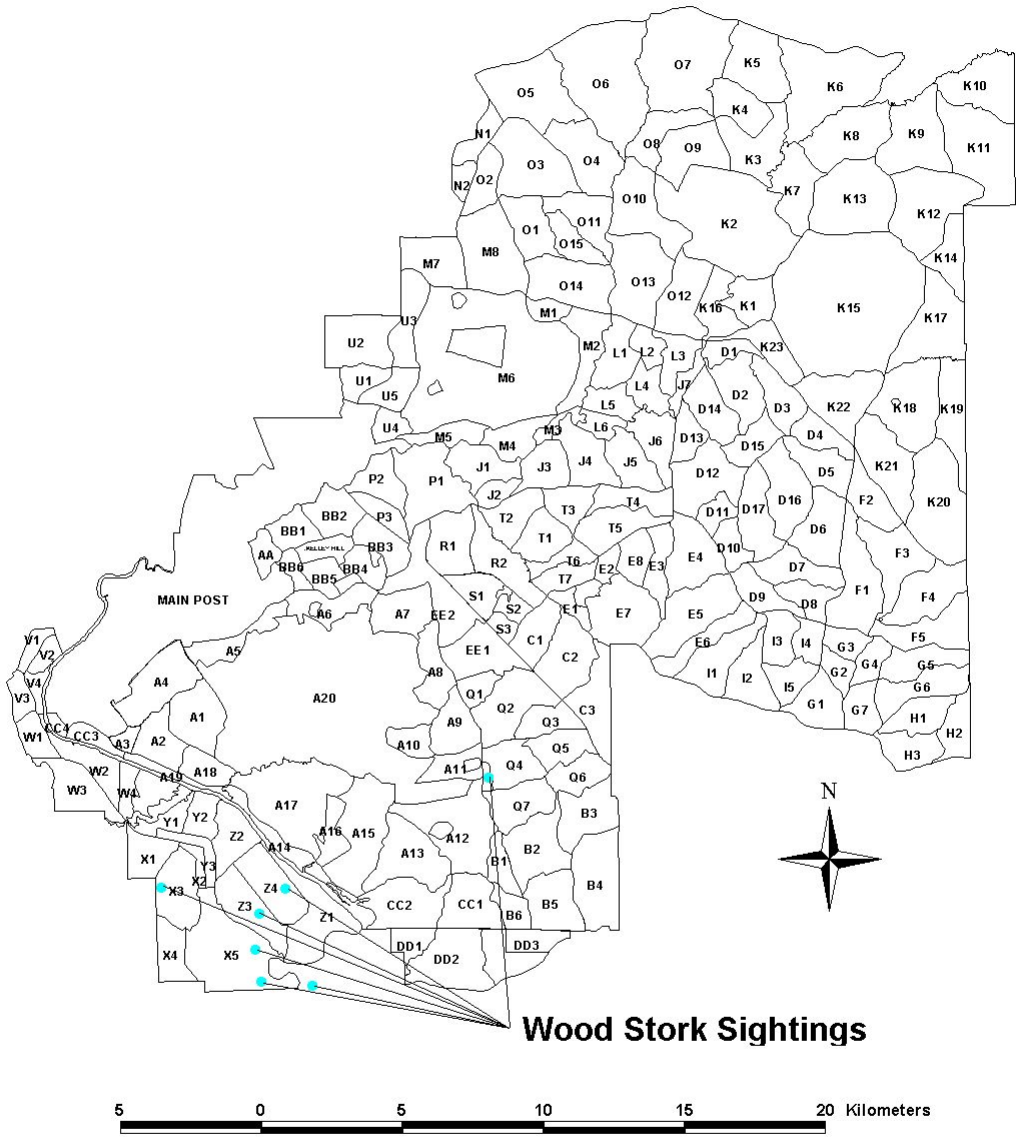

Figure 2
Wood Stork Sightings on Fort Benning

Roost sites tend to be structurally similar to nesting sites but they also use a wider variety of sites for roosting than for nesting (Coulter 1990). Roosts may be used for long periods of time, either seasonally or annually over many years, or may be used for only brief periods, depending on the availability of persistent foraging areas in surrounding wetlands. Roosting sites include cypress heads and swamps, pine or hardwood islands in marshes, mangrove islands, expansive willow thickets or dry marshes, or on the ground on levees.

LIFE HISTORY/ECOLOGY

Wood storks usually nest in large rookeries and feed in flocks. They generally do not breed until age four (USFWS 1991). Wood storks are seasonally monogamous, probably forming a new pair bond every season. In Georgia and South Carolina, wood storks lay eggs from March to late May, with fledging occurring in July and August. Nests are constructed as high as 100 feet in cypress trees but as low as 3 feet in mangrove colonies. Nests are constructed of sticks, vines, leaves, and Spanish moss, and lined with leaves or cypress foliage. Wood storks have also successfully nested in man-made artificial structures (Robinette and Davis 1992). The average number of eggs a wood stork may lay is three with a range of 2-5. Incubation takes about 30 days and young will fledge in 9 weeks. The young are fed by the parents regurgitating whole fish into the bottom of the nest. Under good conditions two young will be fledged per successful nest (USFWS 1991).

Wood storks feed on a variety of fish and amphibians within a size range of 1 to 10 inches in length (Kahl 1964, Ogden et al. 1976). The specialized feeding behavior of the wood stork involves tactilocation (grope feeding). The stork wades through the water with its beak immersed and partially open. Once a small fish has been detected, the mandibles close, the head raised, and the food swallowed (USFWS 1986). Tactilocation allows storks to feed at night or utilize water that is turbid or densely vegetated. However, for this type of feeding to be effective, prey must be concentrated in relatively high densities. Nesting wood storks mainly feed in wetlands between 5 and 40 miles from the colony. Non-breeding storks may range farther, as long as the food supply remains sufficient. The loss of suitable feeding habitat is believed to be the main cause for decline.

Artificial feeding ponds have been used successfully to provide supplemental high quality forage for wood storks and other wading birds (Coulter et al. 1987; Robinette and Davis 1992). Their potential impact on nesting success, production, and survival of newly fledged young is unknown. Preliminary results from a study conducted in 1995, on coastal colonies in Georgia, indicate artificial feeding ponds, located in close proximity to a colony site may have significant positive impacts on production (USFWS 1996).

In captivity, the oldest recorded specimen was a bird at the National Zoological Park that lived for 27 years and 6 days (Brouwer et al. 1992). In the wild, the oldest known age bird was 11 years and 8 months (Hancock et al. 1992). There is little known about wood stork mortality outside of the nesting colonies. Five factors that accounted for loss of nests in east-central Georgia were: raccoon predation, stress induced by cold weather, intraspecific aggression, storm damage, and other unknown factors (Coulter and Bryan 1995). Raccoon predation occurred when the swamp under nesting trees dried up. Alligators appeared to be an effective deterrent to raccoon predation. When sufficient water was under the nest trees, alligators were present. When water levels receded, the alligators left and raccoon predation became a problem.

The estimated total population of nesting storks throughout the southeastern United States declined from 15,000 to 20,000 pairs during the 1930s, to 10,000+ pairs in 1960 to 1961, to a low of between 4,500 and 5,700 pairs in most recent years from 1977 to 1980 (Ogden et al. 1987). Surveys for all known colonies in South Carolina, Georgia, and Florida since 1983 have revealed a population ranging from 5,500 to 6,500 pairs.

REASONS FOR LISTING

The loss of suitable feeding habitat is believed to be the main cause of the decline of the wood stork. This decrease in feeding habitat has been largely due to the loss of or degradation of essential wetland habitat (Ogden and Nesbitt 1979, Ogden and Patty 1981). Wetland drainage and changes in the hydroperiod are believed to have lowered the productivity and availability of fish for the wood stork (Ogden and Nesbitt 1979, Ogden 1983).

The development of intensive water management in southern Florida has apparently affected wood stork reproductive success. The primary and most obvious effect of the decrease in areas subject to natural flooding followed by gradual drying; is that such a regime is essential to wood storks. If suitable concentrations of prey fish are not available, nest abandonment may occur. Kushlan et al. (1975) found that a water level increase as little as 3 cm (1.2 inches) in the first two months of nesting was correlated with nest desertion in the Everglades National Park (ENP) colonies, and that subsequent re-nesting efforts were usually unsuccessful. They also found that, while successful wood stork nesting was associated with wet years prior to 1962, nesting became relatively more successful in dry years after that date. This coincided with the restriction of water deliveries through a smaller flow section across Tamiami Trail causing higher water levels in some portions of ENP per given rainfall, and at the same time, overdrainage of other areas of the Park.

Drainage of cypress stands will prevent wood storks from nesting and lowered water levels after nest initiation facilitates raccoon predation. Raccoons may also enter colonies more easily when mats of aquatic vegetation form under cypress swamp colonies (USFWS 1996). On the other hand, colonies that are perpetually flooded will have no cypress regeneration.

Pesticide contamination has not generally been considered to adversely affect wood stork reproduction (Ohlendorf et al. 1978), but a 1984 study (Fleming et al.) suggests that reproduction in north and central Florida colonies may have been adversely affected by the chemical compound DDE. DDE was found in higher concentrations in eggs from nests in which not all the eggs hatched.

Feeding areas in south Florida have decreased by about 35 percent since 1900 due to human activities. Human disturbances to the rookeries have adversely affected nesting success. Human disturbance may cause adults to leave nests, exposing the eggs and downy nestlings to predators, sun and rain.

Recent programs designed to begin the ecosystem restoration process for ENP, have shown no evidence that they have benefited the wood storks. Urban and agricultural expansion in southwestern Florida continue to adversely impact the Corkscrew Swamp and other Big Cypress

Basin colonies, resulting in a continuing decline in total nesting effort by storks in that region as well.

CONSERVATION MEASURES

The USFWS (1996) has established management zones and guidelines for feeding sites for this endangered species. The restrictions placed for these areas include no human intrusion into the feeding sites while occupied by the wood stork. There should be no human activity between 300-750 feet of feeding wood storks, depending on the density of the vegetation. Another restriction includes elimination (if present) of water management practices within feeding sites. There should be no sharp rises in the water levels which may be disruptive to feeding wood storks. The use of potential contaminants, such as herbicides, pesticides, or fertilizers should be avoided within these wet areas. Fertilizers may alter the density of the native vegetation and change the fish populations found in the area.

The USFWS has established primary and secondary management zones and guidelines for nesting colonies. The primary zone is most critical and must be managed strictly to maintain colony sites. The primary zone should extend a minimum of 500 feet and up to 1500 feet when there are no visual or broad aquatic barriers. The width of the primary zone is dependent on the density of vegetation surrounding the colony and the open water between the colony and the nearest human activity. The following activities should be avoided during all times of the year in the Primary Zone:

1) Any lumbering or other removal of vegetation, and
2) Any activity that reduces the area, depth, or length of flooding in wetlands under and surrounding the colony, except where periodic (less than annual) water control may be required to maintain the health of the aquatic, woody vegetation, and
3) The construction of any building, roadway, tower, power line, canal, etc.

The following activities within the primary zone are likely to be detrimental to a colony if they occur when the colony is active:

1) Any unauthorized human entry closer than 300 feet of the colony, and
2) Any increase or irregular pattern in human activity anywhere in the primary zone, and
3) Any increase or irregular pattern in activity by animals, including livestock or pets, in the colony, and
4) Any aircraft operation closer than 500 feet of the colony.

Restrictions in the secondary zone are needed to minimize disturbances that might impact the primary zone and to protect essential areas outside of the primary zone. The secondary zone may be used by storks for collecting nesting material, for roosting, loafing, and feeding and may be important as a screen between the colony and areas of relatively intense human activities. The secondary zone should range outward from the primary zone 1000-2000 feet. Activities in the secondary zone that may be detrimental to nesting wood storks include:

1) Any increase in human activities above the level that existed in the year when the colony first formed, especially when visual screens are lacking, and

2) Any alteration in the area's hydrology that might cause changes in the primary zone, and

3) Any substantial (greater than 20 percent) decrease in the area of wetlands and woods of potential value to storks for roosting and feeding.

In addition, the probability that low flying storks, or inexperienced newly fledged young will strike tall obstructions requires that high-tension power lines be no closer than one-mile and tall transmission towers no closer than 3 miles from active colonies. Other activities, including busy highways and commercial and residential buildings may be present in limited portions of the secondary zone at the time that a new colony first forms. Although storks may tolerate existing levels of human activities it is important that these human activities not expand substantially.

The general characteristics and temporary use patterns of many stork roosting sites limit the number of specific management recommendations that are possible to the following:

1) Avoid human activities within 500-1000 feet of roost sites during seasons of the year and times of the day when storks may be present. Nocturnal activities in active roosts may be especially disruptive.

2) Protect the vegetative and hydrological characteristic of the more important roosting sites--those used annually and/or used by flocks of 25 or more storks. Potentially, roosting sites may, some day, become nesting sites.

In 1994, the Florida Game and Fresh Water Fish Commission developed draft guidelines to assist professionals conducting forestry practices on lands where wood storks occur. The guidelines are designed to prevent incidental take and provide management options to enhance the species and habitat when consistent with the landowners' objectives.

Over the last several years, South Carolina and Georgia have been successful in managing man-made dike impoundments for use by wood storks. These impoundments can be made available to storks under a variety of circumstances because of the ability to artificially manipulate water levels and concentrate fish in canals and natural pools.

The USFWS Ecological Services Branch has been working with public and private landowners to create foraging areas for the benefit of wood storks. Wood storks have successfully fledged young from artificial nesting structures on Harris Neck National Wildlife Refuge in coastal Georgia since 1993. Production from structures has been similar to that from natural sites. Structures are made from four by four posts, steel re-bar, coated screen and artificial foliage. Artificial structures can be used in existing or pre-existing colony sites where natural nesting habitat is lacking and/or degraded (Robinette 1992).

CONSERVATION GOALS

Since there is only a transient ost-breeding population on Fort Benning it is difficult to set a population goal to reach. The ultimate goal would be to have a breeding population on Fort Benning but that is very unlikely due to the lack of gradually drying wetlands to provide the necessary forage for the wood storks during nesting. Therefore, the conservation goal is to maintain the current post-breeding dispersal population and the habitat necessary to support them.

MANAGEMENT PRESCRIPTIONS AND ACTIONS

Wood storks that use Fort Benning are post-breeding dispersal birds and their numbers and duration of stay can be extremely variable. That combined with no control over the water depth in their habitat makes any management effort very difficult. Their foraging habitat and conditions are very specific, and the condition of these variables dictates how many birds will be here and for how long.

The primary management tool is protection of potential wood stork habitat. The areas used by the wood storks are rarely used for training purposes. The areas primarily used by the storks are the backwaters of the Chattahoochee River on the Alabama side of the Installation. Any unit that conducts a training exercise or construction activity on Fort Benning must complete a Form FB 114-R(Request for Environmental Analysis) detailing their proposed activity and location. Those activities that might affect the wood stork or its habitat can be monitored and restricted.

The hydrology and vegetation associated with wood stork habitat will not be altered or destroyed. Activities that cause a sudden fluctuation in water levels will be avoided, especially near feeding areas. The use of potential contaminants, such as herbicides, pesticides or fertilizers will be avoided within these areas except as needed to maintain the area as foraging habitat. The use of herbicides in these areas may be necessary to keep feeding areas open and free of invasive aquatic vegetation.

As part of the Threatened and Endangered Species Educator's program, information on the wood stork will be disseminated to the military troops as well as to the general public to raise the awareness of this species and what can be done to help protect it.

Any management activities will be coordinated with USFWS and the Georgia Department of Natural Resources, Nongame Endangered Wildlife Program. A regional strategy for the wood stork will be developed in partnership with the USFWS's Northeast Gulf Ecosystem Team.

SURVEYS, INSPECTIONS, AND MONITORING

A combination of foraging and roost surveys will be used to locate wood stork use on Fort Benning if resources are available. Foraging surveys will begin July 1 and continue once per week until the end of August. Initially the survey will be done by vehicle and walking following the route as described on Figure 3. Annual boat surveys will also be conducted. Once storks are observed in the area roost surveys will be conducted once each week by boat until the end of

August to search for roost sites, provided there is favorable weather. A survey crew consisting of a boat operator and an observer will search the River Bend area for roost sites (Figure 4). The survey will start two hours before sunset and will end at dark. Number, location, activity, weather, date and time will be recorded for any observations. If an aircraft is available, an aerial survey of the River Bend area will be accomplished during August.

The Conservation Branch staff will be given observation forms for when wood storks are observed during their normal daily duties. Number, location, activity, date and time will be recorded. The observation forms will be given to the Threatened and Endangered Species Biologist and then entered into the Threatened and Endangered Species Database. Large concentrations or possible nests will be confirmed by a biologist. In the event that nesting is discovered, protection measures as stipulated in the Wood Stork Recovery Plan will be implemented. Additional survey measures will also be developed and implemented to monitor the colony.

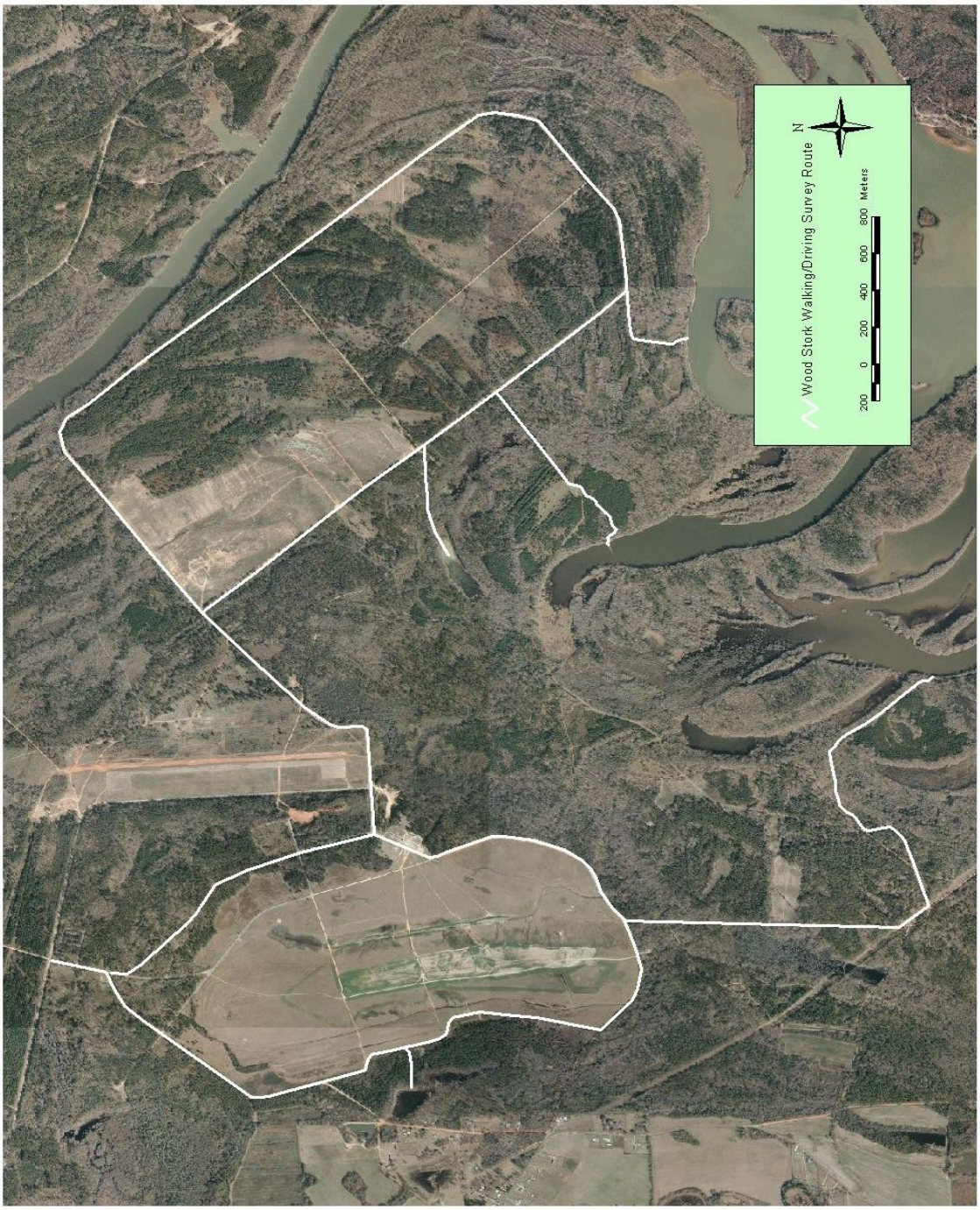

Figure 3
Walking/Driving Survey Route

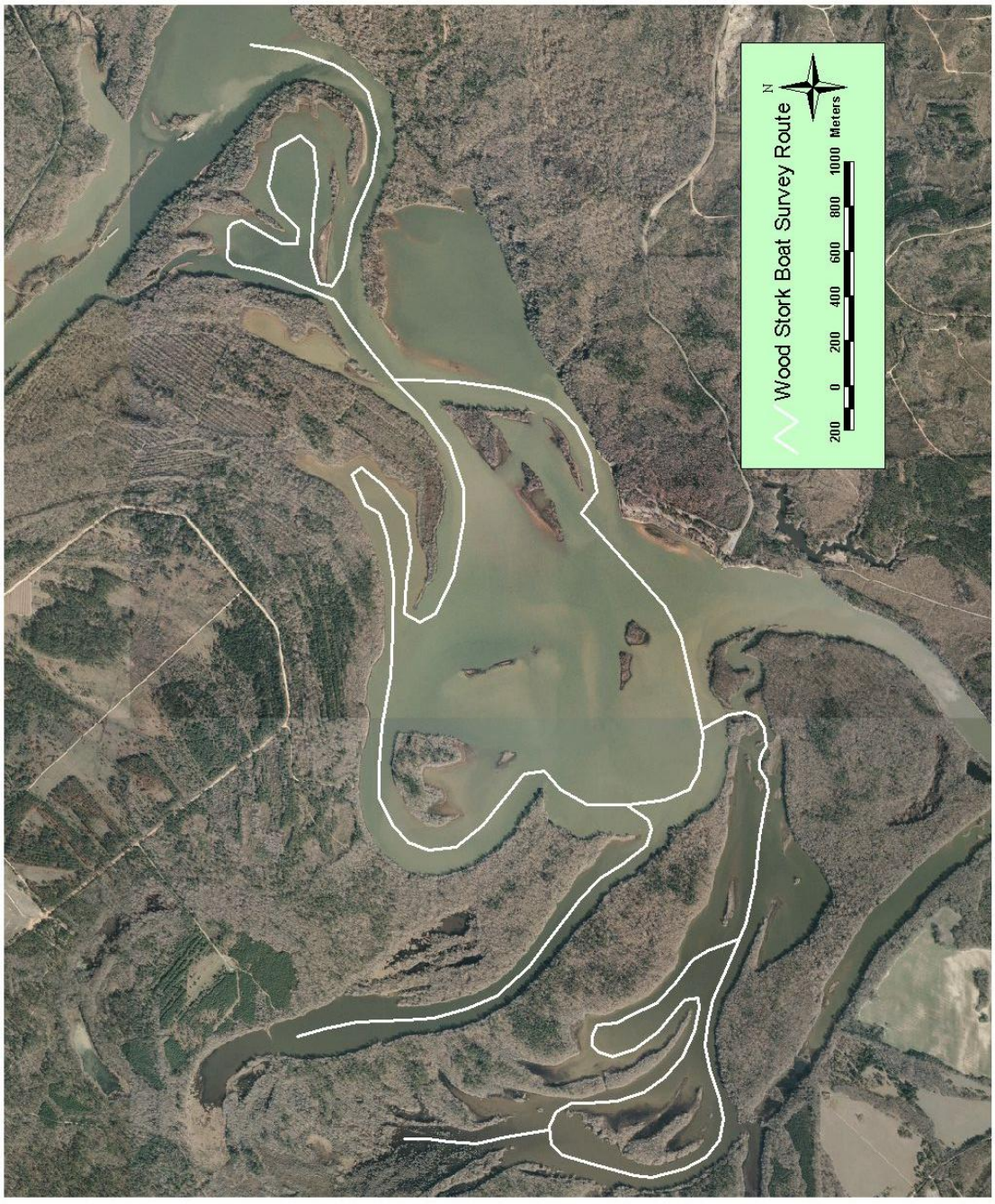

Figure 4
Boat Survey Route

TIME, COST and PERSONNEL

The planning and funding period for the implementation of this ESMC is 5 years, though some components of the plan extend beyond this time frame. Projected annual costs for implementation are shown in Table 1. Nothing in this plan shall be interpreted to require payment of funds in violation of the Antideficiency Act.

Table 1
Projected Annual Implementation Costs

FISCAL YEAR	ESTIMATED ANNUAL COST
2014	$ 25,000
2015	$ 25,000
2016	$ 25,000
2017	$ 25,000
2018	$ 25,000
5-YEAR TOTAL	$ 125,000

CHECKLIST

Schedule	Activity	Implemented Date	Signature
July - August 2014	Begin weekly foraging and roosting surveys.		
August 2014	Conduct aerial survey.		
June 2015	Evaluate effectiveness of artificial foraging ponds for use by wood storks.		
July 2015	Provide report to Commander on effectiveness of ESMP.		
July - August 2015	Begin weekly foraging and roosting surveys.		
August 2015	Conduct aerial survey.		
July 2016	Provide report to Commander on effectiveness of ESMP.		
July - August 2016	Begin weekly foraging and roosting surveys.		
August 2016	Conduct aerial survey.		
July 2017	Provide report to Commander on effectiveness of ESMP.		
July - August 2017	Begin weekly foraging and roosting surveys.		
August 2017	Conduct aerial survey.		
July 2018	Provide report to Commander on effectiveness of ESMP.		
July - August 2018	Begin weekly foraging and roosting surveys.		
August 2018	Conduct aerial survey.		
July 2019	Provide report to Commander on effectiveness of ESMP.		
July - August 2019	Begin weekly foraging and roosting surveys.		
August 2019	Conduct aerial survey.		

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APPENDIX E5

ENDANGERED SPECIES MANAGEMENT COMPONENT

FOR

RELICT TRILLIUM

(*Trillium reliquum* Freeman)

Fort Benning, Georgia

Updated by

Roderick M Thornton
Threatened & Endangered Species Biologist
Conservation Branch, DPW

APPROVAL PAGE

Approving Official:

_____ _____
INSTALLATION COMMANDER Date

Reviewed by:

_____ _____
DIRECTOR OFPUBLIC WORKS Date

_____ _____
DIRECTOR OF PLANS, TRAINING, MOBILIZATION, AND SECURITY Date

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STAFF JUDGE ADVOCATE Date

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EXECUTIVE SUMMARY

Background: Army Regulation (200-1) "Environmental Protection and Enhancement" requires the preparation of Endangered Species Management Component (ESMC) for listed and proposed threatened and endangered species and critical habitat present on Installations. All Army land uses are subject to these regulations. Failure to implement this management plan can lead to violation of the Endangered Species Act of 1973 (ESA) and result in the costly disruption of military operations.

Current Species Status: Relict trillium (*Trillium reliquum* Freeman) is listed as endangered by the U.S. Fish and Wildlife Service (USFWS). Five populations are known to occur on Fort Benning. The species occurs primarily in undisturbed moist hardwood forests in limited portions of Alabama, Georgia, and South Carolina. The 1994 USFWS Biological Opinion states that the Fort Benning populations may comprise a significant portion of the protected populations and are essential for the recovery of the species. The species is vulnerable to several activities on the Installation such as fire and timber harvesting and is threatened by feral swine and invasive plants—Japanese honeysuckle (*Lonicera japonica*) and kudzu (*Pueraria lobata*).

Habitat Requirements and Limiting Factors: The species is typically found in mature undisturbed hardwood stands. The major limiting factor is the availability of suitable habitat.

Management Objectives: Management will be for the protection and enhancement of existing populations on the Installation.

Conservation Goals: The conservation goal is to maintain the existing populations found on Fort Benning and to continue surveying for new populations.

Actions Needed:

1. Complete fencing of populations that are subject to damage from feral swine.
2. Monitor the encroachment of Japanese honeysuckle and kudzu and initiate control efforts if needed.
3. Continue to monitor the present populations while developing and implementing additional monitoring methods.
4. Protect populations from man-made disturbances such as timber harvesting and burning.
5. Continue to survey for new populations.

Total Estimated Cost of Conservation Actions: Projected costs for the five years of this plan are $20,000 per year.

INTRODUCTION

The purposes of this Endangered Species Management Component (ESMC) are: (1) to present information on the relict trillium, a Federally listed endangered species present at Fort Benning; (2) to discuss threats it faces on the Installation; (3) to define conservation goals; and (4) to outline a plan for management of the species and its habitat that will enable achievement of conservation goals. These purposes are consistent with the U.S. Fish and Wildlife Service (USFWS) Relict Trillium Recovery Plan (USFWS 1991). Cost of the conservation efforts and impacts to other Installation activities will also be discussed.

Relict trillium is a perennial herb with a stalkless flower placed in the center of a whorl of three strongly mottled leaves. The species is sparsely located along the upper coastal plain of Alabama, Georgia, and South Carolina and is present in 12 counties in Georgia (Figure 1).

This species is listed as endangered due to population decline. Loss or alteration of habitat is considered the cause of the decline. Without appropriate management of the species and its habitat, the species will continue to decline.

This ESMC is based on and is consistent with the following laws, regulations, and guidelines: Endangered Species Act of 1973 (ESA); Army Regulation (AR) 200-1; the USFWS Relict Trillium Recovery Plan; and Conservation Recommendations for relict trillium in the September 1994 USFWS Biological Opinion for the affects of military training and associated activities at Fort Benning on Federally listed endangered and threatened species.

SPECIES INFORMATION

This section provides a description of the species including distribution, habitat/ecosystem, life history, evidence for its decline, and conservation measures taken by various agencies or organizations.

DESCRIPTION

Relict trillium is a spring flowering, tuberous rhizomed perennial that dies back to the rhizome after the fruit matures. It has a stalkless (sessile) flower located in the center of a whorl of three strongly mottled leaves. The stem is 5-25 cm long and S-curved (decumbent), often leaving the leaf whorl nearly resting on the litter layer. The leaves are elliptic to orbicular, 5-14 cm long, almost as wide, and narrowing to a pointed apex where the margins are nearly straight, thus the apex is sharply pointed and evenly tapered (acute). The leaves have five shades of color from green through blue-green to silver, with a strong central silvery streak on the upper surface. The flowers, 22-60 mm long, are less than half as long as the leaves, and emit an unpleasant, fetid odor. The three sepals are loosely spreading, usually purplish on the inner surface. The three petals are more erect, slightly twisted, and range in color from dark purple to yellow. The stamens are about half as long as the petals, and the tip of the anther is prolonged into a distinct beak (Figure 2). The fruit is an ovoid to globose fleshy capsule, 1.0 to 1.5 cm in diameter, with about 10-45 plump seeds.

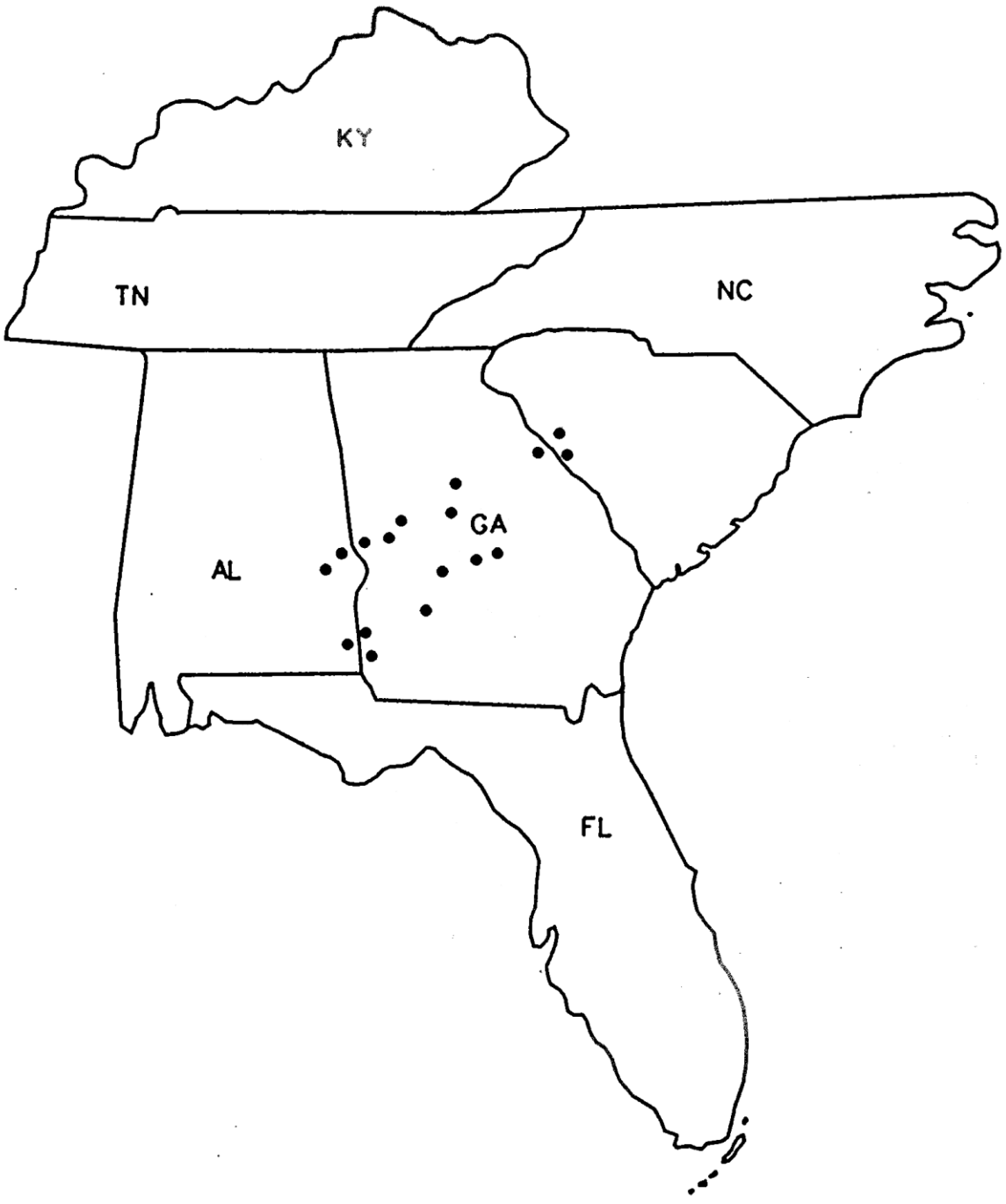

Figure 1
Species Location Map for Relict Trillium

Trillium reliquum Freeman

Relict Trillium, Relict Toadshade

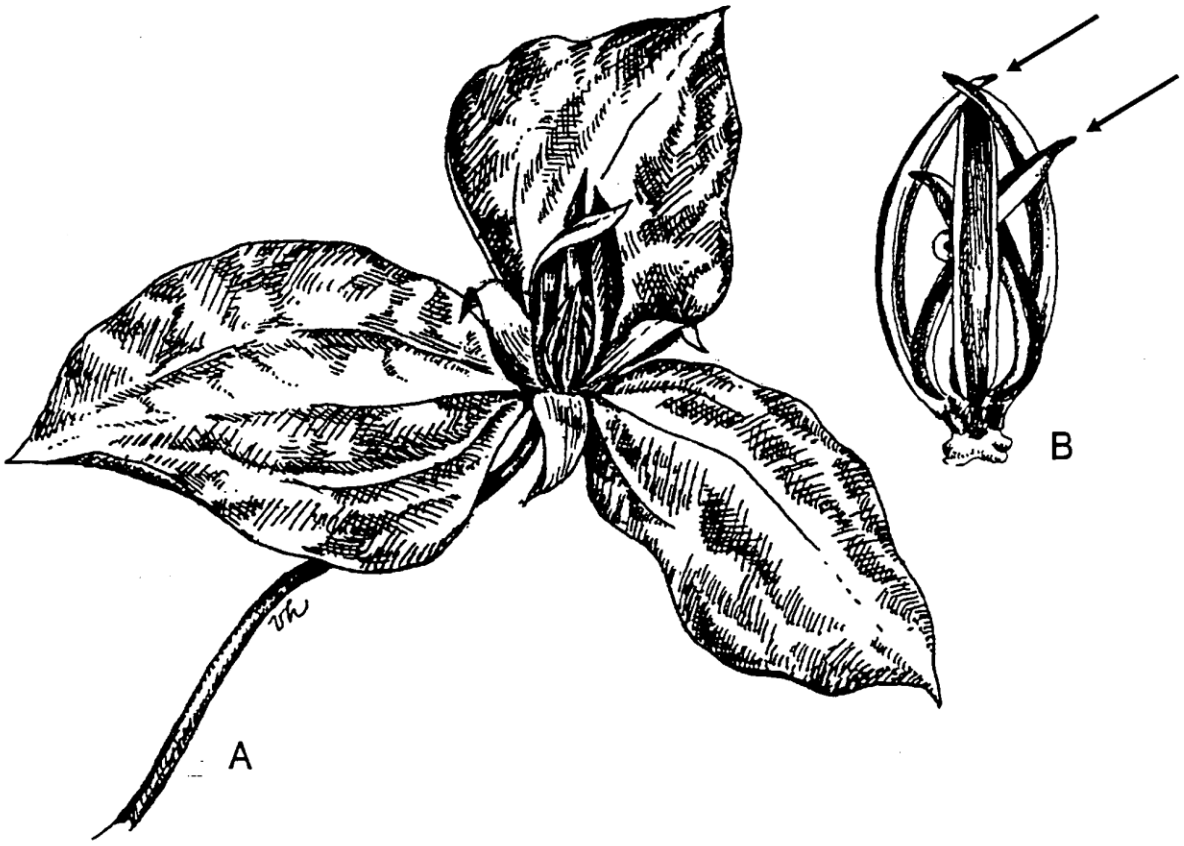

ILLUSTRATION: (A) flowering stem, 1 ×; (B) inner flower parts, stamens surrounding pistil, 3 ×; note prominent beaks at tips of stamens. Source: original drawing by Vicky Holifield.

Figure 2
Illustration of Relict Trillium (Patrick et al. 1995)

The plant flowers from March to April and fruits from May to early June (Freeman 1975 and Patrick et al. 1995). It differs from the only other decumbent sessile trillium (*Trillium decumbens*) in that relict trillium has a glabrous or non-hairy stem. The species was listed as endangered in accordance with the ESA by the USFWS on April 4, 1988 (53 FR 10884).

DISTRIBUTION

The historic distribution is not known; however, it can be assumed that it was much larger than its current range with populations lost to development and habitat destruction. Current distribution includes scattered populations in Alabama, Georgia, and South Carolina. At present, there are two known populations in Alabama, 14 in Georgia, and four in South Carolina (Figure 1) (USFWS 1991).

There are seven known locations on Fort Benning. The seven locations are designated as Baker Creek, Upper Baker Creek, Kendall Creek North, Kendall Creek South, Randall Creek North, Randall Creek East and Randall Creek South (Figure 3).

HABITAT/ECOSYSTEM

Relict trillium is found primarily in moist hardwood forests that have had little or no disturbance in the recent past. The soils on which it grows vary from rocky clays to alluvial sands, but all exhibit high organic matter content in the upper soil layer. In the Coastal Plain, these are often with boulders or ledges with soft limestone. In the Piedmont, it is found in deep loamy soils, either in rich ravines or adjacent alluvial terraces with numerous other spring-flowering herbs. Most sites appear to be free from the influence of fire, both in the recent and distant past. Timber harvesting at the known sites has been limited to selective cutting (Freeman 1975). Relict trillium does occur on less than optimum sites, such as power and sewer line rights of way, and can apparently become reestablished after intensive disturbance to the habitat, such as agricultural activity. Re-establishment within power line and sewer line rights-of-way would be expected, provided that maintenance activities do not include broad spectrum herbicides or other intensive disturbances. Re-establishment of the species after intensive agricultural activities could be expected, provided that there is a nearby source of seeds for the plants and the original soil, moisture, and vegetational associates are reestablished on the disturbed site (Patrick et al. 1995).

LIFE HISTORY/ECOLOGY

Very little is known on the life history of this species. At least some seed dispersal is by ants, however, little else is known, including how far seeds can be dispersed by this vector and others and what conditions are optimal for dispersal. Major pollinators and pollination mechanisms of this species need to be determined.

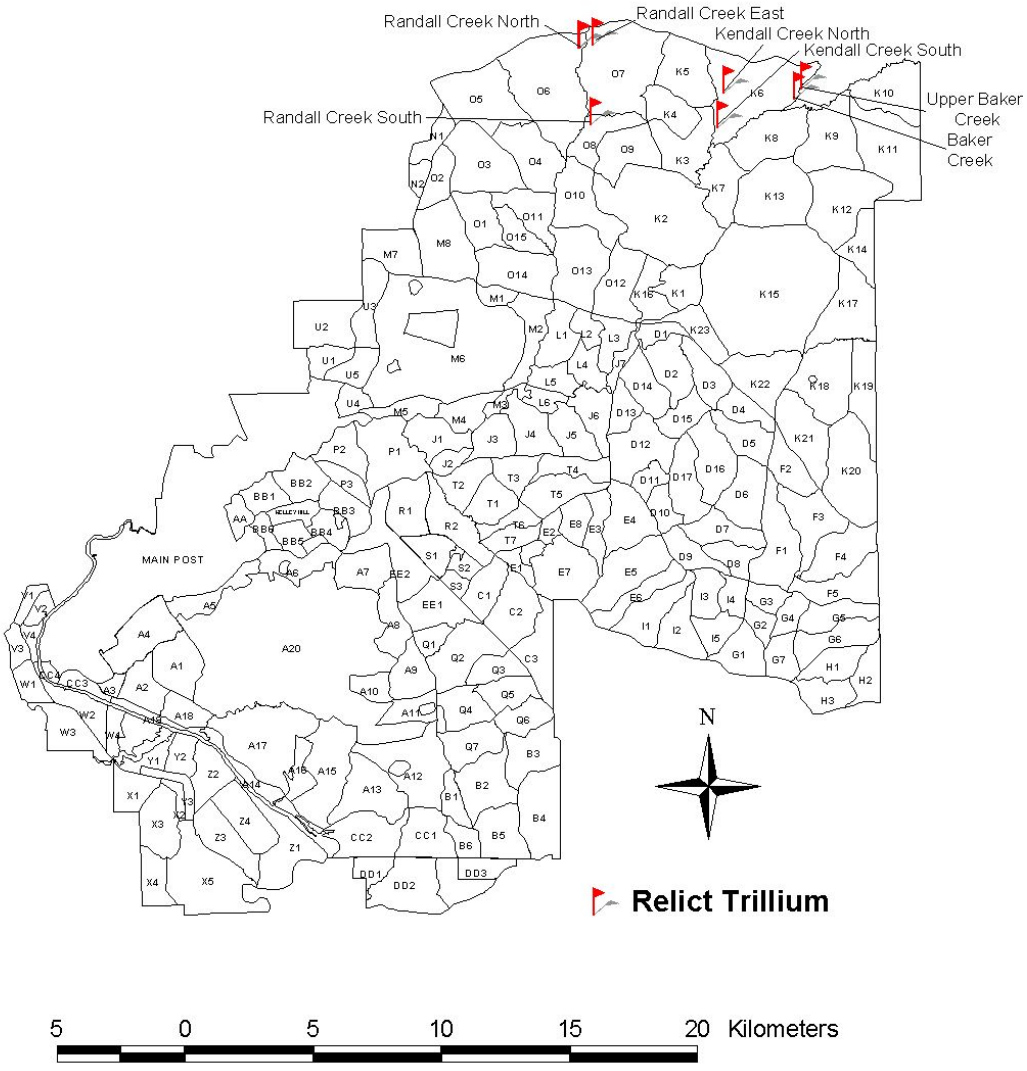

Figure 3
Location of Relict Trillium on Fort Benning

REASONS FOR LISTING

All of the known *Trillium reliquum* populations are currently threatened by one or more human activities. The most significant of these threats is the loss or alteration of their habitat resulting from residential development. Most populations are adjacent to rapidly expanding urban areas, and the direct impacts of construction activities associated with an expanding population are significant. Logging of areas occupied by the species constitutes a significant threat as does conversion or use of the sites for pine monoculture, pastures or row crop agriculture. Fires, whether caused by arson, accident, or for timber management, threaten all populations. At the time of listing, relict trillium was not protected in any of the states in which it occurs. An aggressive weedy species *Lonicera japonica*, Japanese honeysuckle, may represent a serious threat to relict trillium. Because of the severity of the threats facing the species throughout its rather limited range, it was determined to be listed as endangered (USFWS 1991).

On Fort Benning, one of the most serious threats relict trillium faces has been the introduction of feral swine. In 1995, feral swine were first reported in Training Compartments K-5, K-6, and CC-1. Apparently, these animals were released by adjacent hunting clubs. By June 1997, the feral swine had spread to most parts of the Installation where there is suitable habitat. Feral swine can cause extensive damage by rooting up vegetation. Feral swine have been observed in all of the relict trillium populations. Presently, there is no direct evidence that the feral swine are significantly impacting the relict trillium populations. It does not appear that the swine are eating the trillium as a preferred food source. However, some plants have been uprooted during their rooting activity. During times of drought conditions when food sources become scarce deer have been known to target relict trillium. The Randall creek population showed signs of heavy browsing by deer in 2007. In 2008 the Randall Creek population seemed to have recovered and suffered no long term effect from the previous year browsing by deer.

CONSERVATION MEASURES

The USFWS has developed and is implementing a recovery plan for relict trillium. The plan calls for protection and management of existing populations, increased research, and more extensive surveys. The Natural Heritage Programs in Alabama, Georgia, and South Carolina; the USFWS; or The Nature Conservancy have contacted most of the landowners of the relict trillium populations. This has resulted in an informal nonbinding agreement to protect several of the populations. Searches for new populations are being conducted by the appropriate State conservation agencies and the USFWS. These searches will ensure that future conservation efforts will be concentrated on the most significant and biologically important relict trillium populations.

On Fort Benning, the seven known locations (five populations) have been designated as Sensitive Areas, in which digging and vehicles are not allowed. Timber harvesting is not allowed within 200 feet of the boundary of the populations and prescribed burning is prohibited within the site. To protect the trillium from feral swine, the Baker Creek, Kendall Creek South, and Kendall Creek North, and Randall Creek North populations have been completely fenced. The other locations will remain unfenced until there is a threat from feral swine in the area.

CONSERVATION GOALS

The conservation goal is to maintain existing populations at healthy and stable levels and preserve habitat in which they occur. Surveys for new locations are ongoing.

MANAGEMENT PRESCRIPTIONS AND ACTIONS

The most important management action is to protect the relict trillium from disturbance. This will be accomplished by:

1) Fencing populations, if necessary, from feral swine.
2) Prohibiting timber harvest within 200 feet of the population boundary.
3) Prohibiting digging and vehicles within the sensitive area signs around each population.
4) Prohibiting prescribed burning within the boundaries of the population.
5) Controlling populations of feral swine by trapping or shooting.

The USFWS, during their 100 percent survey of Fort Benning, surveyed potential locations north of Highway 280/27 and located three additional populations for a total of five populations. Since that time, two additional populations/subpopulations have been identified. As part of the Army Transformation and Base Realignment and Closure activities Fort Benning contracted for surveys for all of the potential habitat areas on the northern half of the Installation. Jay Carter and Associates surveyed these areas in March/April during 2008 through 2010 and found no new populations of relict trillium. Surveys will continue to look for previously unknown populations.

As part of the monitoring methods, Japanese honeysuckle and kudzu within the populations will be monitored. If it appears the invasive vines are excessively encroaching upon the trillium, different control methods will be evaluated and the safest and most effective methods will be implemented until they are under control.

Further information needs to be gathered to carefully describe the nature of the habitat occupied by the species. Since very little is known about this species, information on its genetic diversity, population biology, and ecology is necessary before effective management guidelines can be formulated and implemented. Future investigations should determine population size and age-class distribution for all populations, study abiotic and biotic features of the species' habitat, conduct long term demographic studies and determine genetic variability between populations, determine the effects of past and ongoing habitat disturbance, define criteria for self-sustaining populations and determine the size of the area needed to protect each population, and develop techniques and reestablish populations in suitable habitat within the species' historic range, if necessary, to recover the species. Although many of these activities are beyond the scope of Fort Benning's in house resources, funding will be sought to contract out in depth relict trillium studies.

Any management activities will be coordinated with the USFWS and the Georgia Department of Natural Resources, Nongame Endangered Wildlife Program. Any regional strategies for relict trillium will be developed in partnership with the USFWS' Northeast Gulf Ecosystem Team.
As part of the Threatened and Endangered Species Educator's program, information on relict trillium will be disseminated to the military troops as well as to the general public to raise the awareness of this species and what can be done to help protect it.

Any unit that conducts a training exercise or construction activity on Fort Benning must complete a Form FB 144-R (Reqeust for Environmental Analysis) detailing their proposed activity and location. Those activities that might affect the relict trillium or its habitat will be carefully coordinated to minimize adverse impacts.

These management actions will have virtually no effect on military training. All the populations comprise a very small area and are located in areas that receive little training pressure.

SURVEYS, INSPECTIONS, AND MONITORING

Relict trillium surveys were initiated on Fort Benning in 1991 with the establishment of two permanent, U.S. Army Land Condition Trend Analysis (LCTA) special use plots (designated as 201 and 202). LCTA plots are a standard 100m x 6m dimension. Data collected in the establishment of these plots included a woody species inventory, line transect, slope, aspect, vegetation type, and soil series and depth. The woody species inventory consisted of species density, distribution, location and height. Line transects recorded disturbance, ground cover type, aerial cover by species, and height at 1m intervals along a 100m transect at the center of each plot. Monitoring in the next three years consisted of a belt monitoring, tallying number of woody species by height class, and a line monitoring of disturbance and vegetation cover. These data are used to assess changes over time and to determine long-term trends. In 1995, a modified inventory was conducted, which included a belt monitoring and line transect. More information about LCTA monitoring techniques may be found in USACERL Technical Report N-92/03. All data sheets for LCTA monitoring are maintained by the LCTA Coordinator.

Relict trillium populations have been monitored annually during the flowering/fruiting season (April to June) in 1991, 1992, 1993, 1994, 1995, 1997, 1998, 1999, and 2000. No monitoring for relict trillium was conducted in 1996. The 1991-1995 surveys were conducted by LCTA crew members, and the 1997-2000 surveys were conducted by Conservation Branch personnel. Survey data collected by Conservation Branch personnel are maintained at Building 5884. For a complete history of monitoring by population, refer to the 2000-2005 ESMP. In 2002, a standard monitoring method was established for all relict trillium populations on the Installation. The method was developed by Fort Benning Conservation Branch personnel in cooperation with the Georgia Department of Natural Resources and the USFWS.

> There are five locations of relict trillium being monitored on Fort Benning. These five locations are named Randall Creek North, Randall Creek South, Kendall Creek North, Kendall Creek South, and Baker Creek South (Figure 3). There are other small groups or subpopulations known to exist on Fort Benning, but no intensive monitoring is in place for these groups at this time. These subpopulations are however checked annually for any sign of disturbance.

Monitoring for all populations will be conducted during the peak of the flowering period, which generally occurs in March and April (Patrick 1995). Due to variations in the timing of the flowering period from year to year, the populations should be checked on a weekly basis starting in March to determine when flowering begins. Once flowering is detected, monitoring should be performed to coincide with the peak of the flowering period—usually within two weeks of the first flowers. This method will help to minimize the effect of seasonal variation as to the timing of the flowering season.

Each population contains five, $1m^2$ plots, which are being monitored. These plots are marked by two pieces of ½-inch rebar extending approximately 2 ½ feet above the ground. The rebar has been painted fluorescent orange and has flagging attached to ease locating the sites and as a safety precaution. The paint and flagging should be checked and replaced, as needed, every year.

The five plots at Randall Creek North are placed so that the plot square (1 meter inside diameter square) is placed on the rebar and laid down on the side opposite of the creek. This is done by placing one edge of the square against the rebar, centering it on the rebar, and then dropping the square. The remainder of the plots—Randall Creek South, Kendall Creek North, Kendall Creek South, and Baker Creek—are placed on the north side of the rebar regardless of the position of the creek. It is recommended that any future plots be established using the latter method to avoid future confusion.

All of the plots have been located with a GPS unit and the coordinates are recorded in (UTM, NAD 83). The following information should be taken from each plot. Record the position, age class, species, and reproductive status of each trillium within the plot. The following abbreviations should be used when sketching the plot.

- RF – Trillium reliquum flowering
- RS – Trillium reliquum non-flowering (sterile)
- RJ – Trillium reliquum juvenile (one leaf individual)
- CF – Trillium cuneatum flowering
- CS – Trillium cuneatum non-flowering (sterile)
- CJ – Trillium cuneatum juvenile (one leaf individual)
- C – cotyledon

In addition to the sketch, the following information should be recorded on the data sheet: position of the plot in reference to topography, type class of the overstory, estimated percentage of crown cover over the plot, and height of the main canopy. Also, include any information that might be pertinent to the health of the population such as the presence of invasive species, erosion, ground disturbance, browsing by animals, logging activities, signs of flooding, drought conditions, and fire.

Once all of the trilliums in the plot have been mapped, a photograph should be taken using a digital camera. The photo should be taken from the south side of the plot (except for Randall Creek North, which will be taken from the creek side of the plot) using a 6-foot step latter in

order to get a more vertical view of the plot. These photos then will be placed in a file with the sketches of the plots and filed by year for future comparison.

In addition to the five $1m^2$ plots located at each site, additional monitoring plots will be established to capture the overall trends of each population. Some sort of linear plot will need to be established at each site to help capture population growth or shifts on the landscape. Exact methods for these additional plots are not yet developed.

A short report summarizing fence inspections, fence maintenance, relict trillium population levels, and data on current feral hog distributions and population levels will be provided to the USFWS by January 15th to help evaluate the effectiveness of relict trillium protection measures.

TIME, COST and PERSONNEL

The planning and funding period for the implementation of this ESMC is 5 years, though some components of the plan extend beyond this time frame. Projected annual costs for implementation are shown in Table 1. Nothing in this plan shall be a violation of the Antideficiency Act.

Table 1
Projected Annual Implementation Costs

FISCAL YEAR	ESTIMATED ANNUAL COST
2014	$ 20,000
2015	$ 20,000
2016	$ 20,000
2017	$ 20,000
2018	$ 20,000
5-YEAR TOTAL	$ 100,000

CHECKLIST

Schedule	Activity	Implemented Date	Signature
January 2014 – December 2014	Monthly monitoring of trillium sites for feral swine		
March 2014	Conduct annual survey of all populations		
July 2014	Provide report to Commander on effectiveness of ESMP		
January 2015– December 2015	Monthly monitoring of trillium sites for feral swine		
March 2015	Conduct annual survey of all populations		
July 2015	Provide report to Commander on effectiveness of ESMP		
January 2016 – December 2016	Monthly monitoring of trillium sites for feral swine		
March 2016	Conduct annual survey of all populations		
July 2016	Provide report to Commander on effectiveness of ESMP		
January 2017 – December 2017	Monthly monitoring of trillium sites for feral swine		
March 2017	Conduct annual survey of all populations		
July 2017	Provide report to Commander on effectiveness of ESMP		
January 2018 – December 2018	Monthly monitoring of trillium sites for feral swine		
March 2018	Conduct annual survey of all populations		
July 2018	Provide report to Commander on effectiveness of ESMP		

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U.S. Fish and Wildlife Service (FWS). 1991. Recovery Plan for Relict Trillium (*Trillium reliquum* Freeman). Prepared by Robert R. Currie for U.S. Fish and Wildlife Service, Atlanta, Georgia. 29 pp 1.

APPENDIX E6
ENDANGERED SPECIES MANAGEMENT COMPONENT

FOR

GEORGIA ROCKCRESS

(*Arabis georgiana*)

Fort Benning, Georgia

Written by

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Threatened & Endangered Species Biologist
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APPROVAL PAGE

Approving Official:

_____ _____
INSTALLATION COMMANDER Date

Reviewed by:

_____ _____
DIRECTOR OF PUBLIC WORKS Date

_____ _____
DIRECTOR OF PLANS, TRAINING, MOBILIZATION, AND SECURITY Date

_____ _____
STAFF JUDGE ADVOCATE Date

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EXECUTIVE SUMMARY

Background: Army Regulation (200-1) "Environmental Protection and Enhancement" requires the preparation of Endangered Species Management Component for listed and proposed threatened and endangered species and critical habitat present on installations. All Army land uses are subject to these regulations. Failure to implement this management plan can lead to violation of the Endangered Species Act of 1973 (ESA) and result in the costly disruption of military operations.

Current Species Status: The U.S. Fish and Wildlife Service, proposes to list the Georgia rockcress as threatened under the Endangered Species Act (ESA), with a critical habitat designation. In total, the USFWS propose to designate 17 critical habitat units with approximately 297 hectares (732 acres) of riparian, river bluff habitat for the species. Five critical habitat units are located in Georgia, including parts of Gordon, Floyd, Harris, Muscogee, and Clay Counties, and 12 critical habitat units in Alabama, including parts of Bibb, Dallas, Elmore, Monroe, Sumter, and Wilcox Counties (USFWS 2013). There are two populations are known to occur on Fort Benning for a total of 25 hectares (61 acres). The Service is proposing that if Fort Benning revises its Integrated Natural Resource Management Plan to include a plan to protect Georgia rockcress and its habitat, critical habitat will not be designated on Fort Benning. This ESMC serves that purpose.

Habitat Requirements and Limiting Factors: Georgia rockcress generally occurs at sites with a substantial, mixed-level canopy with spatial heterogeneity, which provides for mixed sunlight and shade throughout the day and impedes invasive species. The habitat supports a relatively closed to open canopy of *Juniperus virginiana* (eastern red cedar), *Ostrya virginiana* (American phornbeam), *Quercus muehlenbergii (*chinquapin oak), *Fraxinus Americana* (white ash), *Acer barbatum* (southern sugar maple), and *Cercis Canadensis* (eastern redbud) with a rich diversity of grasses and forbs characterizing the herb layer (Schotz 2010, p. iii). Georgia rockcress generally occurs on steep river bluffs often with shallow soils overlaying rock or with exposed rock outcroppings. These edaphic conditions result in micro-disturbances, such as sloughing soils with limited accumulation of leaf litter or canopy gap dynamics, possibly with wind-thrown trees, which provide small patches of exposed mineral soil in a patchy distribution across the river bluff (Schotz 2010, p. 6). The major limiting factor is the threat of clearing and quarrying of rocky bluffs, hardwood slopes, and riverbanks and invasion by exotic pest plants such as Japanese honeysuckle (*Lonicera japonica*), (USFWS 2013).

Management Objectives: Management will be for the protection and enhancement of existing populations on the installation and habitat areas.

Conservation Goals: The conservation goal is to maintain the existing populations found on Fort Benning and to continue surveying for new populations and habitat areas.

Actions Needed:

1. Fencing of populations that are subject to damage from feral swine as needed.
2. Monitor the encroachment of Japanese honeysuckle, kudzu, Elaeagnus sp., and other invasive species and initiate control efforts if needed.
3. Continue to monitor the present populations while developing and implementing additional monitoring methods.
4. Protect populations from man-made disturbances such as timber harvesting, military training.
5. Continue to survey for new populations.

Total Estimated Cost of Conservation Actions: Projected costs for the five years of this plan are $5,000.00 per year.

INTRODUCTION

The U.S. Fish and Wildlife Service, proposes to list the Georgia rockcress as threatened under the Endangered Species Act (ESA), with a critical habitat designation (78 FR 56506-65540 and 78 FR 49422-49440). The purposes of this Endangered Species Management Component (ESMC) are: (1) to present information on Georgia rockcress at Fort Benning; (2) to discuss threats it faces on the Installation; (3) to define conservation goals; and (4) to outline a plan for management of the species and its habitat that will enable achievement of conservation goals. Cost of the conservation efforts and impacts to other Installation activities will also be discussed.

This species is listed as candidate species due to population decline. USFWS also is proposing to designate critical habitat in several counties, including those overlapping Fort Benning. Loss or alteration of habitat is considered the cause of the decline. Without appropriate management of the species and its habitat, the species will continue to decline.

The National Defense Authorization Act for Fiscal Year 2004 (Pub. L. 108–136) amended the Act to limit areas eligible for designation as critical habitat. Specifically, section 4(a)(3)(B)(i) of the Act (16 U.S.C. 1533(a)(3)(B)(i)) now provides: ''The Secretary shall not designate as critical habitat any lands or other geographic areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.'' Fort Benning is currently revising its INRMP to include specific measures for the Georgia rockcress and its habitat. The revised INRMP is expected by December 2014. Therefore, USFWS is proposing that the Fort Benning habitat area be covered by exemption from the final critical habitat designation based on the revised approved INRMP.

This ESMC is based on and is consistent with the following laws, regulations, and guidelines: Endangered Species Act of 1973 (ESA); The Sikes Act Improvement Act of 1997 (Sikes Act) (16 U.S.C. 670a); and Army Regulation (AR) 200-1.

SPECIES INFORMATION

This section provides a description of the species including distribution, habitat/ecosystem, life history, evidence for its decline, and conservation measures taken by various agencies or organizations.

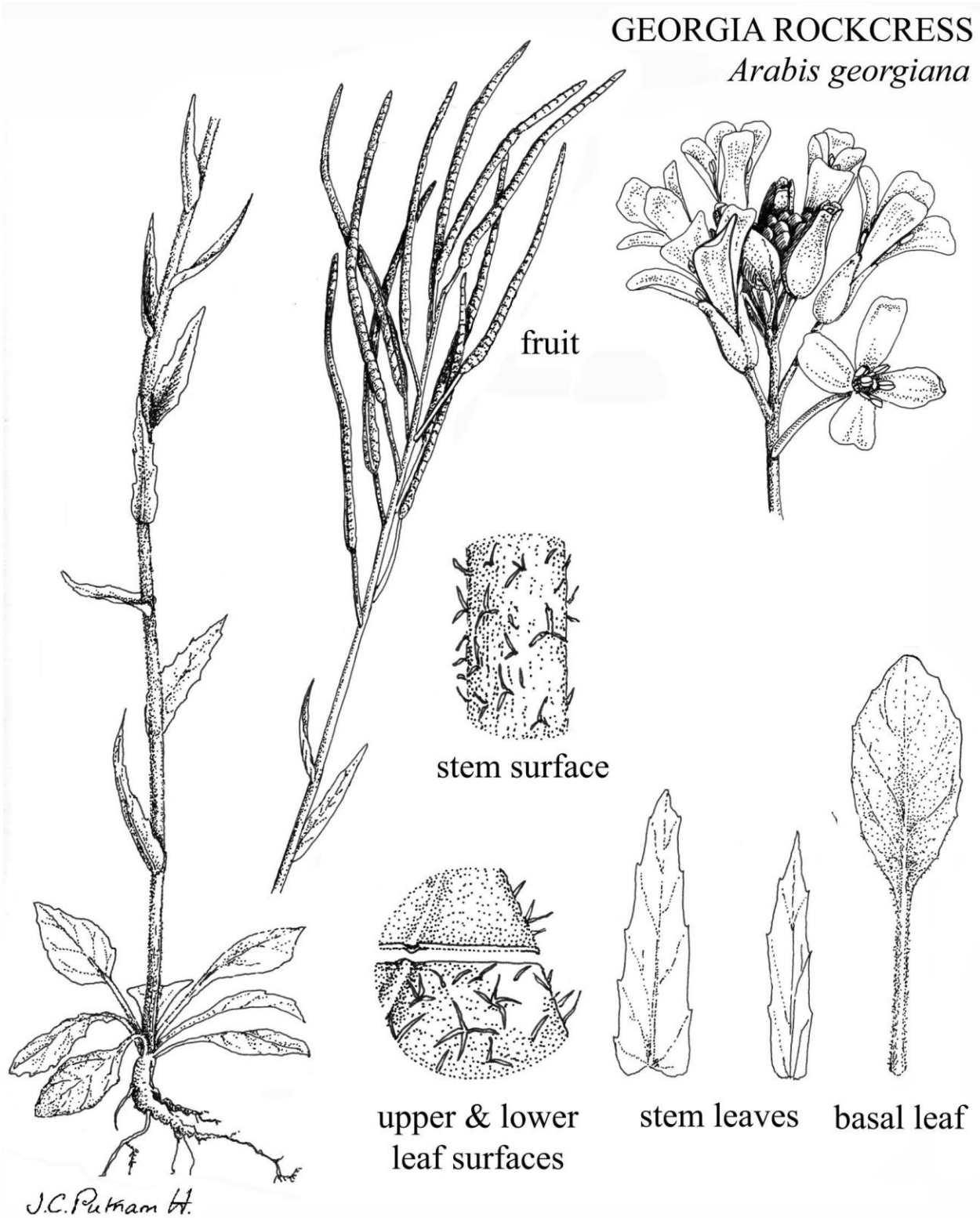
DESCRIPTION

Georgia rockcress is a perennial herb up to 90 centimeters (cm) (35 inches (in.)) tall. The basal leaves are oblanceolate (lance-shaped but broadest above the middle and tapering toward the base), rounded at the apex, toothed on the margins, 4 to 8 cm (2 to 3 in.) long, and with or without long, tapered petioles. The basal leaves form a basal rosette and usually persist through the fruiting season with green lower surfaces. The stem leaves are alternate, lanceolate (lance-shaped) to narrowly elliptic, 1 to 5 cm (0.4 to 2.0 in.) long, and somewhat clasping around the stems. The upper surfaces of the stem leaves have stiff, branched hairs when young and are

smoothish when mature. All leaves tend to be finely hairy. The flowers are borne in a terminal inflorescence (cluster at the tip of the stem) that is somewhat loosely branched. There are four, white petals that measure 6 to 10 millimeters (mm) (0.2 to 0.4 in.) long. The fruit stands erect as a slender (1 mm or 0.04 in. wide), relatively long (5 to 7 cm or 2 to 3 in.) pod that splits in two, leaving behind a thin, papery, lengthwise partition. Seeds are brownish, oblong, about 2 mm (0.1 in.) long, and are borne in single rows on each side of the partition. Flowering occurs from March to April, with fruiting beginning in May and into early July (Allison 1995, p. 4; Patrick et al. 1995, pp. 17-18; Chafin 2007, pp. 47-48; Schotz 2010, p. 3). Figure 1 includes an illustration of the Georgia rockcress as described above.

DISTRIBUTION

Twenty-eight sites are known in Georgia and Alabama. There are two known locations on Fort Benning. The two locations are in training compartments Z01 (Alabama), which contains 35 acres, and AA3 (Georgia), which contains 26 acres. Both sites are located along the banks of the Chattahoochee River (Figure 2). The map depicts the known locations of Georgia rockcress and its protected habitat on the Installation. The boundaries for the protected habitat are the same as the proposed critical habitat in USFWS's maps for proposed listing in the Federal Register (Docket No. FWS–R4–ES–2013–0030).



(NatureServe 2007)

Figure 1
Illustration of Georgia rockcress

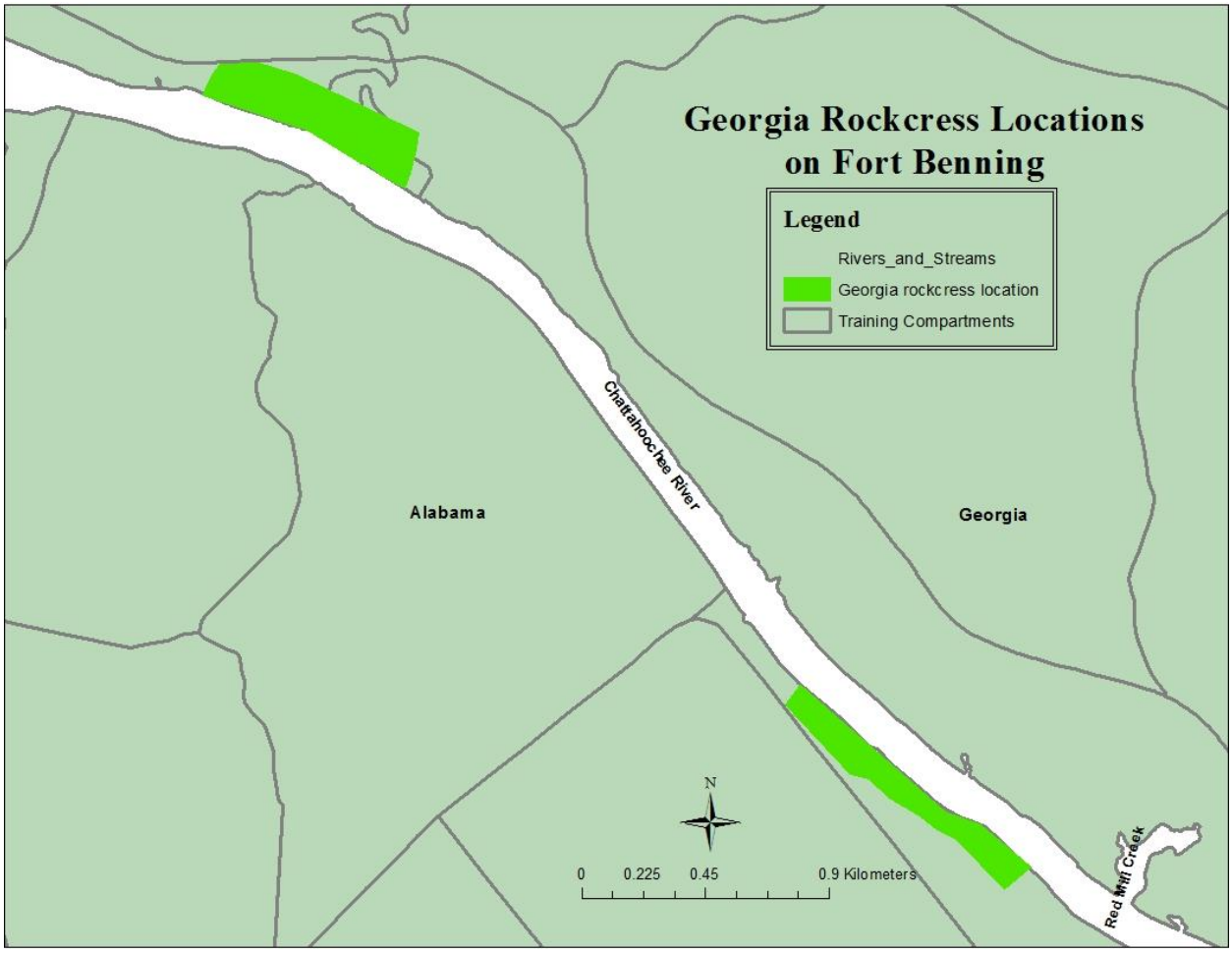


Figure 2
Species Location Map for Georgia Rockcress on Fort Benning
11 Nov 2013

HABITAT/ECOSYSTEM

Habitat consists of: shallow, basic or circumneutral, soils on rocky slopes above streams; thin woods on limestone or granite bluffs; hardwood forests on slopes above streams; sandy, recently eroded riverbanks; often under red cedar, black oak, sugar maple, chestnut oak, and oakleaf hydrangea (NatureServe 2007).

Life History/Ecology
Georgia rockcress will persist in shady habitats but flowers and fruits best when exposed to sun for most of the day. It appears to depend exclusively on sexual reproduction and is probably not self-compatible since the female stigma in a given flower becomes receptive before that flower's pollen is released. Seeds have been observed to germinate in the fall and winter of the year they are produced. Georgia rockcress is not a strong competitor and grows where other plants are excluded by thin, rocky soils or recent soil erosion (NatureServe 2007).

The U.S. Fish and Wildlife Service, proposes to list the Georgia rockcress as threatened under the Endangered Species Act (ESA), with a critical habitat designation. On Fort Benning the USFWS proposes two locations; one on the Georgia side of the Chattahoochee River which contains 14 hectars/35 acres and one on the Alabama side of the river which contains 11 hectares/26 acres.

REASONS FOR LISTING

USFWS has determined that habitat degradation and the subsequent invasion of exotic species, more than outright habitat destruction, is the most serious threat to this species' continued existence. Disturbance, associated with timber harvesting, road building, and grazing has created favorable conditions for the invasion of exotic weeds, especially Japanese honeysuckle in this species' habitat. The majority of extant populations are currently threatened by the presence of exotics. (USFWS 2013).

On Fort Benning, one of the most serious threats Georgia rockcress faces has been the introduction of invasive species to include feral swine, kudzu, Japanese climbing fern, Japanese honeysuckle and others. Feral swine can cause extensive damage by rooting up vegetation. Feral swine have been observed in all of the areas where the Georgia rockcress occurs on the installation. Presently, there is no direct evidence that the feral swine are significantly impacting the Georgia rockcress populations. It does not appear that the swine are targeting Georgia rockcress as a preferred food source.

CONSERVATION MEASURES

Current management efforts on the Installation for Georgia rockcress consists of habitat protection and periodic monitoring of the known populations. The species is vulnerable to several activities on the Installation such as fire and timber harvesting and is threatened by feral swine and invasive plants (*Lonicera japonica*) Japanese honeysuckle, (*Pueraria lobata*) kudzu, and (*Elaeagnus sp.*) silverberry.

On Fort Benning, the known locations will been designated as Sensitive Areas, in which digging and vehicles are not allowed. Timber harvesting is not allowed within 200 feet of the boundary of the populations and prescribed burning will be limited within the site to infrequent, low intensity burns under controlled conditions.

CONSERVATION GOALS

The conservation goal is to maintain existing populations at healthy and stable levels and preserve habitat in which they occur. Surveys for new populations and potential habitat are ongoing.

MANAGEMENT PRESCRIPTIONS AND ACTIONS

The most important management action is to protect the Georgia rockcress sites from disturbance. This will be accomplished by:

1) Fencing populations, if necessary, from feral swine.
2) Prohibiting timber harvest within 200 feet of known populations.
3) Prohibiting digging and vehicles within the sensitive area signs around each population.

4) Limiting prescribed burning within the boundaries of the population to low intensity burns that may aid in maintaining suitable habitat for Georgia rockcress.

5) Controlling populations of feral swine by trapping or shooting.

6) Monitor the encroachment of Japanese honeysuckle, kudzu, Elaeagnus sp., and other invasive species and initiate control efforts if needed.

Any management activities will be coordinated with the USFWS and the Georgia Department of Natural Resources, Nongame Endangered Wildlife Program. Any regional strategies for Georgia rockcress will be developed in partnership with the USFWS.

Any unit that conducts a training exercise or construction activity on Fort Benning must complete a Record of Environmental Consideration (FB-144-R) detailing their proposed activity and location. Those activities that might affect the Georgia rockcress or its habitat will be carefully coordinated to minimize adverse impacts.

These management actions will have virtually no effect on military training. All the populations and protected habitat comprise a very small area and are located in areas that receive little training pressure.

SURVEYS, INSPECTIONS, AND MONITORING

Population sites and protected habitat will be inspected twice annually to check for signs of disturbance or encroachment by invasive species. We will periodically survey the sites for the presence and abundance of Georgia rockcress. Plants will be tallied as vegetative or fertile individuals. Data will be maintained over time to attempt to detect trends in the population size and reproductive status. All monitoring and survey data for Georgia rockcress will be made available to the USFWS and perspective state natural resource agencies upon request.

TIME, COST and PERSONNEL

The planning and funding period for the implementation of this ESMC is 5 years, though some components of the plan extend beyond this time frame. Projected annual costs for implementation are shown in Table 2. Nothing in this Plan shall be a violation of the Antideficiency Act.

Table 2
Projected Annual Implementation Costs

FISCAL YEAR	ESTIMATED ANNUAL COST
2014	$ 5,000
2015	$ 5,000
2016	$ 5,000
2017	$ 5,000
2018	$ 5,000
5-YEAR TOTAL	$ 25,000

CHECKLIST

Schedule	Activity	Implemented Date	Signature
Jan 2014- Dec 2014	2 Site inspections for disturbance or invasive species. Corrective actions to be taken as needed.		
May - July 2014	Conduct periodic survey of all populations		
September 2014	Provide report to Commander on effectiveness of ESMC		
Jan 2015- Dec 2015	2 Site inspections for disturbance or invasive species. Corrective actions to be taken as needed.		
September 2015	Provide report to Commander on effectiveness of ESMC		
Jan 2016- Dec 2016	2 Site inspections for disturbance or invasive species. Corrective actions to be taken as needed.		
September 2016	Provide report to Commander on effectiveness of ESMC		
Jan 2017- Dec 2017	2 Site inspections for disturbance or invasive species. Corrective actions to be taken as needed.		
September 2017	Provide report to Commander on effectiveness of ESMC		
Jan 2018- Dec 2018	2 Site inspections for disturbance or invasive species. Corrective actions to be taken as needed.		
September 2018	Provide report to Commander on effectiveness of ESMC		

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USFWS. 2013. Federal Register / Vol 78, No. 177 / 56506-65540 September 12, 2013 / Proposed Rules, Docket No. FWS–R4–ES–2013– 0030.

APPENDIX E7

MANAGEMENT PLAN

FOR

Gopher Tortoise

(*Gopherus polyphemus*)

Fort Benning, Georgia

prepared by

Roderick Mark Thornton
Wildlife Biologist
Conservation Branch, EMD, DPW

28 June 2011

APPROVAL PAGE

Approving Official:

_____ _____
INSTALLATION COMMANDER Date

Reviewed by:

_____ _____
DIRECTOR OF PUBLIC WORKS Date

_____ _____
DIRECTOR OF PLANS TRAINING Date
MOBILITY AND SECURITY

_____ _____
STAFF JUDGE ADVOCATE Date

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EXECUTIVE SUMMARY

Current Species Status: The gopher tortoise (Gopherus polyphemus) is Federally listed as threatened in Louisiana, Mississippi, and west of the Tombigbee and Mobile Rivers in Alabama. It is listed as a candidate species by the U.S. Fish and Wildlife Service (USFWS) in the remainder of its range. It is also listed as threatened by the state of Georgia. Gopher tortoises are a resident species of Fort Benning. They occur in the sandhill communities throughout most of the Installation. The largest concentrations of gopher tortoises are in the northeastern portion of the Installation. In 1998-1999 the USFWS surveyed the Installation for the presence of gopher tortoise burrows. They located over 8200 burrows on Fort Benning. These burrows are scattered across the Installation and many of the burrows are thought to be inactive. Gopher tortoises will dig several burrows over their long lives. Most of the available literature suggests that a rough estimate of a population can be derived by counting the known burrows and multiplying it by .33. This is only a rough estimate and better more intensive methods have now been developed. Many of these burrows will used by many species of vertebrates and invertebrates, which greatly benefit from the gophers tortoise's burrowing nature. The biggest military influence impacting gopher tortoise habitat on Fort Benning is heavy mechanized training. Gopher tortoises rely on dry sandy sites to dig their burrows and for foraging habitat. These sites are also ideally suited for heavy mechanized training.

Habitat Requirements and Limiting Factors: Gopher tortoises are found from southeastern South Carolina through southern Georgia and most of Florida (except the Everglades), and westward through southern Alabama, Mississippi and the eastern "toe" of Louisiana (Figure 1). They also occur on coastal islands off Georgia and Florida. Most of the best gopher tortoise habitat is located on private lands with a very small percentage located on public, state, Federal or military reservations. The gopher tortoise most often lives on well-drained, sandy soils in transitional (forest and grassy) areas (Ernst and Barbour 1972). It is commonly associated with a pine overstory and an open understory with a grass and forb groundcover and sunny areas for nesting (Landers 1980). There are many factors, which are limiting the gopher tortoise, but the most significant threat is the loss of habitat due to intensive land use. On private lands it is land development that most often competes for prime tortoise habitat that occurs on the high dry ground. On military properties such as Fort Benning training is the major competitor for gopher tortoise habitat. Many types of training can be successfully accomplished without harming the habitat. Precautions must be followed when training with heavy equipment that can decimate native vegetation and run over active tortoises and burrows.

Management Objectives: Management will focus on the protection and enhancement of existing suitable and potential habitat while maintaining or increasing the current population on the Installation. Management will be compatible with the 2008 "Management Guidelines For The Gopher Tortoise On Army Installations".

Conservation Goals: To maintain population numbers and improve upon existing habitat. To reclaim habitat that has been lost through past land management practices, without significantly impacting military training. It is the Army's goal to assist in the prevention of the need to list the gopher tortoise as an endangered or threatened species in its eastern range. The Army will strive

to accomplished this by significantly contributing to the landscape-scale conservation of some of the largest existing gopher tortoise populations and habitats.

Actions Needed: The major steps needed to satisfy management objectives and achieve conservation goals are:

1. Conduct surveys of potential habitat areas for gopher tortoises to estimate population size and identify habitats used by gopher tortoises.
2. Conduct line transect distance sampling on all suitable habitat with a 3-5 year return interval to establish a population baseline and detect demographic changes to the population over time.
2. Monitor activities in known gopher tortoise areas and limit any activity that would be detrimental to gopher tortoise habitat.
3. Establish gopher tortoise sanctuaries both on and off the Installation to accept tortoises that must be relocated to accommodate military training needs.
4. Work with state and Federal agencies to take steps to help prevent the need for further Federal listing of the species.
5. Identify and improve habitat within habitat management units (HMUs) that could support gopher tortoise translocations and aid in the management of the species.
6. Enhance existing habitat areas occupied by tortoises through prescribed fire and sound forestry practices to increase population health and survivability.
7. Reclaim potential habitat areas that have been lost to thick underbrush and closed canopies through the use of fire, herbicides and forest management.
8. Increase public awareness.

1.0 INTRODUCTION

The purposes of this Species Management Plan (SMP) are: (1) to present information on the gopher tortoise, a Federal candidate species present at Fort Benning; (2) to discuss threats it faces on the Installation; (3) to define conservation goals; and (4) to outline a plan for management of the species and its habitat that will enable achievement of conservation goals.

The gopher tortoise is a land tortoise, which lives in the sandy soils of the southeastern coastal plain. It occurs from South Carolina to Florida and west as far as eastern toe of Louisiana.

2.0 SPECIES INFORMATION

This section provides a description of the species, including distribution, habitat/ecosystem, life history, evidence for its decline, and conservation measures taken by various agencies or organizations.

Description: Gopher tortoises are land turtles, which inhabit sandy soils of the Southeast United States. The desert tortoise, a close cousin, is a resident of the desert southwest. Gophers tortoises are primarily grazers, feeding on juicy weeds, fruits, and grasses found near the surface. They are medium-size turtle with a broad, muscular head and a relatively short tail. It is distinguished from other turtles by its lack of webbed feet, its distinct sub-maxillary gular glands, and its unhinged shell (Auffenberg 1978, Ernst and Barbour 1972).

Distribution: Gopher tortoises are found from southeastern South Carolina through southern Georgia and most of Florida (except the Everglades), and westward through southern Alabama, Mississippi and the eastern "toe" of Louisiana (Figure 1). The main body of the more or less continuous portion of the gopher tortoise's current range is found in north Florida, Southern Georgia and southeast Alabama (Auffenberg and Franz 1978). The distribution of the animal is thought to be limited to areas with deep sandy soils and its sensitivity to colder climates (Auffenberg and Franz 1982). Gopher tortoises occur throughout most of Fort Benning with the main concentrations being in the northern 1/3rd of the Installation. Based on a survey performed by the USFWS from 1995 through 1997 there are estimated to be about 8200 burrows on the Installation including both active and inactive burrows (Figure 2).

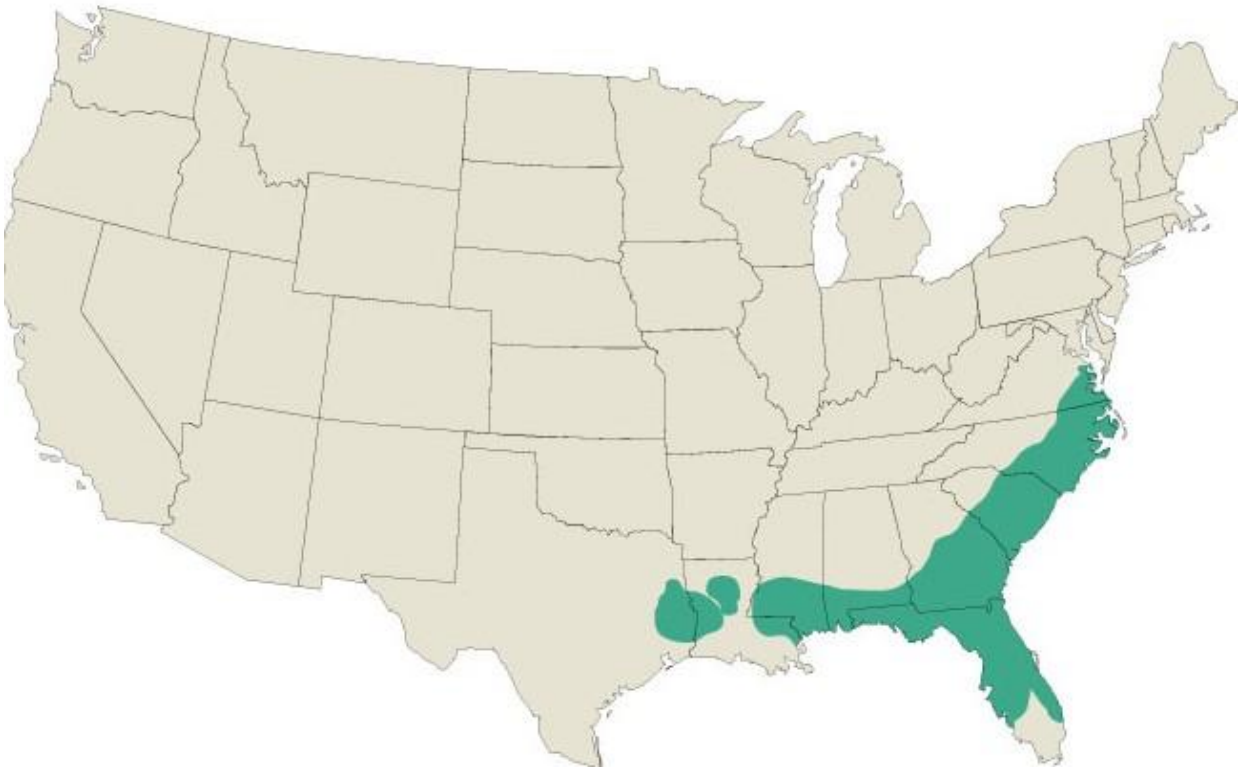

Figure 1
Distribution of Gopher Tortoise

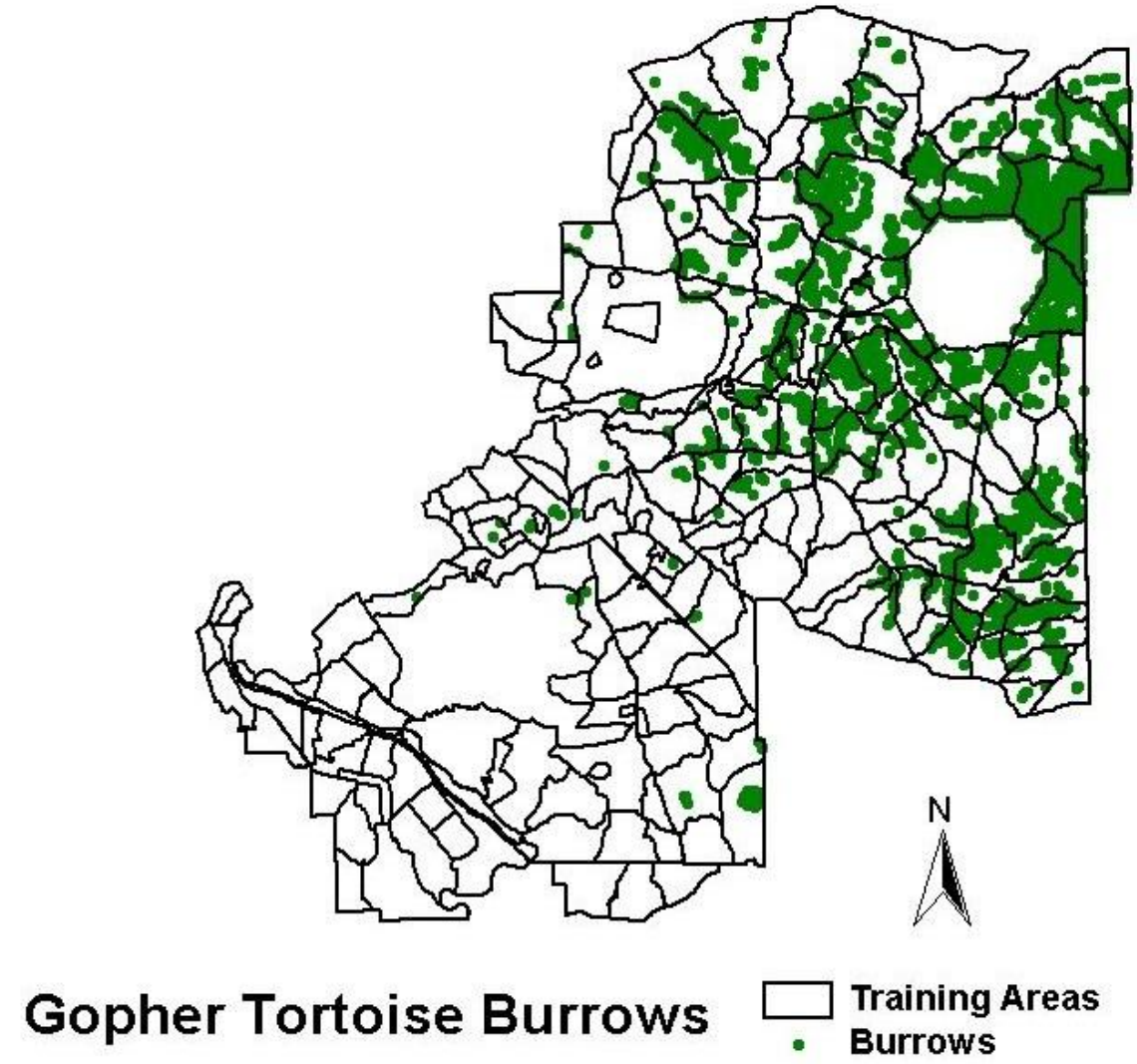

Figure 2

Habitat/Ecosystem: Gopher tortoises occupy a wide range of upland habitat types. They are however dependent on a suite of physical features that are found in some upland areas (Campbell and Christman 1982). These upland areas can support a variety of habitat types in which the gopher tortoise can exist. Tortoises also will occupy different habitats seasonally (McRae et. al. 1981, Diemer 1986), although the general biotic features of these habitats are thought to be similar in nature. The general physical and biotic features thought to characterize suitable adult tortoise habitat are: a) the presence of well drained sandy soils which allow easy burrowing; b) an abundance of herbaceous ground cover; c) generally open canopy and a sparse shrub cover, which allows sunlight to reach the ground floor (Cox et. al. 1987). Habitat requirements of juveniles are not well known, but they are thought to be similar to those of adult tortoises (McRae et. al. 1981b).

SOILS

Soil conditions, rather than climatic conditions are responsible for the xerophytic nature of the habitats that are preferred by tortoises and their associates (Carr 1952, Ernst and Barbour 1972, Mount 1975, Auffenberg and Franz 1982). Soil types occupied by tortoises have been described by Lohoefener (1982), Auffenberg and Franz (1982), and Diemer (1984). These soils characteristically have very little clay content and allow rain water to drain through them rapidly. Water tables are often several feet below the surface of these types of soils (Landers and Speake 1980). In Georgia tortoises occupy areas where the sandy soils exceed 1 meter in depth (Landers and Speake 1980). In south Florida tortoises may occupy areas with much shallower sands. It is believed that in these areas tortoises are able to survive without digging burrows due to the mild winter conditions and high humidity levels. Instead they dig shallow depressions known as "tortoise forms" like many other tropical tortoises (Auffenberg 1969).

HERBACEOUS GROUND COVER

The amount of herbaceous ground cover is an important indicator for the quality of habitat for supporting tortoises (Cox et al 1987). There is a positive relationship between % ground cover and tortoise densities. Auffenberg and Iverson (1979) found that areas with 80% or greater herbaceous ground cover supported 5-20 times more tortoises than areas with less than 35% herbaceous ground cover. Auffenberg and Iverson (1979) also discovered that tortoises in areas with low herbaceous ground cover had increased foraging radii when compared to those in areas with high herbaceous ground cover.

OPEN CANOPY

An open canopy is necessary to provide good tortoise habitat. An open canopy allows sunlight to reach the forest floor providing energy to grow a healthy herbaceous ground cover and to help warm the bare earth for incubation sites.

Life History/Ecology: Adult tortoises average 9-11 inches in length and weigh from 8-10 pounds. There is notable geographic variation in size throughout the gopher tortoise range (Landers et. al. 1982). Extremes in weight and length approach 15 pounds and 14 inches respectively (Dietlein and Franz 1979). The shell of the tortoise is domed and varies in color geographically from light tan to dark gray with many intermediate hues (Cox et. al. 1987).

Sexual dimorphism is evident in the general shell dimensions of mature adults with females being larger (McRae et. al. 1981a). The concavity of the plastron is usually greater in males than in females, and the length of the anal notch on the shell is longer in males (McRae et. al. 1981). Hatchlings are yellow-orange in color and are about 1.5 to 2 inches in length. They grow 0.4 to 0.8 inches per year and will increase eight-fold in size before reaching adulthood (Landers et. al. 1982). The forelimbs of gopher tortoises are flattened and greatly stiffened, to aid in excavating burrows and in protection when the tortoise assumes a defensive posture by pulling its head and limbs into its shell (Auffenberg and Franz 1979). Gopher tortoise burrows are roughly the size of the tortoise and may extend some 25 feet in length reaching a maximum depth of about 6 to 8 feet. Tortoise burrows have only one entrance. Gopher tortoises form colonies of several individuals, each having one or more burrows within close proximity of a neighboring tortoise. Tortoise colonies are limited by the amount of available food and suitable burrow sites. In areas with abundant food sources and suitable burrow sites tortoise densities can be as high as one per half acre. The current definition of a tortoise *colony* is "3 or more active adult burrows within 100 m of each other, (adult burrows have a burrow width of >9") or any combination of active adult and active hatchling/subadult burrows within 100 m of each other". Burrows 1.5-9" in width are hatchling/subadult burrows." This definition is currently being revisited. A *colony site* is defined as "all active/inactive burrows *and* a 200' buffer."

The gopher tortoise is a relatively long-lived species, often reaching 40 to 60 years. They reach sexual maturity at around 20 years of age. Breeding varies with location of the colony but usually peeks in May and June and eggs are laid in sunny openings near the burrow or in the apron of the burrow it's self. Tortoises like all other reptiles do not incubate their eggs since their body temperature varies with the air temperature. Instead they rely on the sun to warm the earth in which the eggs are laid. Incubation varies latitudinally, with 110 days in the northern most portion of the range (South Carolina) (Wright 1982) to 80-90 days in the southern most portion of the range (North Florida) (Iverson 1980). Hatching occurs from August through October.

Reasons for Listing The major reasons for decline of gopher tortoises are habitat destruction and degradation and human predation. These factors have reduced gopher tortoise numbers by as much as 80% over the past 100 years (Auffenberg and Franz 1982). In Georgia, rural expansion and reservoir dams are listed as contributing reasons for tortoise losses (Landers and Garner 1981). Clearing of land for agricultural purposes has also been a contributing factor to the gopher tortoises decline. On Fort Benning mortality from vehicular traffic and loss of habitat due to military training and past land management practices have been the major factors. Fire exclusion over the past decades and forest fragmentation have added to the loss of habitat. Once fire is excluded from an open canopy ecosystem, such as the historical southern pine forests, hardwood shrubs and trees invade the area and close the canopy. This shading of the forest floor prevents many native herbaceous plants from growing forcing the gopher tortoises to find new area in which to forage.

3.0 CONSERVATION GOALS

The conservation goals are to maintain and increase population numbers and improve existing habitat. Reclaiming habitat that has been lost through past land management practices, with minimal impact on military training, requires the implementation of the following management practices: 1) forestry management which favor gopher tortoise habitat, 2) maintenance of existing habitat through the use of prescribed burning and timber thinning operations, 3) identify and mark high quality habitat to exclude vehicular traffic, 4) control invasive/exotic species that propose a threat to gopher tortoise survival and reproductive fecundity, 5) reintroduce native grasses and forbs that are important for foraging resources, and 6) monitor existing populations for population trends, activity, and reproductive success.

The United States Department of Defense and the USFWS established a Memorandum of Agreement (MOA) for the Conservation of the Gopher Tortoise in its Eastern Distribution in 2006. The objectives of the MOA are as follows:

- Enhance communication and coordination among participants and other interested parties to identify opportunities for collaborative action to further acquisition, protection, restoration and management of gopher tortoise habitat.
- Encourage Federal, state, regional, local and private funding to acquire, protect, restore, monitor and manage gopher tortoise habitat.
- Encourage public/private partnerships among governmental agencies, community and non-governmental organizations, academic institutions, corporations, and private landowners to coordinate resources and achieve habitat conservation results on a large landscape scale.
- Promote the education of interested private individual and corporate landowners regarding tortoise conservation and habitat management.
- Utilize Geographic Information System (GIS) analyses to identify the most ecologically important areas in need of protection that may also serve to protect military test and training missions and the mission of the Parties.
- Promote the sustainability of the military and Forest Service mission in the region by utilizing all appropriate conservation tools to create buffer areas.
- Manage any acquired lands in a manner that will protect their natural resources and that will be consistent with the missions of the Parties.
- Increase simultaneously the recovery potential for other Federal and state threatened and endangered species associated with the gopher tortoise and reduce the need to list additional species.
- Work to achieve landscape-level conservation of fish, wildlife, plants, and their habitats through partnerships with interested organizations and individuals.
- Seek to sustain a healthy natural environment to enhance the public's ability to enjoy the outdoors and to conserve natural resources for future generations.
- Explore the development of tools which may be used to implement these objectives.
- To meet annually to provide a status report on activities taken to further the goals of this agreement and to set priorities for the coming year.

By implementing these management activities, gopher tortoise habitat on Fort Benning should be secure and overtime will expand to allow for a healthier and larger population.

4.0 MANAGEMENT PRESCRIPTIONS AND ACTIONS

Conservation of the Gopher Tortoise and other species is part of a broader goal to conserve biological diversity on Army lands consistent with the Army's mission. Biological diversity and the long-term survival of individual species, such as the Gopher Tortoise, ultimately depend upon the health of the sustaining ecosystem. Therefore, the Installation-specific Gopher Tortoise management strategies will promote ecosystem integrity. Maintenance of ecosystem integrity and health also benefit the Army by preserving and restoring training lands for long-term use.

Fort Benning will work closely and cooperatively with the Gopher Tortoise Team (GTT). The GTT is a group created to administer and periodically review the Candidate Conservation Agreement (CCA), and will consist of one or more designated representatives from the Army and each party to the CCA. Installations should routinely communicate with the Army's GTT representative(s) to ensure that proposed actions are consistent with CCA guidance.

Systematic Management Strategy for the gopher tortoise is a systematic, step-by-step approach to identify gopher tortoise populations, gopher tortoise habitat (current and potential), and training and other mission requirements (present and future). Analysis of these factors and their interrelated impacts are needed as a first step in the development of a management strategy. There are eight steps in this systematic approach to management.

1. Identify Installation and tenant unit mission requirements. Overlay these requirements on the Gopher Tortoise distribution scheme. This is in direct support of a CCA Section 10.1.1 commitment - identify areas of potential agency mission – Gopher Tortoise habitat conflict. This is the first proactive step in identifying potential conflicts and developing possible Gopher Tortoise avoidance, minimization or mitigation measures.

2. Develop a Global Information System (GIS) for the Gopher Tortoise population and its habitat on the Installation. Based on current use, soils, and vegetation, designate non-fragmented' areas of occupied as well as potentially suitable habitat as Gopher Tortoise Habitat Management Units (HMUs). This supports CCA Section 10.1.1 commitments to identify suitable or potentially suitable habitat for and areas occupied by the gopher tortoise.

3. Determine current Gopher Tortoise population levels and demographics by conducting line transect distance burrow surveys using GIS land cover data and DISTANCE 6.0 software available on the web at http://www.ruwpast-and.ac.uk/distance as described in the Gopher Tortoise Survey Handbook developed by the Jones Ecological Research Center. After an initial baseline survey is conducted, surveys using consistent and systematic re-sampling should be repeated every 3-5 years to monitor long term population trends.

4. Identify any isolated Gopher Tortoise burrows that are outside areas that realistically can be managed as HMUs. These may include residential lawns, roadsides or transmission line rights of way in areas where prescribed burning or mowing of adjacent habitat is not feasible, etc.

5. Identify HMUs that could support Gopher Tortoise translocation by serving as recipient sites.

6. Identify HMUs with Gopher Tortoise densities and foreseeable conflict with present and projected mission activities that will adversely and permanently degrade/ fragment/ destroy occupied gopher tortoise habitat. In concert with Section 10.1.2 of the CCA, Installations will consider translocating Gopher Tortoises from these HMUs to areas of protected suitable habitat.

7. Analyze the information developed above using the guidance contained in these guidelines.

8. In support of CCA Section 10.1.1, 6th bullet, and where permitted by law, assist in the identification of important Gopher Tortoise populations, habitats, cooperators, and partnership opportunities outside the Installation boundaries.

Management efforts will be geared towards the protection of existing and potential gopher tortoise habitat. All existing and potential habitat on the Installation will be identified and broken into management units based on size and natural habitat boundaries called "Habitat Management Units" (HMUs) (Figure 3). This will involve the protection of the sandy upland areas on Fort Benning. Some areas that contain good colonies of gopher tortoises will be posted with signs that read "Sensitive Area, No Vehicles Allowed". This will minimize the possibility of burrows being collapsed by tracked and wheeled vehicles and will also protect vital foraging habitat. A review of all (Form FB 144-Rs (Request for Environmental Analysis) that may affect gopher tortoise habitat will help identify and mitigate any potential conflicts. Prescribed fire, use of herbicides, and timber management operations will be used to improve existing habitat and to reclaim habitat that has been lost due to hardwood invasion.

Prescribed Fire is an important tool in maintaining the plant community necessary for gopher tortoise survival. Prescribed burning will be done on a 2 to 3 year rotation on pine forested upland sites that contain gopher tortoise colonies. This frequency of fire is important to insure that there is adequate forage at the ground level for tortoises and that bare mineral soil is exposed for nest sites. Maintaining an open canopy allows sunlight on the forest floor, encouraging the grass and weed community so valuable to gopher tortoises and creating conditions favorable for nesting sites. Timber harvesting in these areas will concentrate on creating an open canopy favoring long leaf pine. Longleaf pine is an important component of this ecosystem; it provides the fuel needed to burn the area on a 2 to 3 year rotation.

Silvicultural standards for Red-cockaded Woodpecker (RCW) management on the Installation are consistent with requirements for Gopher Tortoise habitat. Where RCW management is not an issue, forest management and timber harvest will be evaluated for compatibility with Gopher Tortoise habitat needs. The Installation will use pine and hardwood timber harvest and various forms of mechanical and chemical vegetation control, as necessary, to achieve specific habitat and vegetation objectives or to enhance degraded habitat. In general, silvicultural practices in HMUs will employ ecosystem management including maintaining canopy closure at 60% or less, reducing midstory encroachment, and maintaining native grasses and forbs through prescribed burning, minimizing soil disturbance, and implementing appropriate timber

management to promote adequate light at ground level. Roller-chopping and other intensive heavy equipment use in areas with high burrow concentrations will be avoided, unless there is no other alternative to reducing shrub cover.

Reforestation efforts will concentrate on natural regeneration through uneven-age management where possible. In areas that are to be reforested through artificial regeneration, tree spacing should be kept fairly open, no more than 600 trees to the acre, and thinning should take place as soon as possible to keep the stand open and protect the grass and weed community. Site preparation in areas that contain tortoises should be kept to a minimum. Where possible the use of fire alone for site preparation is the preferred method. The use of "shear and rake" should only be uses as a last resort.

Logging operation in areas containing tortoise colonies should be scheduled to avoid activity during the peak of the breeding period of May and June and the hatching period of August-October. An effort should be made to spread the logging slash throughout the stand and avoiding piling slash up near burrows. If an area is to be windrowed then breaks should be made in the rows every 50 feet to allow tortoises to pass through.

Mammalian predators are a threat to the survival of hatchling and juvenile tortoises. In areas where there are high levels of raccoons, armadillos, possums, and wild pigs some control may be necessary to insure hatchling and juvenile survival. Wild pigs may also be nest predators and further study on the possibility of nest predation by pigs should be conducted. Gopher tortoises have a very low rate of reproduction and the additional pressure of exotic predators, such as wild pigs and fire ants, may be sufficient to reduce reproduction below a level which is necessary to maintain populations.

Training Restrictions around colonies and burrows are necessary to prevent direct mortality and indirect mortality due to degradation of habitat quality. No bivouac activity within a colony site. Areas with heavy bivouac use should be situated 300 meters (~900 feet) from colony boundary. Burrows should be posted if they are in jeopardy of being run over by military or maintenance vehicles. This involves burrows on firing points, ranges, fields, roadsides, right-of-ways, and power lines. Keep all equipment, vehicles
(including tracked vehicles), and personnel 15 feet from all gopher tortoise burrows, both posted and unposted burrows.

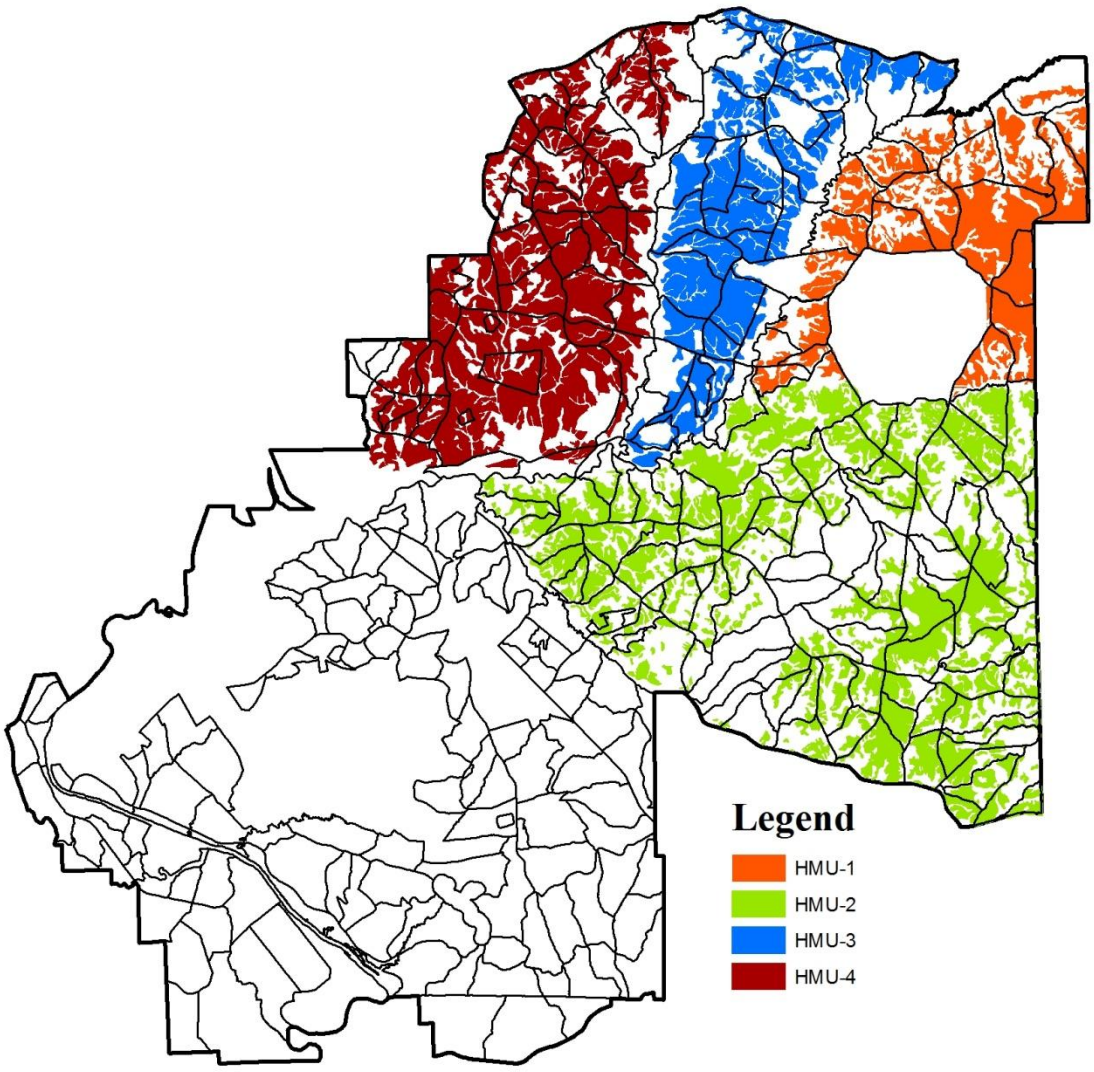

Figure 3
Habitat Management Units

5.0 SURVEYS, INSPECTIONS AND MONITORING

In 2008 the Army established guidelines for the management of gopher tortoises on military Installations. Installations will determine current gopher tortoise population levels and demographics by conducting line transect distance burrow surveys using GIS land cover data and DISTANCE 6.0 software as described in the Gopher Tortoise Survey Handbook developed by the Jones Ecological Research Center. After an initial baseline survey is conducted, surveys using consistent and systematic re-sampling should be repeated every 3-5 years to monitor long term population trends.

Burrow Surveys for and monitoring of tortoise burrows in gopher tortoise HMUs will be conducted by qualified biologists at intervals of 3-5 years. Surveys in previously unoccupied areas are needed only if the Installation biologist determines that improved habitat conditions have increased the likelihood of gopher tortoise occurrence.

Project Surveys to identify gopher tortoises that may need to be avoided or possibly relocated prior to certain actions. The Installation will conduct burrow surveys prior to construction or other significant land-disturbing activities, excluding prescribed fire. These surveys will be conducted within the year prior to project initiation by natural resources personnel or contractors trained and experienced in gopher tortoise biology. Burrows found prior to activities should be marked with conspicuous caution flagging tied to adjacent shrubs or other vegetation. Avoidance, minimization, and /or mitigation measures will be implemented in areas where such activities will impact gopher tortoise, as necessary or as needed.

Burrow Marking as deemed necessary burrows may be permanently marked or tagged for monitoring and/or burrow protection. If permanently marking burrows, inconspicuous numbered metal tags on short wire stakes will be used. Particularly vulnerable burrows can be marked with conspicuous tall stakes placed beside to help vehicle operators avoid them. Where many burrows are near where tracked or wheeled vehicles are prone to disturbing them, appropriate signage may be deemed necessary, with language such as "Be Aware—Please Avoid Gopher Tortoise Burrows."

6.0 TRANSLOCATION

Translocation of Gopher Tortoises from populations threatened by habitat destruction to restore severely depleted populations on secure lands is an important management tool. Fort Benning will provide for translocation to augment low density populations, where appropriate and reestablish populations to areas where habitat improvements have provided favorable conditions for gopher tortoises.

1. The Installation will identify potential recipient translocation sites for gopher tortoises being displaced by development or other activities elsewhere on the Installation and/or nearby private lands.

2. Recipient sites must have no (or limited) foreseeable conflict with present and projected mission activities.

3. In areas determined acceptable to receive gopher tortoises, habitat inspection and improvement work must be completed before translocation is attempted to ensure that translocation is successful. Potential recipient sites must have suitable habitat in good condition that is presently deemed to be either lacking or under-stocked with tortoises and will not be readily repopulated without human intervention. The reason(s) for deficient tortoise populations should be recognized or suspected (and no longer exist) before tortoises are stocked onto these lands. Reasons for low densities might include a past history of human harvest, disease die-offs, or unsuitable habitat (e.g., dense pine plantation, fire-suppressed habitat) that has been restored to favorable conditions for tortoises.

4. Any translocations will be undertaken in close coordination with the Gopher Tortoise Team (GTT) and Georgia's NonGame/Endangered Species Program.

7.0 TIME, COST AND PERSONNEL

The planning and funding period for the implementation of this SMP is 5 years, though some components of the plan extend beyond this time frame. Projected annual costs for implementation are shown in Table 1. Nothing in this Plan shall be interpreted to require payment of funds in violation of the Antideficiency Act.

Table 1
Projected Annual Implementation Costs

FISCAL YEAR	ESTIMATED ANNUAL COST
2014	$ 50,000
2015	$ 50,000
2016	$ 50,000
2017	$ 50,000
2018	$ 50,000
5-YEAR TOTAL	$ 250,000

8.0 CHECKLIST

Schedule	Activity	Implemented Date	Signature
March - May 2014	Begin Population Survey for HMUs Using Line Transect Method		
June 2014	Analyze Survey Data and Generate Population Report.		
July-September 2014	Survey HMUs for potential habitat improvements and habitat disturbance due to mechanized training.		
July 2014	Provide report to Commander on effectiveness of SMP.		
March - May 2015	Begin Population Survey for HMUs Using Line Transect Method		
June 2015	Analyze Survey Data and Generate Population Report.		
July-September 2015	Survey HMUs for potential habitat improvements and habitat disturbance due to mechanized training.		
July 2015	Provide report to Commander on effectiveness of SMP.		
March - May 2016	Begin Population Survey for HMUs Using Line Transect Method		
June 2016	Analyze Survey Data and Generate Population Report.		
July-September 2016	Survey HMUs for potential habitat improvements and habitat disturbance due to mechanized training.		
July 2016	Provide report to Commander on effectiveness of SMP.		
March - May 2017	Begin Population Survey for HMUs Using Line Transect Method		
June 2017	Analyze Survey Data and Generate Population Report.		
July-September 2017	Survey HMUs for potential habitat improvements and habitat disturbance due to mechanized training.		
July 2017	Provide report to Commander on effectiveness of SMP.		
March - May 2018	Begin Population Survey for HMUs Using Line Transect Method		
June 2018	Analyze Survey Data and Generate Population Report.		
July-September 2018	Survey HMUs for potential habitat improvements and habitat disturbance due to mechanized training.		
July 2018	Provide report to Commander on effectiveness of SMP.		

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APPENDIX E8

ENDANGERED SPECIES MANAGEMENT COMPONENT

FOR

Shinyrayed Pocketbook

(*Lampsilis subangulata*)

ENDANGERED SPECIES MANAGEMENT COMPONENT

FOR

Shinyrayed Pocketbook

(*Lampsilis subangulata*)

Fort Benning, Georgia

Written by

Roderick M Thornton
Threatened & Endangered Species Biologist
Conservation Branch, DPW

APPROVAL PAGE

Approving Official:

_____ _____
INSTALLATION COMMANDER Date

Reviewed by:

_____ _____
DIRECTOR OF PUBLIC WORKS Date

_____ _____
DIRECTOR OF PLANS, TRAINING, MOBILIZATION, AND SECURITY Date

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EXECUTIVE SUMMARY

Background: Army Regulation (200-1) "Environmental Protection and Enhancement" requires the preparation of an Endangered Species Management Component for listed and proposed threatened and endangered species and critical habitat present on installations. All Army land uses are subject to these regulations. Failure to implement this management plan can lead to violation of the Endangered Species Act of 1973 (ESA) and result in the costly disruption of military operations.

Current Species Status: In 1989 the USFWS recognized *L. subangulata* as a candidate for endangered or threatened status. Williams and Butler (1994) considered the shinyrayed pocketbook to be a species of special concern in Florida. In 1994 the United States Fish and Wildlife Service (USFWS) proposed that *L. subangulata* have endangered status and in 1998 it was officially listed as an endangered species (USFWS 1994,1998). Historical records show that *L. subangulata* was once common in the main channel of the Flint and Chipola rivers, however it has not been collected from the main channel of the Apalachicola River. Brim-Box and Williams reported *L. subangulata* were found not only in tributaries of the Flint River but in tributaries of the Chattahoochee River in Georgia and Alabama. Live specimens of *L. subangulata* have been found in the Sawhatchee Creek which is a Chattahoochee tributary. *Lampsilis subangulata* was also found in the main channel of the Flint River near its headwaters, and at 4 sites in the main channel Chipola River (Brim Box and Williams 2000). There are currently no known populations on Fort Benning. The USFWS has however determined that all of Uchee Creek is considered to be critical habitat for the species.

Habitat Requirements and Limiting Factors: *Lampsilis subangulata* was reported from medium-sized creeks and rivers in clean and silty sand substrates in slow-to-moderate current (Williams and Butler 1994). Similarly, Heard (1979) found that in Florida populations of *L. subangulata* were found in muddy sand and sand in slight-to-moderate current. Clench and Turner (1956) reported that *L. subangulata* preferred small creeks and spring fed rivers. *Lampsilis subangulata* is unique because it is one of 4 mussels that produce a superconglutinate (a packet of larvae encased in a mucous tube) which is used to attract fish hosts (O'Brien et al. 1995, O'Brien 1997). Hosts fish include largemouth bass, *Micropterus salmoides*, and the spotted bass, *M. punctatus* (O'Brien 1995).

Management Objectives: Management will be for the protection and enhancement of existing habitat on the installation. Due to the designation of Uchee Creek as critical habitat for shinyrayed pocketbook, Fort Benning will evaluate the potential impacts of any actions that might affect the quality and integrity of the creek prior to taking said action within the watershed.

Conservation Goals: The conservation goal is to maintain or improve the habitat quality within that portion of Uchee Creek that resides on Fort Benning by avoiding or mitigating adverse impacts of any action within the watershed that could have effects on the quality of habitat within Uchee Creek.

Actions Needed:

1. Evaluate all actions within the watershed within Fort Benning for potential impacts to the habitat.
2. Monitor the encroachment of invasive species and consider control efforts if needed.
3. Minimize impacts to Uchee Creek from man-made disturbances such as timber harvesting, military training, and construction.

Total Estimated Cost of Conservation Actions: Projected costs for the five years of this plan are $1,000.00 per year.

INTRODUCTION

The U.S. Fish and Wildlife Service, listed the shinyrayed pocketbook as endangered under the Endangered Species Act (ESA) on March 16th 1998. Uchee Creek was added as critical habitat for shinyrayed pocketbook on November 15th 2007 (72 FR 64286 64340). The purposes of this Endangered Species Management Component (ESMC) are: (1) to present information on shinyrayed pocketbook and Uchee Creek at Fort Benning; (2) to discuss threats it faces on the Installation; (3) to define conservation goals; and (4) to outline a plan for management of the species habitat that will enable achievement of conservation goals. Cost of the conservation efforts and impacts to other Installation activities will also be discussed.

The National Defense Authorization Act for Fiscal Year 2004 (Pub. L. 108–136) amended the Act to limit areas eligible for designation as critical habitat. Specifically, section 4(a)(3)(B)(i) of the Act (16 U.S.C. 1533(a)(3)(B)(i)) now provides: ''The Secretary shall not designate as critical habitat any lands or other geographic areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.'' Fort Benning is currently revising its INRMP to include specific measures for the shinyrayed pocketbook habitat within Uchee Creek. The revised INRMP is expected by December 2014. Therefore, Fort Benning will request that USFWS determine the shinyrayed pocketbook habitat area be covered by exemption from the critical habitat designation based on the revised and approved INRMP.

This ESMC is based on and is consistent with the following laws, regulations, and guidelines: Endangered Species Act of 1973 (ESA); The Sikes Act Improvement Act of 1997 (Sikes Act) (16 U.S.C. 670a); and Army Regulation (AR) 200-1.

SPECIES INFORMATION

This section provides a description of the species including distribution, habitat/ecosystem, life history, evidence for its decline, and conservation measures taken by various agencies or organizations.

DESCRIPTION

The shinyrayed pocketbook is a medium-sized mussel that reaches approximately 8.4 cm (3.3 in) in length. The shell is subelliptical, with broad, somewhat inflated umbos and a rounded posterior ridge. The shell is fairly thin but solid. The surface is smooth and shiny, light yellowish brown in color with fairly wide, bright emerald green rays over the entire length of the shell (Figure 1). Older specimens may appear much darker brown with obscure rays. Female specimens are more inflated postbasally, whereas males appear to be more pointed posteriorly. Internally, the pseudocardinal teeth are double and fairly large and erect in the left valve, with one large tooth and one spatulate tooth in the right valve. The lateral teeth are relatively short and straight, with two in the left valve and one in the right valve. The nacre is white, with some

specimens exhibiting a salmon tint in the vicinity of the umbonal cavity. The U.S. Fish and Wildlife Service recognizes *Unio subangulatus* (Lea, 1840), and *Unio kirklandianus* (Wright, 1897), as synonyms of *Lampsilis subangulata.*

Like other freshwater mussels, adults are filter-feeders, orienting themselves in the substrate to facilitate siphoning of the water column for oxygen and food (Kraemer 1979). Mussels have been reported to consume detritus, diatoms, phytoplankton, zooplankton, and other microorganisms (Coker et al. 1921, Churchill and Lewis 1924, Fuller 1974). Juvenile mussels employ foot (pedal) feeding, and are thus suspension feeders. Foods of juvenile freshwater mussels up to two weeks old include bacteria, algae, and diatoms with amounts of detrital and inorganic colloidal particles. Specific food habits of the shinyrayed pocketbook are unknown, but are likely similar to those of other freshwater mussels.

DISTRIBUTION

Lampsilis subangulata is endemic to 2 eastern Gulf of Mexico drainages. Historically, it occurred throughout the main channel and tributary habitats in the ACF (Apalachicola, Chattahoochee, and Flint Rivers) drainage and Ochlockonee River drainages (Brim-Box and Williams 2000). The shinyrayed pocketbook was described from the Chattahoochee River, Columbus, Muscogee County, Georgia. Historically, this species was widely distributed in streams in the ACF River basin and Ochlockonee River systems in Alabama, Florida, and Georgia (Heard 1977, Williams and Butler 1994, Brim Box and Williams 2000).

This species has apparently been extirpated from the Chattahoochee River main stem (although relic specimens were found in 1999) and several of its tributaries, including Mill, Little Uchee, Cowikee, and Kirkland Creeks. Historically, 23 collections were known from this subsystem (Brim Box and Williams 2000). Several streams in the Flint River system have also presumably lost their shinyrayed pocketbook subpopulations, including Patsiliga, Gum, Fowlton, and Dry Creeks. The shinyrayed pocketbook has apparently been extirpated in Mosquito Creek, a tributary to the Apalachicola River. In the Chipola River system, subpopulations are no longer known from Cowarts, Spring (near Marianna), and Rocky Creeks. Although Brim Box and Williams (2000) reported no live specimens from the Chipola River main stem during the early 1990s status survey, USFWS personnel documented living shinyrayed pocketbooks at four Chipola River main stem sites in 2000 (J. Ziewitz, USFWS, pers. obs.). This species is extirpated from the Little River and from the lower Ochlockonee River system below Talquin Dam.

Uchee Creek is one of two remaining subpopulations known from Alabama (upstream of Fort Benning), while Sawhatchee Creek is the only other shinyrayed pocketbook subpopulation known from the entire Chattahoochee River system. This mussel persists in the uppermost Flint River main stem, and in Line, Whitewater, Swift, Jones, Abrams, Mill, Muckalee, Lanahassee, Kinchafoonee, Ichawaynochaway, Chickasawhatchee, Aycocks, Coolewahee, and Spring Creeks. Small subpopulations are also known from the upper half of the Chipola River main stem and its tributaries, Big, Waddells Mill, Baker, and Dry Creeks. Ochlockonee River system subpopulations are known from the upper half of the main stem, the Little Ochlockonee River, Barnetts Creek, and West Branch Barnetts Creek. Overall, the shinyrayed pocketbook is thought to persist at 45 sites in seven different watersheds.

Relative subpopulation size for shinyrayed pocketbook is generally low (USFWS 2003). An average of 2.9 live specimens of the shinyrayed pocketbook was found at each of 23 sites during the status survey (USFWS 1998). O'Brien and Brim Box (1999) recorded adult densities of the largest known subpopulation of the shinyrayed pocketbook (Cooleewahee Creek) to be 0.02 specimens per square foot in a bed measuring 59 x 26 feet. Densities of shinyrayed pocketbooks at four other sites where quantitative work was conducted in the Flint and Chipola Rivers yielded no more than 0.01 specimens per square foot (J. Brim Box, USGS, unpub. data). At four sites within approximately a two-mile stretch of the Chipola River, 27 shinyrayed pocketbooks were documented in 2000 (J. Ziewitz, USFWS, pers. obs.).

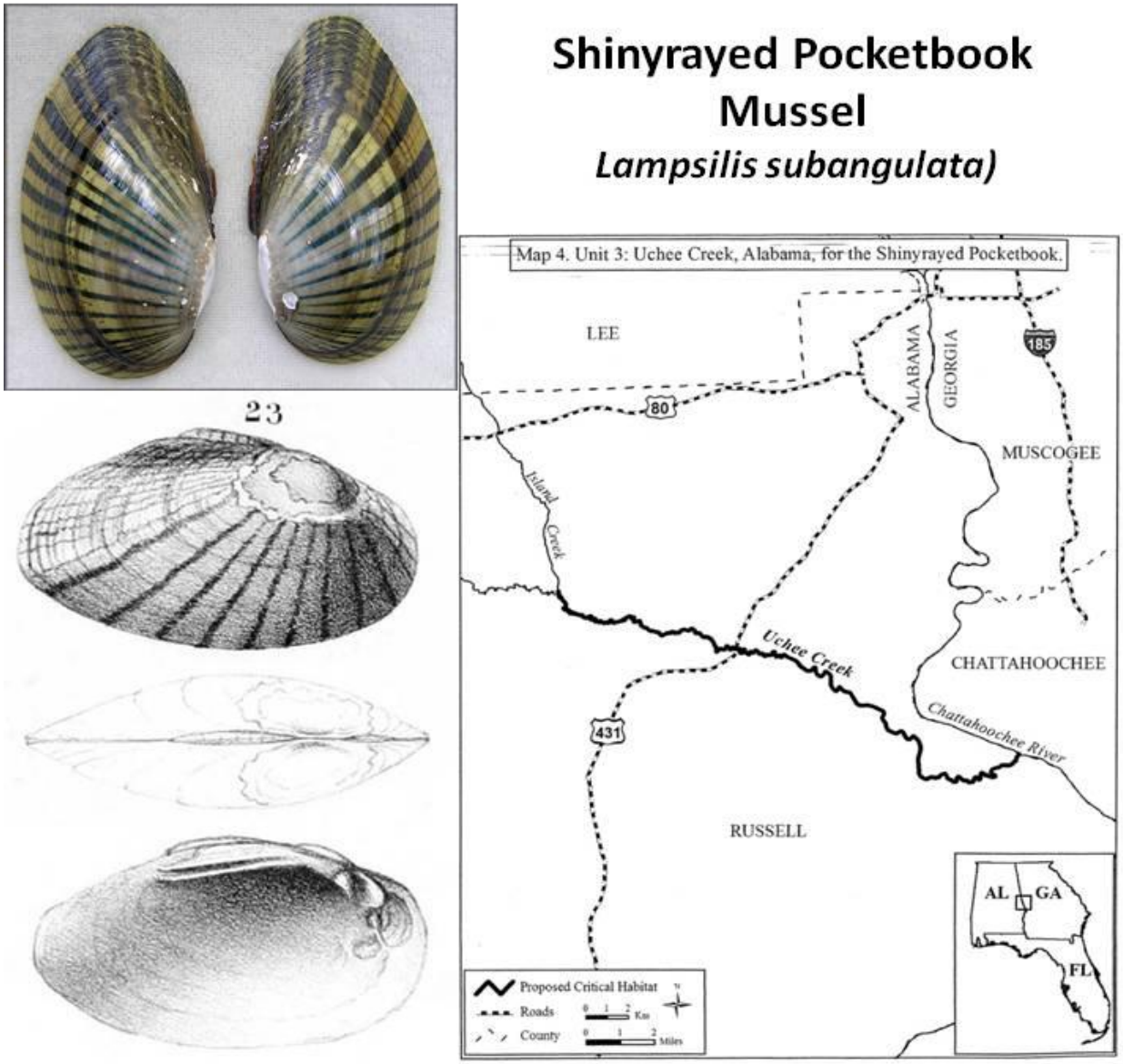

Figure 1
Illustration of Shinyrayed Pocketbook
and Critical Habitat Designation for Uchee Creek

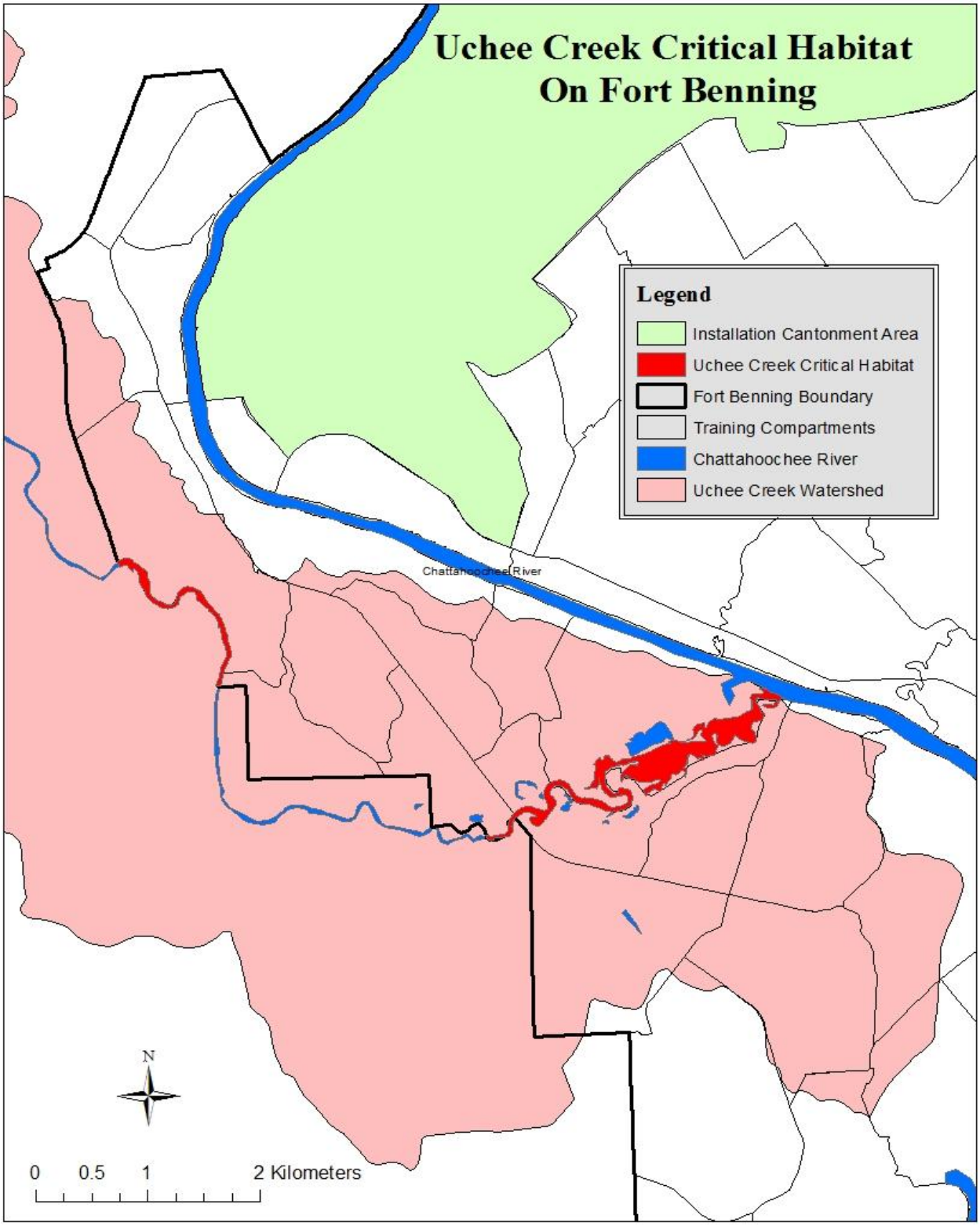

Figure 2
Uchee Creek Critical Habitat on Fort Benning
and Watershed for That Portion of Fort Benning

HABITAT/ECOSYSTEM

The shinyrayed pocketbook inhabits small to medium-sized creeks to rivers in clean or silty sand substrates in slow to moderate current (Williams and Butler 1994; Garner, pers. comm. 2003). Specimens are often found in the interface of stream channel and sloping bank habitats, where sediment particle size and current strength are transitional. Clench and Turner (1956) noted it preferred small creeks and spring-fed rivers. During the status survey in the ACF Basin, 45 percent of the specimens were found in a sand/rock substrate, while 38 percent were associated with a predominance of sand/clay or sandy substrates (Brim Box and Williams 2000).

Life History/Ecology

O'Brien and Brim Box (1999) summarized the reproductive biology of the shinyrayed pocketbook. This species is one of four lampsiline species known to produce a superconglutinate to attract potential fish hosts. Gravid females are found from December through August and superconglutinates are released from late May to early July at water temperatures of 71.6 to 74.3 degrees Fahrenheit. Although apparently mature glochidia are present in the marsupia after the end of the superconglutinate "season", they could not get them to transform during a single test trial with largemouth bass. They suggested that nearly an entire year is needed by the incubating glochidia to reach full maturity. This indicates that the shinyrayed pocketbook is a parent overwintering, summer releasing species. Primary host fishes for the shinyrayed pocketbook based on their laboratory infections appear to be largemouth bass (*Micropterus salmoides)* and spotted bass (*Micropterus punctulatus)* (100 percent transformation rates on fishes tested), although transformations also occurred in low percentages on eastern mosquitofish (*Gambusia holbrooki)*, bluegill (*Lepomis macrochirus)*, and the nonindigenous guppy (*Poecilia reticulata)* that were tested. Glochidia metamorphosed in 11 to 16 days on the basses at a temperature of 72.5 $\pm$ 4.5 degrees Fahrenheit.

REASONS FOR LISTING

The abundance and distribution of the shinyrayed pocketbook decreased historically from habitat loss and degradation (Neves, 1993) caused by impoundments, sedimentation and turbidity, dredging and channelization, gravel mining, and contaminants contained in numerous point and nonpoint sources. A comprehensive review of these past threats is provided elsewhere (USFWS 2003, Brim Box and Williams 2000, Butler 1993, Howard 1997, Frick et al. 1998, Buell and Couch 1995, Richter 1997, Watters 1997, Neves et al. 1997). These habitat changes have resulted in significant extirpations (localized loss of populations), restricted and fragmented distributions, and poor recruitment of young. USFWS has determined that habitat loss and degradation (Williams et al. 1993, Neves 1993) primarily caused by contaminants contained in point and nonpoint source discharges, gravel mining, sedimentation and erosive land practices, water quantity and withdrawal, construction of new impoundments and alien species are primary threats to the shinyrayed pocketbook.

Agricultural sources of contaminants in the ACF and Suwannee basins include nutrient enrichment from poultry farms and livestock feedlots, and pesticides and fertilizers from row crop agriculture (Couch et al. 1996, Frick et al. 1998, Berndt et al. 1998). Nitrate concentrations are particularly high in surface waters downstream of agricultural areas (Mueller et al. 1995; Berndt et al. 1998). A study by the U.S. Soil Conservation Service (USSCS; now the Natural Resources Conservation Service [NRCS]) in the Flint River system determined that between 72 and 75 percent of the nutrients entering Lake Blackshear were derived from agricultural sources (USSCS 1993). Stream ecosystems are impacted when nutrients are added at concentrations that cannot be assimilated (Stansbery 1995). The effects of pesticides on mussels may be particularly profound (Fuller 1974, Havlik and Marking 1987, Moulton et al. 1996, Fleming et al. 1995). Organochlorine pesticides were found at levels in ACF Basin streams that often exceeded chronic exposure criteria for the protection of aquatic life (Buell and Couch 1995, Frick et al. 1998). Once widely used in the ACF Basin (Buell and Couch 1995), these highly toxic compounds are persistent in the environment, and are found in both sediments and the lipid reservoir of organisms (Day 1990, Burton 1992).

Many pollutants in the ACF Basin originate from urban stormwater runoff, development activities, and municipal waste water facilities, primarily in the Piedmont (Frick et al. 1998). Urban catchments in Piedmont drainages have higher concentrations of nutrients, heavy metals, pesticides, and organic compounds than do agricultural or forested ones (Lenat and Crawford 1994, Frick et al. 1998), and at levels sufficient to significantly affect fish health (Ostrander et al. 1995). Within the Suwannee River basin, nutrient concentrations were greater in agricultural areas and nitrates were found to exceed U.S. Environmental Protection Agency (EPA) drinking water standards in 20 percent of the surficial aquifer groundwater samples (Berndt et al. 1998). Pesticide concentrations were found to exceed criteria for protection of aquatic life mostly in urban areas. Currently, there are discharges from 137 municipal waste water treatment facilities in the ACF River basin alone (Couch et al. 1996). Although effluent quality has improved with modern treatment technologies and a phosphate detergent ban, hundreds of miles of streams in the ACF and Ochlockonee basins in Alabama, Florida, and Georgia, as identified in reports prepared by the water quality agencies of these states under Section 305(b) of the Clean Water Act, do not meet water use classifications.

Since approximately 29 percent of the ACF Basin is in agriculture (Frick et al. 1998), sedimentation from agricultural sources is probably significant. According to USSCS (1993), 89 percent of the sediments entering Lake Blackshear on the Flint River are derived from agricultural sources. The lower Flint River system serves as the heart of numerous mussel species' range (including the shinyrayed pocketbook) and is a major agricultural center. This area has experienced "severe losses of topsoil and nutrient additions to local streams due to agriculture" (Neves et al. 1997), and has profoundly affected the biota of surface and ground waters there (Patrick 1992). Despite the implications, only a few studies (e.g., Cooper 1987, Stewart and Swinford 1995) have specifically attributed changes in mussel populations to sediments derived from agricultural practices.

Gravel mining activities continue to threaten the shinyrayed pocketbook subpopulation from the Uchee Creek system (Howard 1997). These activities probably played a significant role in eliminating the Gulf moccasinshell and oval pigtoe from the same creek system.

Many southern streams have increased turbidity levels due to siltation (van der Schalie 1938). The shinyrayed pocketbook attracts host fishes with visual cues, luring fish into perceiving that their glochidia are prey items. Such a reproductive strategy depends on clear water during the critical time of the year when mussels are releasing their glochidia (Hartfield and Hartfield 1996). Turbidity is a limiting factor impeding sight-feeding fishes (Burkhead and Jenkins 1991). In addition, mussels may be indirectly affected when turbidity levels significantly reduce light available for photosynthesis and the production of unionid food items (Kanehl and Lyons 1992).

Water quantity is becoming more of a concern in maintaining mussel habitat in the Apalachicolan Region. The potential impacts to mussels, their host fishes, and their respective habitats from ground water withdrawal may be profound. Within the Flint River basin, decreases in flow velocity and dissolved oxygen were highly correlated to mussel mortality (Johnson et al. 2001). Maintaining adequate water levels in streams is particularly important during the reproductive season for mussels. Drought-related responses could affect the long-term viability of mussel populations in the lower Flint River basin by decreasing the effectiveness of lures and interrupting the life cycle by hindering the process of glochidial release and attachment. For instance, superconglutinates of the shinyrayed pocketbook have been observed lying on the river bottom due to low flow rates (Johnson et al. 2001). Superconglutinates need to be suspended in current for their erratic "swimming" motions to attract the proper host fish. Rare species (e.g., shinyrayed pocketbook, oval pigtoe, and Gulf moccasinshell) were more susceptible to drought-related morality within the Flint River basin and had the highest mortality rates from hypoxic conditions (Johnson et al. 2001).

CONSERVATION MEASURES

Management considerations include protecting streams from sedimentation through application of agricultural and forestry NPDES best management practices (BMPs), avoiding soil and vegetation-disturbing activity in the riparian zone, restoring unstable stream channels and other erosive areas, and other practices that prevent or reduce erosion. Urbanization, road and bridge construction, and other large-scale alterations of land cover that substantially alter the runoff characteristics of the watershed may threaten channel stability. Management considerations to deal with the threat of channel instability include avoiding soil- and vegetation-disturbing activity in the riparian zone, limiting impervious surface area, and other urban storm water runoff control methods; protecting forests along floodplain and at least 150 ft. (ca. 50 m) of adjoining upland from timber harvest, livestock, and development; situating roads at least 0.25 mi. (0.4 km) from heads of all tributaries, and even more on steep slopes; using silt fencing and vegetation to control runoff and siltation at all stream crossings, especially during construction and maintenance; prohibiting dredging and damming of streams and rivers; avoiding introduction of non-native invertebrates, especially zebra mussel (*Dreissena polymorpha*); monitor and attempt to control Asian clam; using and maintaining sewer systems rather than septic tanks and stream dumping for management of waste water; banning use of agricultural

pesticides on porous soils near streams. Maintain fish populations (largemouth and spotted bass) that serve as mussel larval hosts.

CONSERVATION GOALS

The conservation goal is to preserve and enhance where possible habitat quality within Uchee Creek.

MANAGEMENT PRESCRIPTIONS AND ACTIONS

The most important management action is to protect Uchee Creek from disturbance, or minimize disturbance when avoidance is not feasible. This will be accomplished by:

1) Protect riparian areas and implement NPDES BMPs where needed.
2) Prohibiting timber harvest within 50 feet of Uchee Creek or within the limits of designated wetlands or riparian areas.
3) Prohibiting digging and vehicles within the high water line of Uchee Creek without coordination through Fort Benning's NEPA process.
4) Controlling invasive species where feasible, to include Asian clams.

Any management activities will be coordinated with the USFWS and the Alabama Department of Natural Resources, Nongame Endangered Wildlife Program. Any regional strategies for Shinyrayed pocketbook mussel will be developed in partnership with the USFWS.

Fort Benning initially screens any proposed action via a NEPA process, and Fort Benning's proposed actions that may impact the species or critical habitat will be reviewed for potential impacts to the shinyrayed pocketbook through that established NEPA process. Any unit that conducts a training exercise or construction activity on Fort Benning must complete a Record of Environmental Consideration (FB-144-R) detailing their proposed activity and location to initiate the NEPA process. Those activities that might affect the Uchee Creek will be carefully coordinated to avoid or minimize adverse impacts.

These management actions will have neglible impact on military training. All of the protected habitat comprises a relatively small area and is located in an area that receives little training pressure.

SURVEYS, INSPECTIONS, AND MONITORING

No surveys are currently planned for shinyrayed pocketbook mussels. There are no known occurrences of the species on the installation or any record of it within in the portion of Uchee Creek which is encompassed within the boundaries of Fort Benning.

Fort Benning will monitor the critical habitat to identify any potential effects from invasive species or other disturbances. Monitoring will be done from a boat twice a year. Personnel will float the entire creek within the boundaries of the installation looking for invasive species and other types of disturbances that are impacting to the creek. After consultation with USFWS, Fort Benning will take appropriate management actions regarding problematic invasive species. Fort Benning will use these same surveys to determine if soil erosion or other disturbance may be impacting the critical habitat.

TIME, COST and PERSONNEL

The planning and funding period for the implementation of this ESMC is 5 years, though some components of the plan extend beyond this time frame. Projected annual costs for implementation are shown in Table 2. Nothing in this Plan shall be a violation of the Antideficiency Act.

Table 2
Projected Annual Implementation Costs

FISCAL YEAR	ESTIMATED ANNUAL COST
2014	$ 1,000
2015	$ 1,000
2016	$ 1,000
2017	$ 1,000
2018	$ 1,000
5-YEAR TOTAL	$ 5,000

CHECKLIST

Schedule	Activity	Implemented Date	Signature
Jan 2014- Dec 2014	Monitor twice annually for disturbance and invasive species. Corrective actions to be taken as needed.		
September 2014	Provide report to Commander on effectiveness of ESMC		
Jan 2015- Dec 2015	Monitor twice annually for disturbance and invasive species. Corrective actions to be taken as needed.		
September 2015	Provide report to Commander on effectiveness of ESMC		
Jan 2016- Dec 2016	Monitor twice annually for disturbance and invasive species. Corrective actions to be taken as needed.		
September 2016	Provide report to Commander on effectiveness of ESMC		
Jan 2017- Dec 2017	Monitor twice annually for disturbance and invasive species. Corrective actions to be taken as needed.		
September 2017	Provide report to Commander on effectiveness of ESMC		
Jan 2018- Dec 2018	Monitor twice annually for disturbance and invasive species. Corrective actions to be taken as needed.		
September 2018	Provide report to Commander on effectiveness of ESMC		

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APPENDIX F

ADJOINING LANDS

APPENDIX F1

ARMY COMPATIBLE USE BUFFER (ACUB) Proposal 2006

Fort Benning

Prepared by

The Nature Conservancy

SAVING THE LAST GREAT PLACES ON EARTH

In partnership with

Fort Benning
Environmental Management Division (DPW)
Range Division (DOT)
Office of the Staff Judge Advocate (OSJA)

Table of Contents

1 Introduction

Fort Benning is threatened with loss of mission capability due to encroachment from surrounding lands, and limitations on full use of installation lands for training activities and infrastructure. To date, the threats and limitations have been manageable. However impending growth and development, training needs, and unrelenting stewardship responsibility combine to increase the likelihood of both external and internal encroachment, representing new challenges for Fort Benning's training mission. An Army Compatible Use Buffer (ACUB) program is a logical and timely strategy to address these challenges. This document represents a proposal to establish an ACUB around portions of Fort Benning, using a combination of no-development easements, conservation easements, and conservation-focused land acquisitions. The buffer lands will facilitate training activities and expansion of training infrastructure inside the installation, by (1) channeling incompatible growth and development away from critical portions of the installation boundary, and (2) reducing conflict between Fort Benning's training mission and its environmental stewardship responsibilities.

1.1 Training background

1.1.1 General Description of the Installation and Training Mission

- Installation History/Overview

  Fort Benning was established in 1918 and has conducted Army infantry training ever since. The installation was moved to its current location in 1919 and significantly enlarged in 1941-42 to very near its present size, though its mission has expanded considerably since then. Additions have included training for Airborne and Rangers, the Physical Fitness School, non-commissioned officer training, and various consolidations and centralization of Army training activities—all with no significant change in land area. Today Fort Benning has an active-duty military population of over 30,000 Soldiers. Including reserve units, retirees, civilian employees, and dependents, Fort Benning serves a population of over 100,000.

  Geographically, the installation presently covers some 182,000 contiguous acres in Georgia and Alabama. Approximately 170,000 acres are in Georgia (Muscogee and Chattahoochee Counties) and

approximately 12,000 acres are in Alabama (Russell County). Fort Benning is an integral part of the Columbus GA metropolitan area, which also includes Phenix City AL. The Columbus metro area had a population of just under 200,000 people in the 2000 census. Fort Benning's "main post" cantonment area is adjacent to Columbus, which spreads alongside Fort Benning's irregular northwest boundary (Figure 1).

- Fort Benning's mission is to provide the Nation with:
- the world's best infantry Soldiers and trained units;
- a power projection platform capable of deploying and
- re-deploying Soldiers and units anywhere in the world
- on short notice; and
- the Army's premier installation and home for Soldiers, families,
- civilian employees, and military retirees.

Fort Benning is the initial training area for the U.S. Army Infantry and the home of the United States Army Infantry School and Center. The primary military activities at Fort Benning include training entry-level Soldiers, providing the U.S. Army's premier facility for training the Infantry, conducting Airborne and Ranger training, home to the Noncommissioned Officer Academy and the Officer Candidate School, hosting the Western Hemisphere Institute for Security Cooperation (WHINSEC), and providing a power projection platform for rapid deployment. Fort Benning also provides training facilities for several Army Forces Command (FORSCOM) units.

- Types of units training at installation

As of 2005, Fort Benning is home to the following units and tenants that conduct training on the installation:

- 3rd Brigade, 3rd Infantry Division (Mechanized)
- 75th Ranger Regiment
- 36th Engineer Group
- 17th Air Support Operation Squadron
- 29th Infantry Regiment
- 11th Infantry Regiment
- Henry Caro Noncommissioned Officer Academy
- Infantry Training Brigade
- Basic Combat Training Brigade
- Ranger Training Brigade

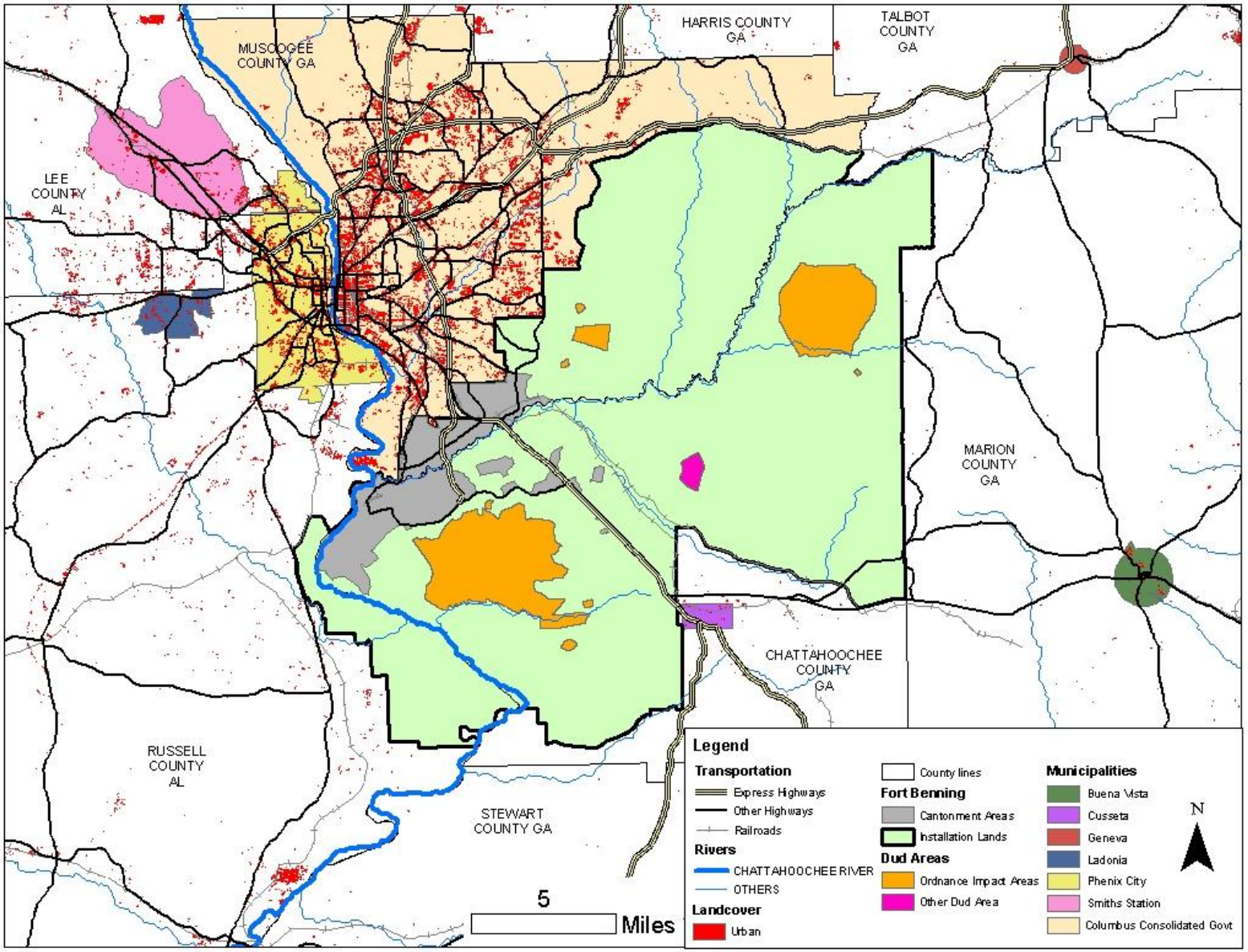

Figure 2. Fort Benning area map with selected land uses illustrated. "Urban landcover" is based on classification of 2003 Landsat imagery. The Chattahoochee River is the Georgia-Alabama state line.

Additional units include two Air Support Operations Squadrons (Air Force) to support the 3rd Brigade and the 75th Rangers, other Air Force detachments providing weather and training support, and a Marine Corps training support detachment.

Fort Benning supports the U.S. Army Training and Doctrine Command (TRADOC) mission to conduct:

- • initial entry training for Infantry Soldiers and officers;
- • basic and advanced level noncommissioned officer and officer
- training courses;
- • the Army's Airborne and Ranger schools; and
- • continued study, testing, and development of future Infantry
- doctrine, weapon systems, tactics, techniques, and procedures.

Infantry training courses include the 14-week One Station Unit Training (OSUT) course, and the 8-week Basic Combat Training course.

In addition, Fort Benning provides regional access for Reserve Component training requirements (National Guard and US Army Reserve). These units utilize ranges for weapons training, as well as land navigation sites and training areas for field unit exercises. ROTC units use Fort Benning for fall and spring field training exercises.

From the other branches of service, a total of about 900 Marines, Airmen and Shipmen attend courses at Fort Benning every year. Personnel from all services may take Airborne, pathfinder, jumpmaster, and sniper courses. Marine and Navy personnel may take Ranger training. Marines take the Captains Career Course, Reconnaissance and Surveillance Leader Course, Infantry Mortar Leader's Course, and Anti-armor Leaders Course.

- Major annual training exercises

  Major training exercises for units residing at Fort Benning have recently been closely associated with deployments, rather than following a strict annual schedule. These have included the 3rd Infantry's "Hammer Focus" on Fort Benning, in advance of their rotation at the National Training Center, and post-deployment "re-set" training on return from deployment.

- Training days/number of Soldiers training: Operational Tempo (OPTEMPO)

Fort Benning's training load has spiked dramatically in recent years. Figure 2 illustrates the trend in total training events (days that a particular training facility is utilized) across Fort Benning by year.

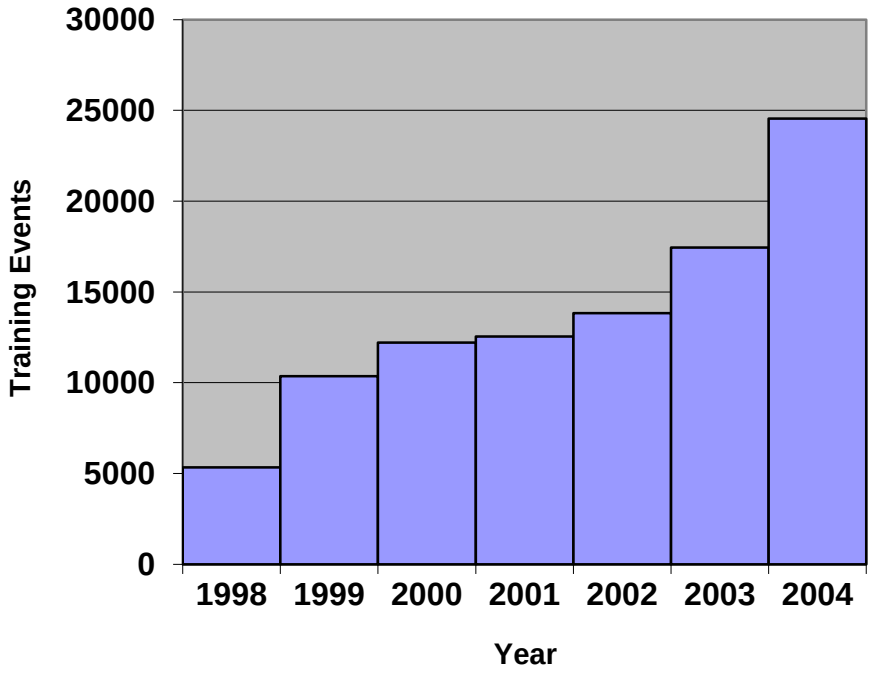

Figure 3. Training Events at Fort Benning, 1998-2004. Source: Fort Benning DOT.

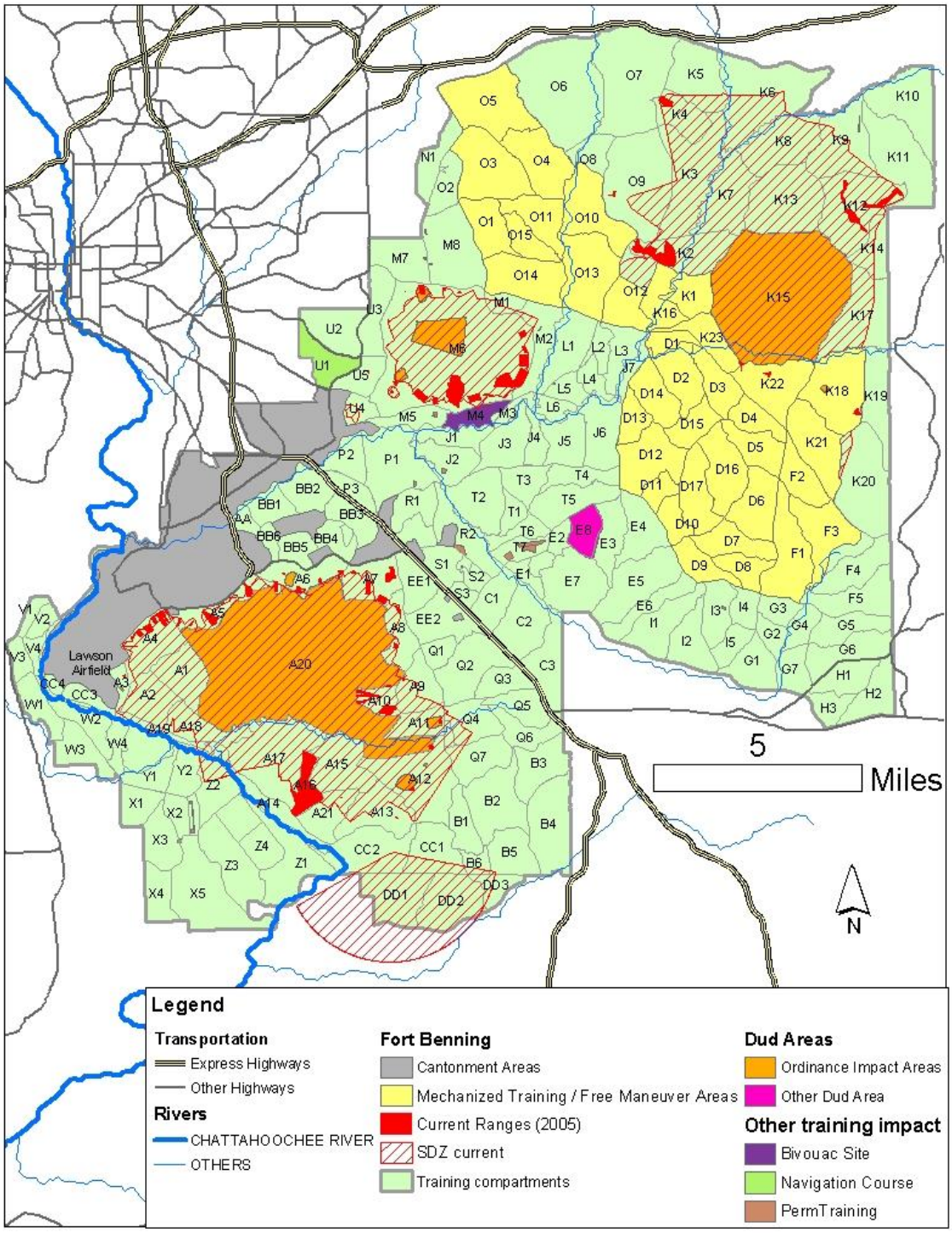

Figure 4. Installation map illustrating Fort Benning's current (2005) training environment. Surface Danger Zones (SDZs) presume level ground with no back barriers; rounds associated with SDZ extending off-post to the south are actually limited from escaping installation by topography.

1.1.2 General Description of the Training Infrastructure

Fort Benning presently has:

- 59 live-fire ranges
- 42 named or numbered tracked vehicle maneuver training areas
- Lawson Army Airfield, capable of supporting all military and civilian aircraft types
- 31 surveyed field artillery and mortar firing points
- 4 Air Force surveyed airborne drop zones
- Numerous specialized non-live-fire training assets
- 9 ordnance impact (dud) areas covering about 16,000 acres.
- Over 50,000 acres of Surface Danger Zone (as mapped assuming level ground with no back barriers).

Fort Benning's mission lands are subdivided into military training compartments (Figure 3). Compartments are designated alphanumerically, e.g. compartment A20 or Alpha 20 is one of 20 contiguous compartments in the southwestern part of the installation, all with prefix "A." Compartment designation facilitates the scheduling of access for both military and land management use in a safe and orderly manner. Compartment designation also can be used to roughly assign the types of training that are authorized within any particular compartment.

While there are nine designated dud areas, the most significant are the impact areas in compartments Alpha 20 (in the southwest) and Kilo 15 (northeast), together comprising approximately 15,000 acres. A number of firing ranges are associated with each of these two impact areas, including Hastings Range which supports large caliber weaponry near the northeastern installation boundary.

The Malone complex is a circle of small-arms ranges encircling the Mike 6 training compartment. Between the Malone complex and the Kilo ranges is a noncontiguous mechanized training area, primarily in the Oscar and Delta training compartments.

Major new projects under construction or planned for Fort Benning as of 2005 include:

- Digital Multi-Purpose Range Complex (DMPRC). A state-of-the-art range facility for advanced gunnery exercises in a realistic training environment, in support of training for the Bradley Fighting Vehicle, the Abrams M1A1 Tank, and future systems such as the Stryker. The DMPRC will cover approximately 1800 acres (1500 acres of cleared forest), with a firing range made up of three lanes approximately 250 meters wide and utilizing the existing Kilo 15 impact area. The DMPRC will contain approximately 35 stationary infantry targets, 11 evasive moving armor targets, 55

stationary armor targets, two defense trenches with two-man foxholes, and 19 defilade positions (Tank and Bradley hiding places).

- Infantry Squad Battle Course (ISBC). Now under construction, the ISBC represents conversion of Galloway Range, utilizing the existing Alpha 20 impact area. The ISBC includes removal/replacement and upgrade of existing targetry, construction of associated support facilities, demolition of currently existing temporary buildings on site, and associated utility placement. Approximate size of the overall project area is 180 to 190 acres.

- Infantry Platoon Battle Course (IPBC). Planned for 2006 in Alpha compartments 12, 13, and 15, the IPBC will include construction of a range and target firing area, placement of targetry, construction/emplacement of support facilities, access roads and trails, and associated utilities. Approximate size of the overall project area is 1,000 acres.

Figure 4 illustrates these and other new infrastructure likely at Fort Benning in coming years. Proposed additions have included at least one new brigade to be stationed at Fort Benning, and/or a major new training school. More specific information on these pending additions will be available in 2006.[22]

[22] The Base Realignment and Closure recommendations published in June 2005 included the movement of the Army's Armor School from Fort Knox to Fort Benning. This addition to Fort Benning's mission was approved by an independent commission in August 2005, but has not been approved by Congress at this writing. Details on the impact of this prospective change to Fort Benning's mission are still speculative and are not included in this ACUB Proposal. However, the prospect of increased personnel and expanded training at Fort Benning has existed for some time, as an expectation for a new brigade and unspecified support of "Army transformation." These long-standing expectations are an important part of the rationale for this ACUB Proposal.

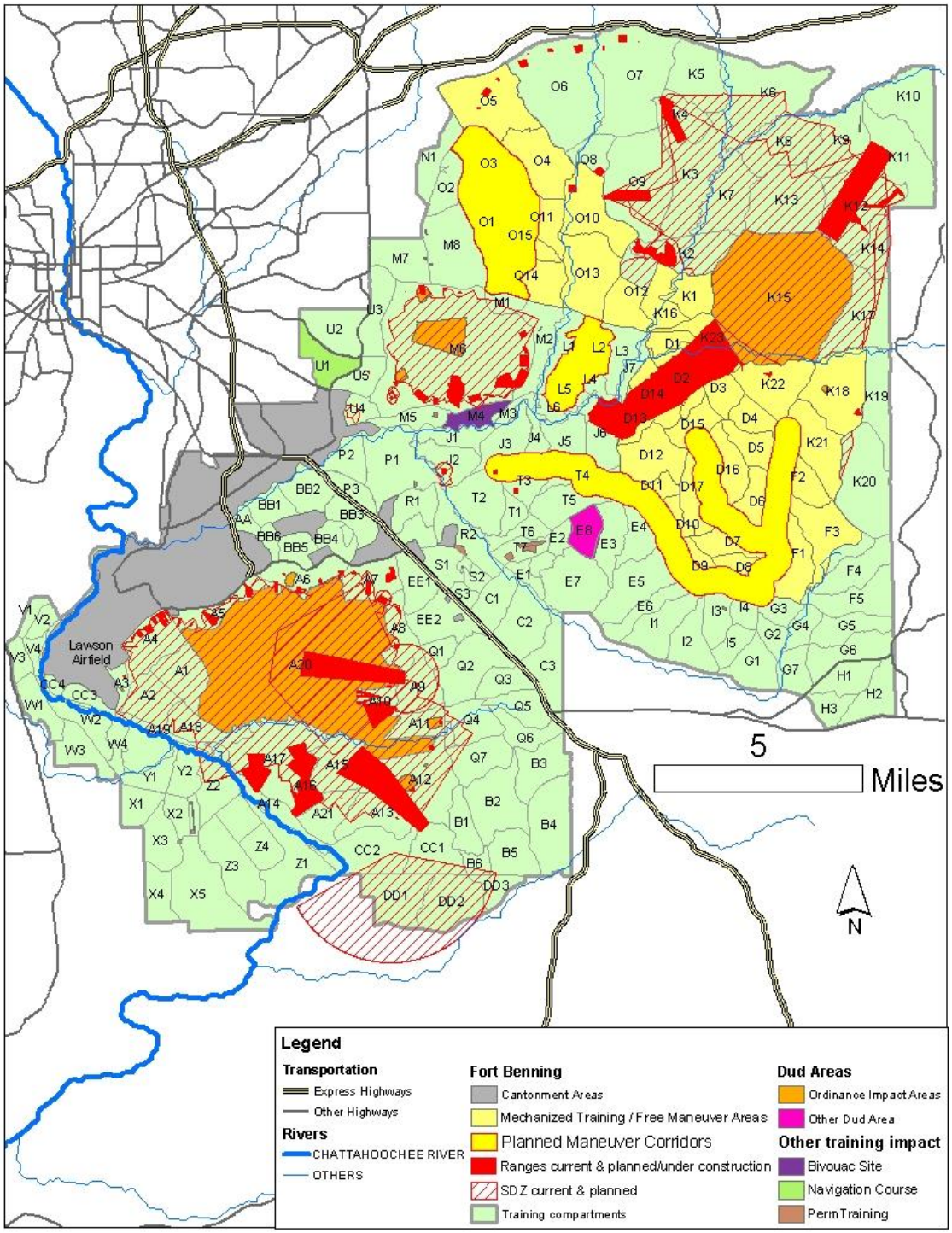

Figure 5. Ranges planned or under construction on Fort Benning, and other implications for training impact, 2005-2012. Additional range and maneuver corridor area (compared to Figure 3) encompasses approximately 17,000 acres. The range shown in compartments D2, D13, D14 is the DMPRC, already under construction. Most other future range plans are "best guess" as of October 2005. Intensified use of cantonment areas (including construction in abandoned/re-forested parts of cantonment areas) are not shown.

1.2 Ecological background

The lands now occupied by Fort Benning are predominantly Fall Line hills dissected by both tributaries and the main channel of the Chattahoochee River. The Fall Line is an ancient shoreline representing the inner-most reach of the Atlantic Ocean over geologic history (Figure 5). Lands above the Fall Line are generally considered "piedmont" and those below "coastal plain." Hence Fort Benning has an unusual variety of geology, topography, and ecology.

Figure 6. Approximate location of the Fall Line across the northern part of Fort Benning.

Historically, most of this land has been farmed and timbered and inhabited in some way dating back to pre-European settlements. Nevertheless, its use as a military training resource over much of the twentieth century resulted in a heavily-forested and frequently-burned landscape, a combination that represents two major ingredients (forest structure and fire) of an ecosystem once common across much of the Southeast. Longleaf pine was a major component of that ecosystem, which has been diminished by fire suppression, conversion to other species, clearing for non-forest land uses, and fragmentation.

As a consequence of Fort Benning's land use history as a "refuge" for forest structure and frequent fire, the installation today harbors several species of conservation significance. Most notable of these is the federally endangered red-cockaded woodpecker (*Picoides borealis*), or RCW. The RCWs on Fort Benning are designated a recovery

population by the U.S. Fish and Wildlife Service (USFWS) and must be managed by promoting longleaf pine habitat via frequent prescribed fire and regulation of pine diameter distributions. The RCW, one of five species occurring on Fort Benning that are federally listed as endangered or threatened, limits land-use options to a greater extent than any other protected species. The other federally-listed species are relict trillium, bald eagle, wood stork, and American alligator (see Section 2.1.1).

The gopher tortoise (*Gopherus polyphemus*), listed by the state of Georgia as a threatened species, also exists on Fort Benning, as do several other species of plant and animal recognized as rare, or listed by state or federal status as requiring special management. While the Endangered Species Act does not impose any restrictions on habitat or species management for species not listed as federally endangered or threatened, Army installations are required to take them into consideration in planning, and to avoid actions that will result in their listing (Department of the Army 1995). The gopher tortoise and several other species of conservation concern also occur in the immediate vicinity of Fort Benning (Table 1).

Fort Benning's size, its status as a relatively intact biological island in a sea of altered landscapes, and its position at the intersection of geological and ecological units all enhance its conservation value. In addition to the rare species mentioned above, Fort Benning may encompass up to 10 ecological associations that are listed as rare or uncommon (G3), three associations that are globally imperiled (G2), and one, the switch-cane shrubland, that is globally critically imperiled (G1). The Longleaf Pine Woodland Alliance occurs on Fort Benning and is a major target for restoration by the installation's Conservation and Land Management staff.

Fort Benning's current land use, as well as its position in the path of increasing urbanization and other intensive land use patterns, ensure that its significance for conservation of diverse natural ecosystems will grow with time.

Table 1. Species of conservation concern[23] outside of Fort Benning and within 10 miles of the installation boundary, with conservation ranks[24] and listing status[25]. Data from Alabama and Georgia Natural Heritage Programs and from NatureServe. Species marked with an asterisk are known to occur on Fort Benning as well as outside the installation.

Kingdom	Phylum/ Division	Class	Scientific Name	Common Name	State rank, AL	State rank, GA	Global rank	Fed. (ESA) status	GA listing status
Animalia	Craniata	Amphibia	*Rana capito**	Gopher Frog	S2	S2S3	G3		
Animalia	Craniata	Amphibia	*Necturus beyeri* complex	Gulf Coast Waterdog	SU	S3	G4		
Animalia	Craniata	Cephalaspidomorphi	*Ichthyomyzon gagei*	Southern Brook Lamprey	S5	S3	G5		
Animalia	Craniata	Osteichthyes	*Cyprinella callitaenia**	Bluestripe Shiner	S1S2	S2	G2G3		T
Animalia	Craniata	Osteichthyes	*Pteronotropis euryzonus**	Broadstripe Shiner	S2	S1	G3		R
Animalia	Craniata	Osteichthyes	*Etheostoma parvipinne**	Goldstripe Darter	S4	S2	G4G5		R
Animalia	Craniata	Reptilia	*Macrochelys temminckii**	Alligator Snapping Turtle	S3	S3	G3G4		T
Animalia	Craniata	Reptilia	*Eumeces anthracinus*	Coal Skink	S3	S2	G5		
Animalia	Craniata	Reptilia	*Heterodon simus**	Southern Hognose Snake	SH	S2	G2		
Animalia	Mollusca	Bivalvia	*Strophitus subvexus*	Southern Creekmussel	S2	S2	G3		
Animalia	Mollusca	Bivalvia	*Lampsilis subangulata*	Shinyrayed Pocketbook	S1	S2	G2	LE	E
Animalia	Mollusca	Bivalvia	*Quincuncina infucata*	Sculptured Pigtoe	S2	S3	G4		
Animalia	Mollusca	Bivalvia	*Medionidus penicillatus*	Gulf Moccasinshell	S1S2	S2	G1	LE	E
Animalia	Mollusca	Bivalvia	*Elliptio purpurella*	Inflated Spike		S2	G3		
Plantae	Anthophyta	Dicotyledoneae	*Arabis georgiana**	Georgia Rockcress	S1	S1	G1	C	T
Plantae	Anthophyta	Dicotyledoneae	*Parietaria pensylvanica*	Hammerwort	SR	S1?	G5		
Plantae	Anthophyta	Dicotyledoneae	*Rhododendron prunifolium*	Plumleaf Azalea	S2S3	S3	G3		T
Plantae	Anthophyta	Dicotyledoneae	*Quercus arkansana**	Arkansas Oak	S2	S2S3	G3		
Plantae	Anthophyta	Dicotyledoneae	*Pityopsis pinifolia*	Sandhill Golden-aster	S1	S2	G4		T

[23] Gopher tortoise (*Gopherus polyphemus*) is known to inhabit this area and definitely occurs on Fort Benning, but no Element Occurrence Records outside Fort Benning are in the databases we received from either Heritage program.

[24] State (S) and Global (G) Heritage program ranks refer to the species' degree of imperilment at the state or global level; 1=critically imperiled, 2=imperiled, 3=vulnerable, 4=apparently secure, 5=secure, H=historic, R=ruderal (weedy), ?=preliminary assessement, Q=questionable. Intermediate rankings are indicated by combining adjacent ranks, e.g. S1S2 indicates a species whose state status is somewhere between imperiled and critically-imperiled. T-rankings apply to a "trinomial" or sub-species taxon

[25] Federal: LE= listed endangered, LT=listed threatened, C=candidate for listing,. GA: E=endangered, T=threatened, R=rare.

Kingdom	Phylum/ Division	Class	Scientific Name	Common Name	State rank, AL	State rank, GA	Global rank	Fed. (ESA) status	GA listing status
Plantae	Anthophyta	Dicotyledoneae	*Myriophyllum laxum**	Lax Water-milfoil	S2	S2	G3		T
Plantae	Anthophyta	Dicotyledoneae	*Helenium brevifolium**	Bog Sneezeweed	S1	S1	G3G4		
Plantae	Anthophyta	Dicotyledoneae	*Stylisma pickeringii var. pickeringii**	Pickering's Morning-glory	S1	S2	G4T2T 3		T
Plantae	Anthophyta	Dicotyledoneae	*Nestronia umbellula**	Indian Olive	S2	S2	G4		T
Plantae	Anthophyta	Dicotyledoneae	*Sarracenia rubra**	Sweet Pitcherplant	S?	S2	G3		E
Plantae	Anthophyta	Dicotyledoneae	*Macbridea caroliniana*	Carolina Bogmint	SR	S1?	G2G3		
Plantae	Anthophyta	Dicotyledoneae	*Silene polypetala*	Fringed Campion		S2	G2	LE	E
Plantae	Anthophyta	Dicotyledoneae	*Amphianthus pusillus*	Pool Sprite, Snorkelwort	S1	S2	G2	LT	T
Plantae	Anthophyta	Dicotyledoneae	*Sedum pusillum*	Granite Stonecrop	SR	S3	G3		T
Plantae	Anthophyta	Dicotyledoneae	*Rudbeckia heliopsidis*	Little River Black-eyed Susan	S2	S1	G2		
Plantae	Anthophyta	Monocotyledoneae	*Carex impressinervia*	Impressed-nerved Sedge	S1		G1G2		
Plantae	Anthophyta	Monocotyledoneae	*Scirpus etuberculatus*	Canby bulrush	SR	S1S2	G3G4		
Plantae	Anthophyta	Monocotyledoneae	*Xyris scabrifolia* (*X. chapmanii*--syn)	Chapman Yellow-eyed Grass	S1S2	S1	G3		
Plantae	Anthophyta	Monocotyledoneae	*Croomia pauciflora**	Croomia	S2	S1	G3		T
Plantae	Anthophyta	Monocotyledoneae	*Trillium reliquum**	Relict Trillium	S2	S2	G2	LE	E
Plantae	Anthophyta	Monocotyledoneae	*Hymenocallis coronaria*	Shoals Spiderlily		S2	G2Q		E
Plantae	Coniferophyta	Pinopsida	*Chamaecyparis thyoides*	Atlantic White-cedar	S3	S2	G4		R

2 Description of the purpose and need for Action

Residential and commercial development associated with Columbus GA, Phenix City AL, and surrounding communities is encroaching on Fort Benning (Figure 6). At the same time, the installation's training lands are faced with land use objectives that sometimes compete, e.g.

- increasing military use
- management and recovery of endangered species
- management of wildlife habitat, and protection of at-risk species
- conservation of wetlands and water resources
- wetlands mitigation
- soil stabilization
- cultural resource protection
- surface danger zones
- dud areas and unexploded ordinance.

The simultaneous trends of community growth and development outside the installation, growth of Fort Benning's training mission, and sustained or increasing environmental stewardship responsibilities combine to create the need for an ACUB.

The existence and magnitude of these three trends are supported by the following evidence:

- North Columbus, Harris County, and Lee County (parts of the Columbus metro area *away* from Fort Benning) have recently been growing at population at rates exceeding 10% (1990-2000), prompting city leaders and economic interests to look for growth opportunities to the south, including providing sewer and water along road or highway corridors north, west, and east of Fort Benning. Recent efforts in this regard have been in part to support growth associated with Fort Benning itself as its mission expands and becomes even more critical to U.S. defense needs. At the same time, large forest landowners MeadWestvaco, Weyerheauser Company, and Ingram & LeGrand have together sold well over 50,000 acres within a 30-mile radius of

Fort Benning in the last two years. Much of this land has been acquired as large packages to be resold in a speculative real estate market, making non-forest land use likely. In addition, highway projects are in progress or on the books which threaten to channel development along corridors quite close to Fort Benning; these include improvements to AL-165 and US-431 in Alabama, U.S.80 and GA-96 in Georgia (the Fall Line Freeway), and the proposed Interstate 14 through Cusseta GA which would bisect Fort Benning itself to link up with Interstate 185 and the Fall Line Freeway. Legislation authorizing a study committee for Interstate 14 was signed into law in 2004.

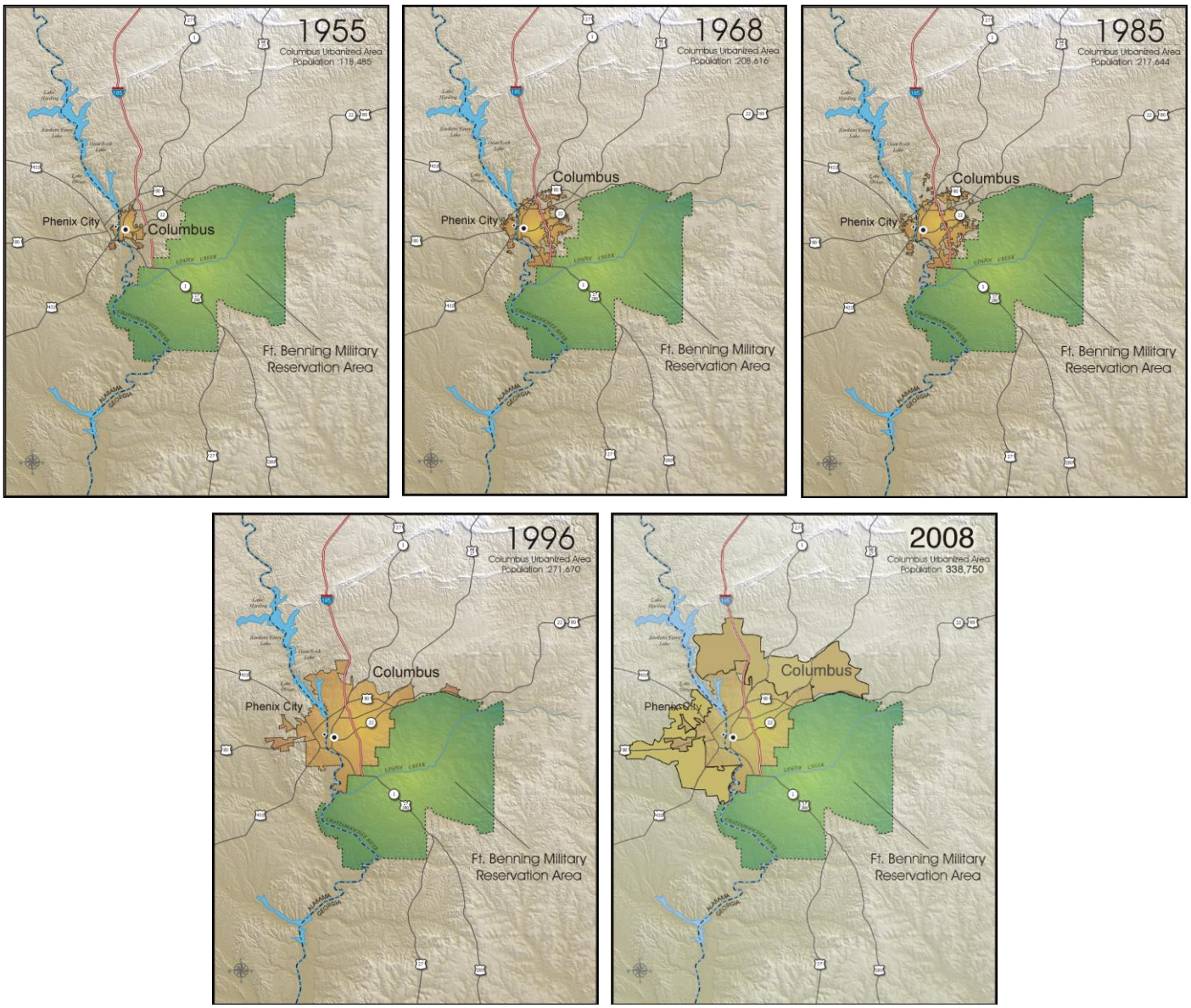

Figure 7. Historical growth pattern of Columbus GA metro area, including projection to 2008. Source: CERL

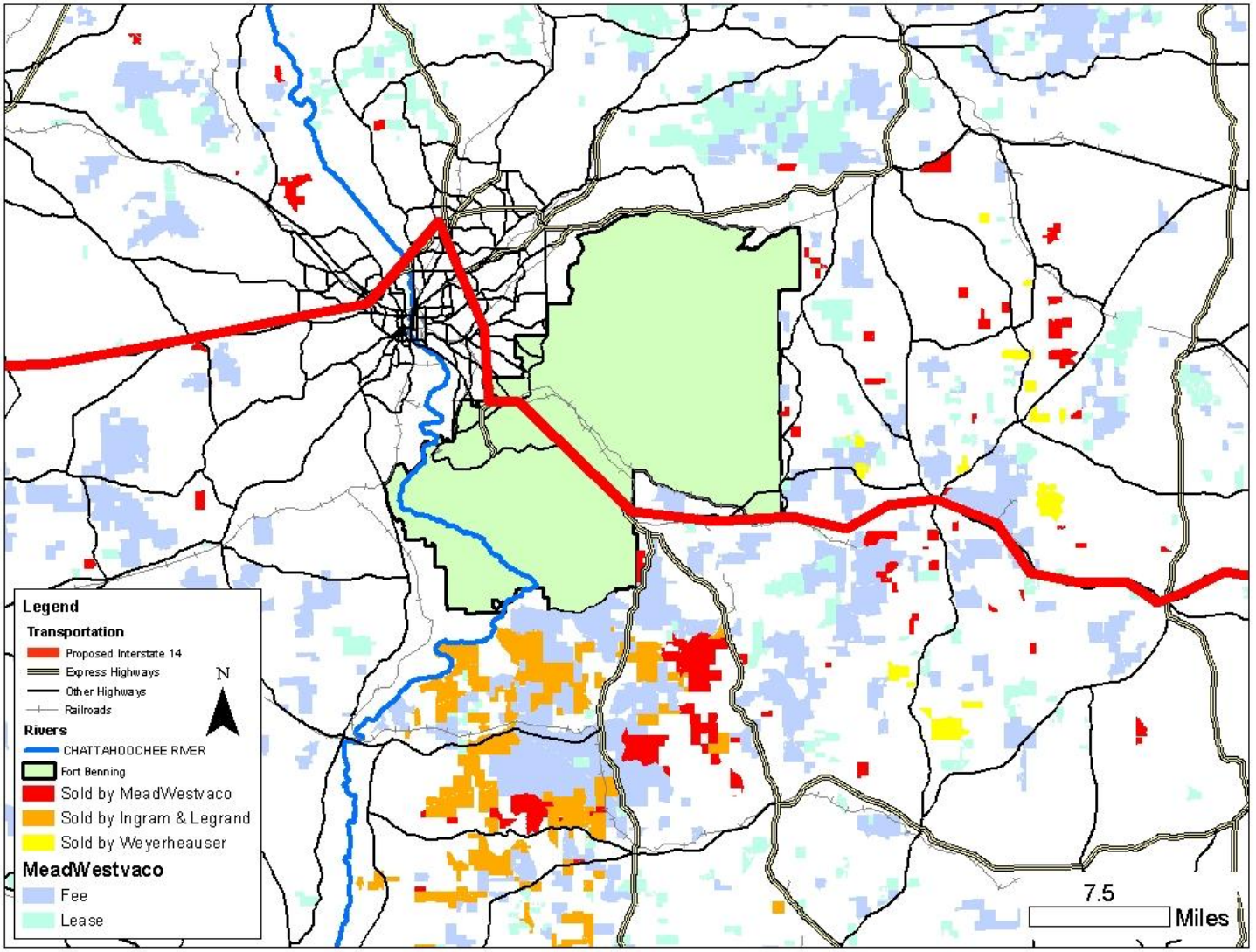

Figure 8. Emerging land use threats to Fort Benning: Recent (2004-05) sales of commercial forest land and proposed new Interstate 14. Other suggested locations for Interstate 14 include routes just north and just south of Fort Benning.

Additional evidence for urban/suburban growth, changing land use, and its effect on both habitat and installation training has been described by Dale (2003) and Westerveldt (2004).

- Pressure to increase Fort Benning's training mission, both more trainees and an expanded mission, has been present for some time now. New ranges and other infrastructure necessary to accommodate Army Transformation are on the drawing boards. Significant increases in personnel will place new demands on cantonment areas and public works. Intensity of training-area use will increase (higher optempto). Access to training areas for land management and maintenance will be hindered due to increased optempo. Traffic of all kinds, military use of forest lands, conversion of forest land to non-forest infrastructure, and weapons noise can all be expected to increase. New firing range infrastructure (the DMPRC) is already impacting traditional traffic corridors.

- Meanwhile, Fort Benning continues to be responsible for its regional red-cockaded woodpecker recovery goal, other endangered species management, land management via prescribed burning, timber harvesting, erosion control, water quality and wetland protection, and prevention of at-risk species from being federally listed. The risk of more species becoming endangered, more difficult recovery goals, and more difficult water resource protection is significantly increased by regional development and land-use trends.

2.1 Current Training Restrictions

2.1.1 Natural Resources

2.1.1.1 Red-cockaded Woodpecker (RCW).

Background. Red-cockaded Woodpeckers (*Picoides borealis*) are listed endangered under the Endangered Species Act. Fort Benning has been designated one of 13 recovery populations for this species by the USFWS and currently supports a viable, well-managed population of this species. A 2002 Biological Opinion by the USFWS found that current management practices would not jeopardize continued existence of the population (USFWS 2002). This opinion superseded an earlier (1994) opinion in which found Fort Benning's population in jeopardy. In addition, a 2004 Biological Opinion by the USFWS found that construction of the DMPRC, with appropriate siting, design, and offset measures, would not jeopardize the population either (USFWS 2004).

Habitat requirements of RCWs include pines in 70-80 year age class or older for cavity (nesting) trees, and well managed, open stands of pine timber in the 30+ year age class for foraging habitat. Frequent fire is necessary to maintain stand conditions conducive to the survival of this species (USFWS, 2003). There are 280 active RCW clusters at Fort Benning (Figure 8), of which 230 contain a potential breeding group. The installation's regional recovery goal is 451 clusters (the number of clusters required to reliably achieve the more specific target of 351 potential breeding groups).

Threats to the RCW on Fort Benning include expanding training infrastructure, very limited habitat outside the boundary, potential regulatory limits on prescribed burning, and forest decline. This latter threat is a result of the species composition of most of Fort Benning's upland pine forest. Loblolly pine (*Pinus taeda*) and to a lesser extent shortleaf pine (*Pinus echinata*) dominate the forest overstory except for those areas that have experienced frequent and regular fire (e.g. interior and perimeter of impact areas encircled by firing ranges). Fire-prone areas are more likely to be dominated by longleaf pine (*Pinus palustris*). While the current forest management strategy on Fort Benning is designed to promote and sustain the longer-lived and more fire-adapted longleaf, RCWs by necessity make their nest cavities in loblolly pine wherever trees of that species and appropriate age and size dominate the forest. A complex of factors probably including loblolly's shorter lifespan, soil and site factors, site disturbance, drought, insects, and disease combine to make the loblolly-dominated forest much less secure as long-term nesting habitat. Areas of obvious low vigor, decline, and overstory mortality are evident in Fort Benning's loblolly pine forest. Recent findings suggest a root pathogen (*Leptographium*) plays a dominant role in forest decline (Lori Eckhardt, LSU, unpublished research). Research to better describe the decline pathology and its rate of occurrence is ongoing; the potential impact on the RCW population, and impact on longleaf pine as well as other tree species, is still unknown.

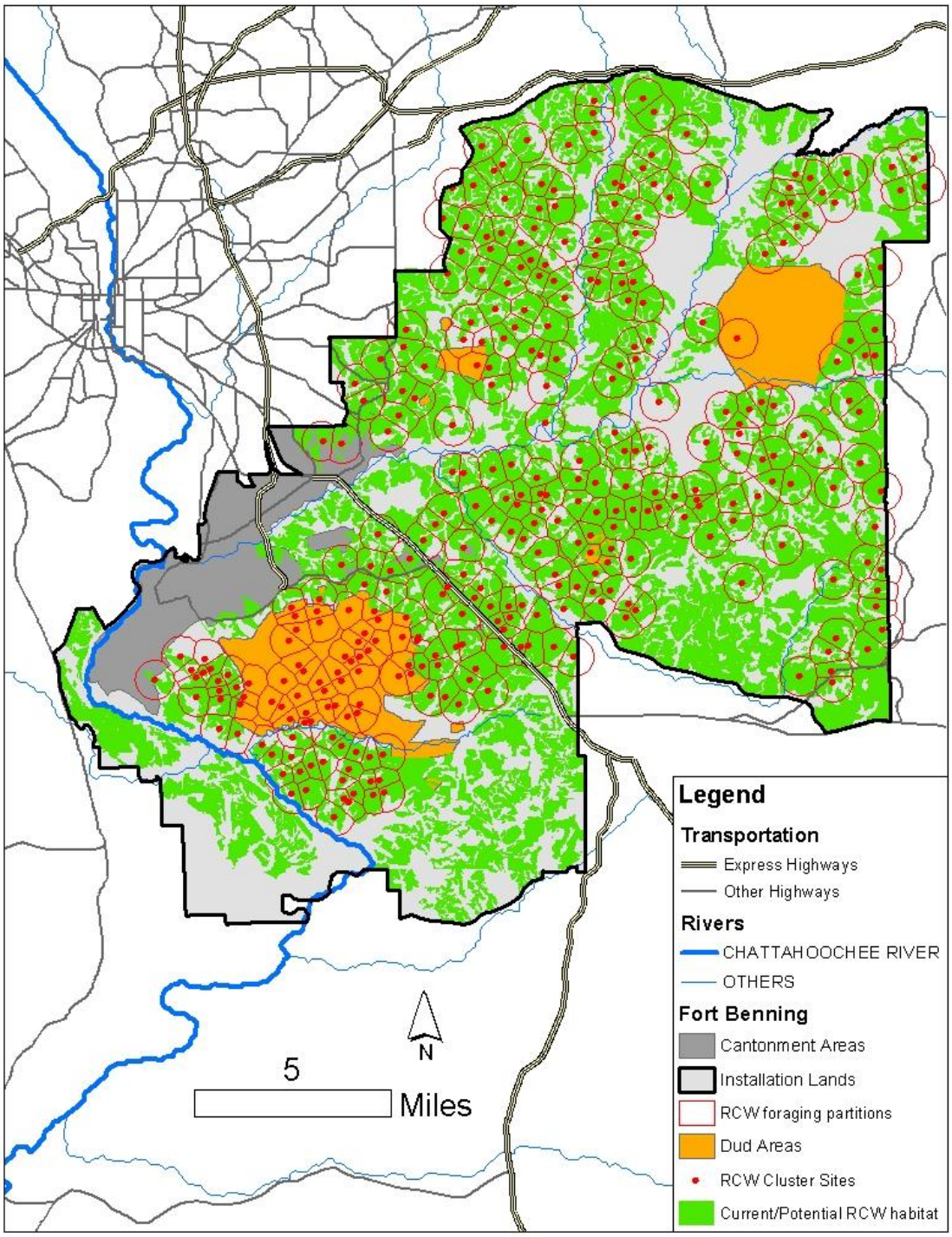

Figure 9. RCW clusters, partitions, and potential habitat. Red polygons represent partitions (nominally 500-acre circles) within which 120 acres of foraging habitat must be maintained. Partitions falling in dud areas are usually unmanaged (sometimes not mapped).

Current Training Impact. The installation recovery goal severely limits the extent of any new infrastructure requiring substantial land clearing, projectile use, or exclusion/reduction of prescribed fire. Excluding existing cantonment areas, wetlands, and unmanageable surface danger zones, the available upland areas on Fort Benning is about 100,000 acres. Providing habitat for 451 RCW clusters will require some 90,000 acres of managed forest. As new infrastructure is created, at some point the clearing of current RCW habitat (e.g. construction of the DMPRC now in-progress) must presuppose replacement of that habitat elsewhere to achieve the recovery goal.[26] The DMPRC project required offsetting lost clusters by arranging to bring some previously inaccessible clusters within the Alpha 20 impact area under management.

Because of historic fire frequency associated with firing ranges, many of the best examples of longleaf pine habitat and RCWs exist around the perimeters (and inside) impact areas. Perimeters of impact areas are often also favored for new range construction. Apart from limitations on new infrastructure, RCWs present the following restrictions on military training (Department of the Army, 1996). A more detailed list of prohibited training activities within RCW cluster buffer zones (200 feet from cavity trees) appears in Table 2.

- Within impact areas, to the degree practicable, known RCW clusters and surrounding foraging areas are designated as "no fire areas" to protect clusters from projectile damage.

- In direct fire areas, range layout is modified or shielded by various means to protect foraging and nesting habitat from significant risk of projectile damage.

- Military training within marked cavity tree buffer zones (200 ft of cavity tree) is limited to military activities of a transient nature (less than 2 hours occupation).

- Military vehicles are prohibited from occupying a position or traversing within 50 feet of a marked cavity tree, unless on an existing road, trail, or firebreak.

- Military personnel are prohibited from cutting down or intentionally destroying pine trees unless the activity is approved previously by the

[26] The amount of potential RCW habitat that can be considered "surplus" is shrinking rapidly. In fact the extent to which any "surplus" exists is debatable and is the subject of ongoing analysis by Fort Benning staff, USFWS, and TNC. Uncertainties include: acreage of restorable longleaf pine habitat, potential management of habitat in surface danger zones, quantitative impact of forest decline on RCW habitat, minimum size of RCW foraging circles for planning purposes, and ultimate RCW recovery goal in face of all these variables.

installation biologist and/or forester and is authorized for tree removal. Hardwoods may be cut and used for camouflage or other military purposes.

- All digging for military training activities in suitable acreage will be filled within a reasonable time after the completion of training.

2.1.1.2 Gopher Tortoise.

Background. Fort Benning is home to between two and three thousand gopher tortoises (*Gopherus polyphemus*), a burrowing reptile which is listed as a threatened species in Georgia. It is one of only three land tortoises left in North America, and the only one east of the Mississippi River. The same species is federally-listed as threatened in the western part of its range (west of the Tombigbee River in Alabama). The exact number of gopher tortoises on the installation is unknown, but a USFWS inventory of tortoise burrows in 1995-96 found over 8000 burrows across the installation (not including unsurveyed impact areas, Figure 9). A reasonable estimate for number of tortoises is one-third of the number of burrows.[27]

Gopher tortoises are found on deep sands where sufficient ground vegetation exists to support their food requirements. Historically, they inhabited the longleaf pine woodlands thought to have covered the uplands of the Fall Line Sandhills. As a state-listed species, Fort Benning is required to take the species into consideration in planning, and to avoid actions that will result in its federal listing (Department of the Army 1995).

The gopher tortoise is a keystone species for xeric-sand-hill ecosystems; over 300 species of amphibians, reptiles, insects, and mammals use tortoise burrows for hiding, nesting, or overwintering. One of these is the gopher frog (*Rana capito*), designated by Georgia as a Species of Conservation Concern due primarily to habitat loss. This species, which depends on a close association of sand hills and seasonally-flooded ponds, exists in the northeastern corner of Fort Benning (vicinity of Hastings Range), and in isolated parts of the Fall Line sand hills to the northeast. In 2001, a disjunct gopher frog population in Mississippi (the Mississippi gopher frog, *Rana capito sevosa*) was judged to be taxonomically distinct and was federally-listed as endangered west of Alabama's Tombigbee River.

[27] Craig Guyer, Auburn University; Mark Thornton, Fort Benning Conservation Branch; personal communications. Also Paula Kahn, Auburn University, unpublished data.

Table 2. Prohibited training activities within marked RCW cavity tree buffer zones (200 ft from cavity tree) in training areas. Not applicable to cavity trees located in dedicated impact areas. Source: Endangered Species Management Plan for the RCW.

MANEUVER AND BIVOUAC

- **HASTY DEFENSE, LIGHT INFANTRY, HAND DIGGING, MORE THAN 2 HOURS**
- **HASTY DEFENSE, MECHANIZED INFANTRY/ARMOR**
- **DELIBERATE DEFENSE, LIGHT INFANTRY**
- **DELIBERATE DEFENSE, MECHANIZED INFANTRY/ARMOR**
- **ESTABLISH COMMAND POST, LIGHT INFANTRY**
- **ESTABLISH COMMAND POST, MECHANIZED INFANTRY/ARMOR**
- **ASSEMBLY AREA OPERATIONS, LIGHT INFANTRY/MECH INFANTRY/ARMOR**
- **ESTABLISH CS/CSS SITES**
- **ESTABLISH SIGNAL SITES**
- **OFF-TRAIL WHEELED VEHICLE TRANSIT WITHIN 50 FT OF CAVITY TREE**
- **OFF-TRAIL ARMORED VEHICLE TRANSIT WITHIN 50 FT OF CAVITY TREE**
- **ESTABLISH CAMOUFLAGE NETTING**
- **VEHICLE MAINTENANCE FOR MORE THAN 2 HOURS**

WEAPONS FIRING

- **ARTILLERY FIRING POINT/POSITION**
- **MLRS FIRING POSITION**
- **ALL OTHER WEAPONS (EXCEPT BLANKS FIRING 7.62mm AND BELOW AND .50 CAL BLANKS).**

NOISE

- **GENERATORS**

PYROTECHNICS/SMOKE

- **CS/RIOT AGENTS**
- **SMOKE GENERATORS OR POTS SET UP WITHIN 200 FT OF CAVITY TREE**
- **INCENDIARY DEVICES (INCLUDING TRIP FLARES)**
- **HC SMOKE OF ANY TYPE**

DIGGING

- **TANK DITCHES**
- **DELIBERATE INDIVIDUAL FIGHTING POSITIONS**
- **ANY FIGHTING-POSITION DIGGING NOT FILLED AFTER USE**
- **CREW-SERVED WEAPONS FIGHTING POSITIONS**
- **VEHICLE FIGHTING POSITIONS**
- **OTHER SURVIVABILITY / FORCE PROTECTION POSITIONS**
- VEHICLE SURVIVABILITY POSITIONS

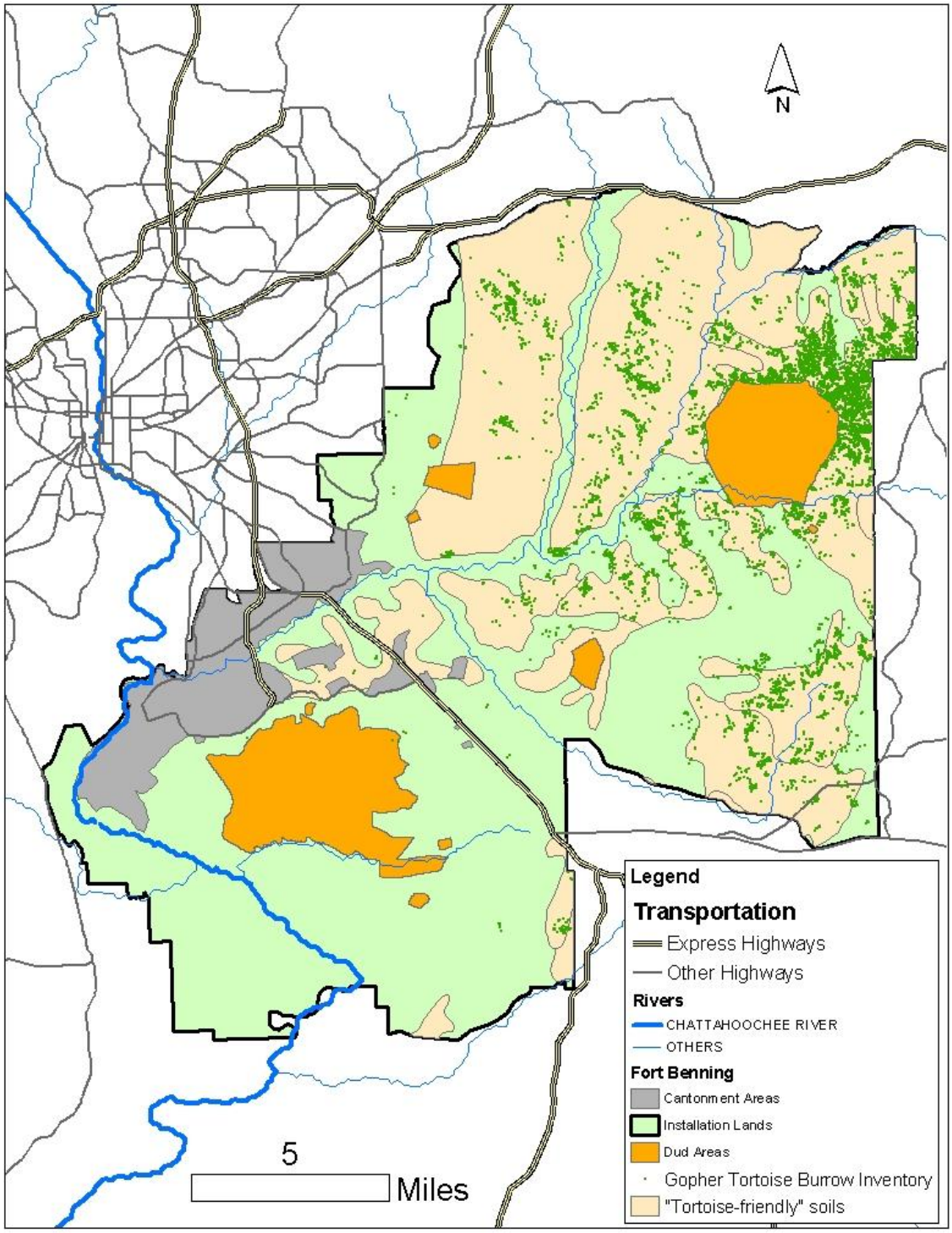

Figure 10. Gopher Tortoise habitat (soil) and burrows inventoried by US Fish and Wildlife, 1995-96. Dud areas not surveyed. "Tortoise-friendly soils" tend to be deep sands with little slope. Additional habitat needs include herbaceous vegetation and open canopies.

Current Training Impact. Areas of high gopher tortoise density on Fort Benning in the vicinity of tracked-vehicle areas are marked with "Sensitive Area" signs and closed to digging and vehicular traffic. These activities are prohibited within 50 feet of any tortoise burrow, whether the burrow is marked or unmarked.

The sandy ridges which gopher tortoises favor are also the sites on Fort Benning physically best suited for mechanized training, which has been shown to have negative effects on gopher tortoises. Populations in areas where training impacts are high have fewer juveniles and increased home range sizes. Training activities disproportionately affect female tortoises, suggesting that extirpation is possible under these conditions (Guyer et al. 1996). Large portions of Fort Benning's sandy ridges have long been heavily disturbed, and have sparse or isolated tortoise populations (if any). They are likely to remain so for the foreseeable future, due to training requirements for mechanized units. As long as the species is not federally listed, current training is not likely to be further affected. However, planning for any new training infrastructure or newly-designated mechanized training areas, would need to consider the risk that the gopher tortoise might become federally listed.

2.1.1.3 Rare Plant Populations.

Background. Fort Benning was designated by the USFWS in a 1994 Biological Opinion as "essential for the recovery of" relict trillium (*Trillium reliquum*), a plant found in rich hardwood forests and federally listed as endangered (USAIC 2001). A number of populations of relict trillium are known in the region, mostly north of Fort Benning. Seven occurrences are known on the installation (Figure 10). Areas occupied range up to several acres in size and in some cases contain several thousand individuals.

Several other rare plant species exist on Fort Benning (Table 1, plant species with asterisks). Pickering's morning glory (*Stylisima pickeringii*), endangered in Georgia, is found on xeric sand hills (often associated with gopher tortoise habitat). Georgia rockcress (*Arabis georgiana*), a candidate for federal listing, threatened in Georgia, is found on rocky bluffs and slopes and sandy riverbanks. Plumleaf azalea (*Rhododendron prunifolium*), threatened in Georgia, occurs in rich ravines. Indian olive (*Nestronia umbellata*), threatened in Georgia, occurs in well-drained upland forests. Sweet pitcherplant (*Sarracenia rubra*), endangered in Georgia, can be found in acidic seeps and bogs. Croomia (*Croomia pauciflora*), threatened in Georgia, occurs in rich ravines and on river bluffs.

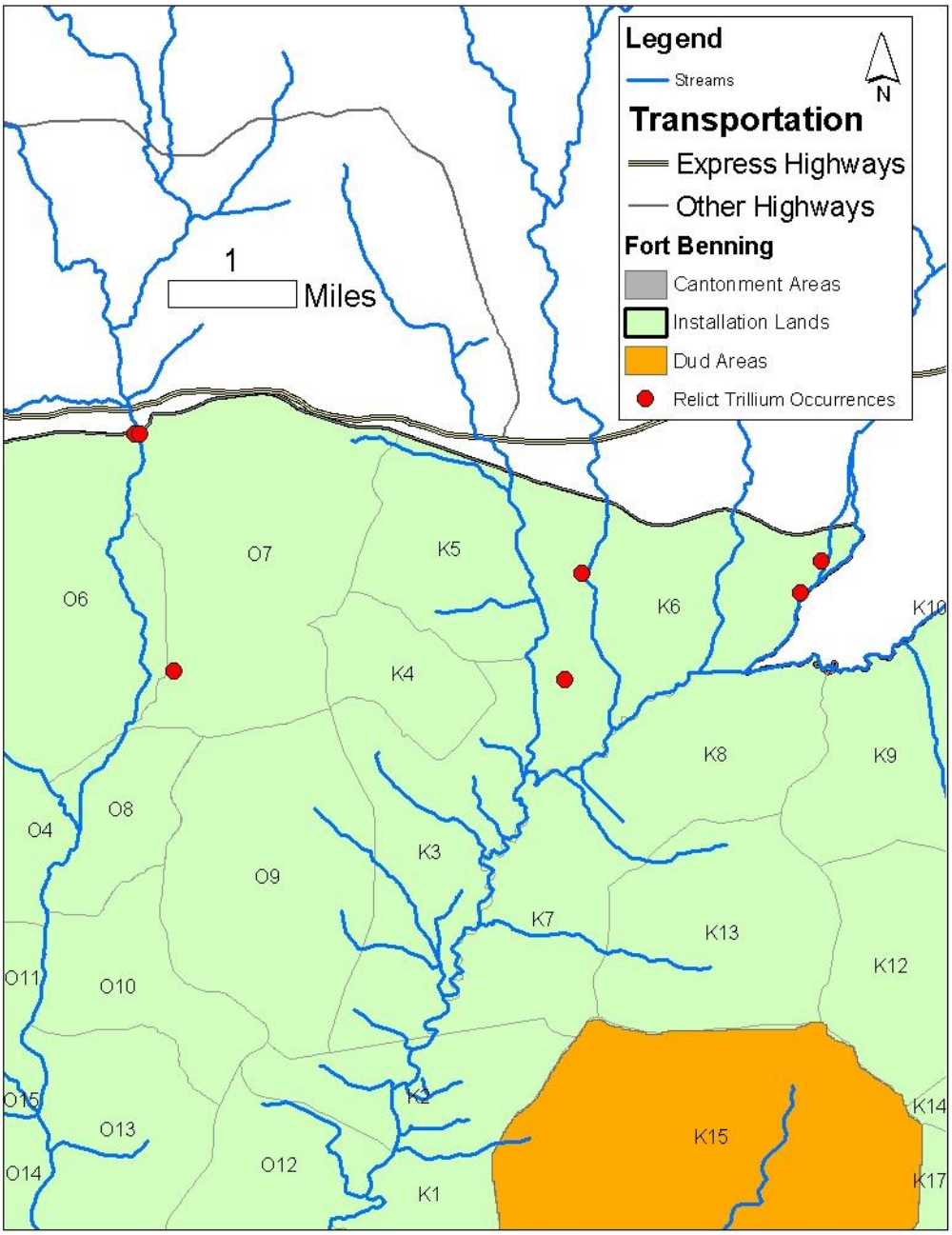

Figure 11. Relict Trillium occurrences on Fort Benning.

Current Training Impact. Rare plants have very little direct impact on training under current listing and policy. State-listed Pickering's morning glory probably has the most likelihood for training impacts due to its presence on sites often used for mechanized training, but probably represents few if any limitations beyond those already present by marked gopher tortoise burrows. Indian olive, also state-listed, might also represent a potential training limitation on uplands, but its known occurrences are few and isolated enough to be of little concern. Other plants, including the federally-listed relict trillium, occur on wetter sites and/or slopes not typically used for training. However, site disturbance by feral hogs and/or the potential for invasive plant encroachment are recognized threats to the viability of all these plants, which therefore require management and monitoring by Fort Benning to minimize their impact.

2.1.1.4 Other Endangered Species.

Background. In addition to the RCW and the Relict Trillium, federally-listed (endangered or threatened) species on Fort Benning include the bald eagle, the American alligator, and the wood stork. Most occurrences of these species are associated with wetland/riparian areas of the Chattahoochee River, its backwaters and nearby tributaries. Wood storks are a transient resident of Fort Benning, seen mainly on the Alabama portion of the installation during late summer. Usually one to 20 birds is seen each year. They use shallow water ponds or Chattahoochee backwater areas depending on available food supplies and appropriate water levels. Two bald eagle nests (used by one pair of eagles) are located on the southern edge of the installation near the Chattahoochee River. The eagles have produced successfully at least one fledgling since the first nest was discovered in 1992. Fort Benning is located on the extreme inland limit of the American alligator's range. Large adults up to 13 feet have been observed. Habitat available to the alligator is limited and consists of fish ponds and beaver ponds on the Georgia portion of the installation and the backwaters of the Chattahoochee River in Alabama.

Current Training Impact. Aircraft accessing Lawson Army Airfield are restricted from certain flight paths during bald eagle nesting season. In addition, portions of training compartments in the vicinity of bald eagle nest sites are closed during eagle nesting season.

2.1.1.5 Watersheds, wetlands, and aquatic biodiversity.

Background. Several streams on Fort Benning are designated "Impaired" under Section 303d of the Clean Water Act (Figure 11). Those which flow onto Fort Benning include: the Chattahoochee River, Little Juniper Creek, Pine Knot Creek, Little Pine Knot Creek, Hitchitee Creek, Little Hitchitee

Creek, and Tiger Creek (Georgia DNR 2004). Uchee Creek, the only named stream flowing from Alabama into Fort Benning, is not impaired (Alabama Department of Environmental Management 2004).

Significant wetlands exist in and all around Fort Benning (Figure 11). Major drainages that arise on private lands and enter the Chattahoochee River on the installation include the Uchee Creek watershed to the west and the Upatoi Creek watershed to the east. Protection of wetlands off the installation is critical because so many of the species of conservation concern identified in the region are either aquatic or associated with wetlands (Table 1). Further, protection of wetlands on private lands upstream will enhance the quality of downstream wetlands and streams on Fort Benning.

Streams in the region support a variety of aquatic organisms of conservation concern including fish, mussels, and aquatic plants. Mussels in particular are sensitive indicators of water quality and ecological integrity. At least five mussel species of conservation concern occur within Uchee Creek in Alabama, including the federally endangered *Lampsilis subangulata* (Shiny-rayed Pocketbook). This Uchee Creek population, one of only two surviving in the Chattahoochee Rivers system, is upstream from Fort Benning. Several other endangered mussels, in addition to L.subangulata, historically inhabited the Chattahoochee and/or its tributaries in the Fort Benning area but have been extirpated, or simply have not been found in recent years (USFWS 2003).

Current Training Impact. Current impacts are primarily related to water crossings, and new construction of training infrastructure. Non-hardened low-water crossings create significant sediment loads in streams; hence low-water crossings must be hardened with concrete to prevent unacceptable sedimentation, particularly in impaired streams. Presence of impaired waters and wetlands can delay infrastructure projects in general, and/or increase the costs due to associated regulatory constraints. These training impacts can occur regardless of whether impairment was caused on or off the installation.

2.1.2 Safety and Human welfare

2.1.2.1 Weapons noise, aircraft noise, and aircraft accidents

Excessive noise can be detrimental to human welfare outside the installation. Excessive noise and vibration can create legal liability for Fort Benning, and numerous complaints are a threat to healthy community relations. As a result, Army regulations provide for training restrictions when command staff perceive any such threats are high.

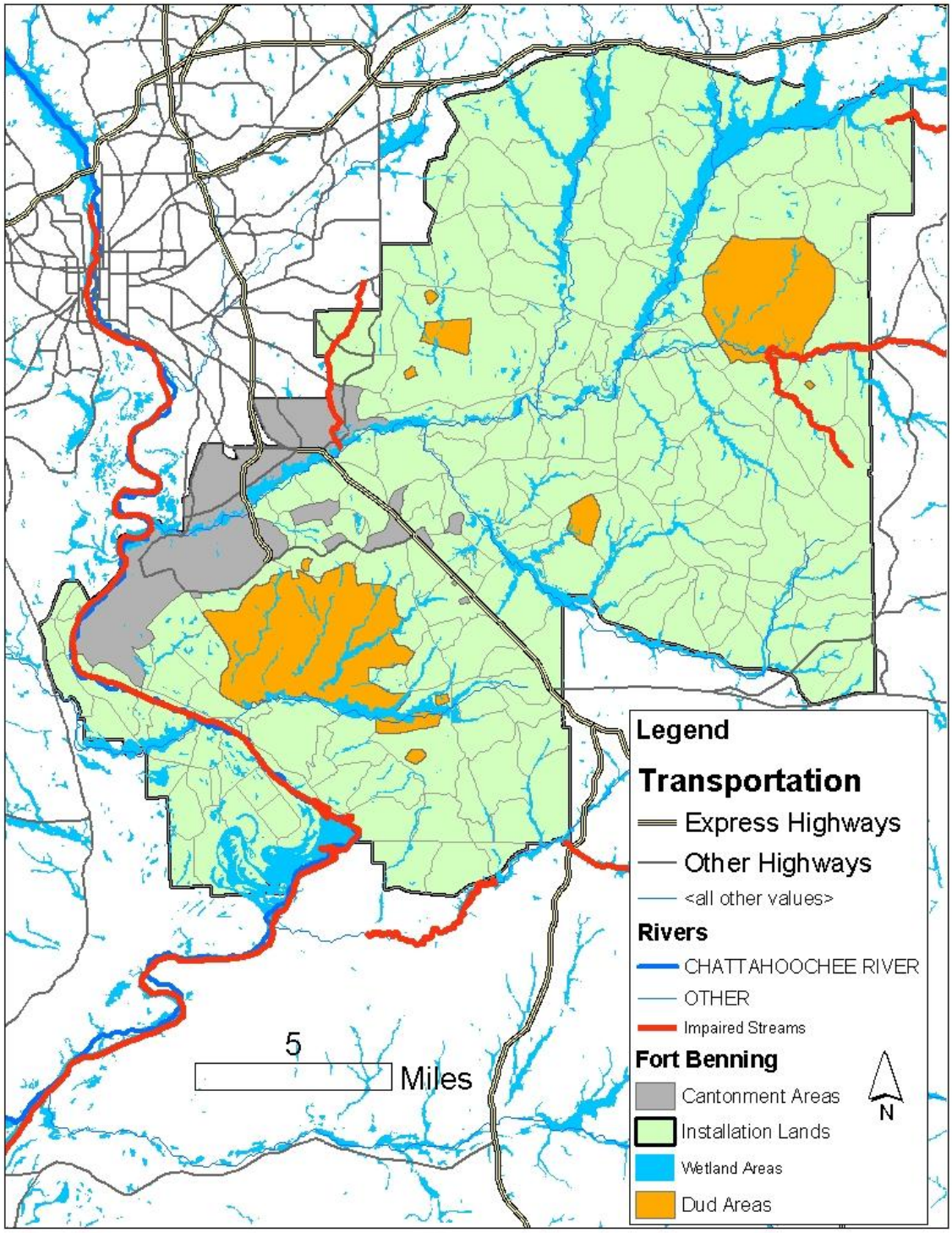

Figure 12. Wetlands and Impaired Streams of Fort Benning and vicinity. Wetland locations from US Fish and Wildlife Service, National Wetlands Inventory (as modified by TNC inside Fort Benning). Impaired Stream locations from EPA, 2004.

In addition, the NEPA process associated with new infrastructure projects will typically address likely noise issues, and require positioning or mitigation to address them.

Specific noise concerns in and around Fort Benning will be described in the future Installation Operational Noise Management Plan (IONMP)[28]. Noise traveling outside the installation is primarily that from large-caliber weapons, with noise impacts extending north and east of the boundary in the vicinity of Hastings Range. Smaller outside areas are also impacted by aircraft noise outside the installation in the vicinity of Lawson Army Airfield. The Army describes various zones of noise impact in AR 200-1. “Noise-sensitive land uses, such as housing, schools, and medical facilities, are compatible with the noise environment in Zone I, normally incompatible in Zone II, and incompatible in Zone III” (Department of the Army, 1997). However, the Land Use Planning Zone, which lies intermediate between Zones I and II, is often regarded as the best predictor of "annoyance" noise impacts when levels during times of increased activity (USACHPPM 2001). This zone extends as far as two or three miles from the installation boundary (or is projected to do so in the future) in various locations.

In addition to noise impacts, Lawson Army Airfield also has associated Accident Potential Zones extending outside the boundary of Fort Benning. Lawson field has two paved runways, the longest of which is capable of supporting all types of military aircraft (up to and including the large military transport aircraft C5, C17 and commercial 747 aircraft). Accident Potential Zones for this runway extend northwest into private land in Alabama. The relationship of aircraft accident potential to human health, property, and safety, and hence installation management, is obvious. While the extent of Accident Potential Zones are smaller than those for noise impact, management of this risk is analogous.

Figure 12 depicts weapons-related noise contours and the location of documented noise complaints for both weaponry and aircraft. Figure 13 illustrates both Noise contours and Accident Potential Zones for Lawson field.

[28] Currently in draft form, under development by US Army Center for Health and Preventive Medicine and Fort Benning.

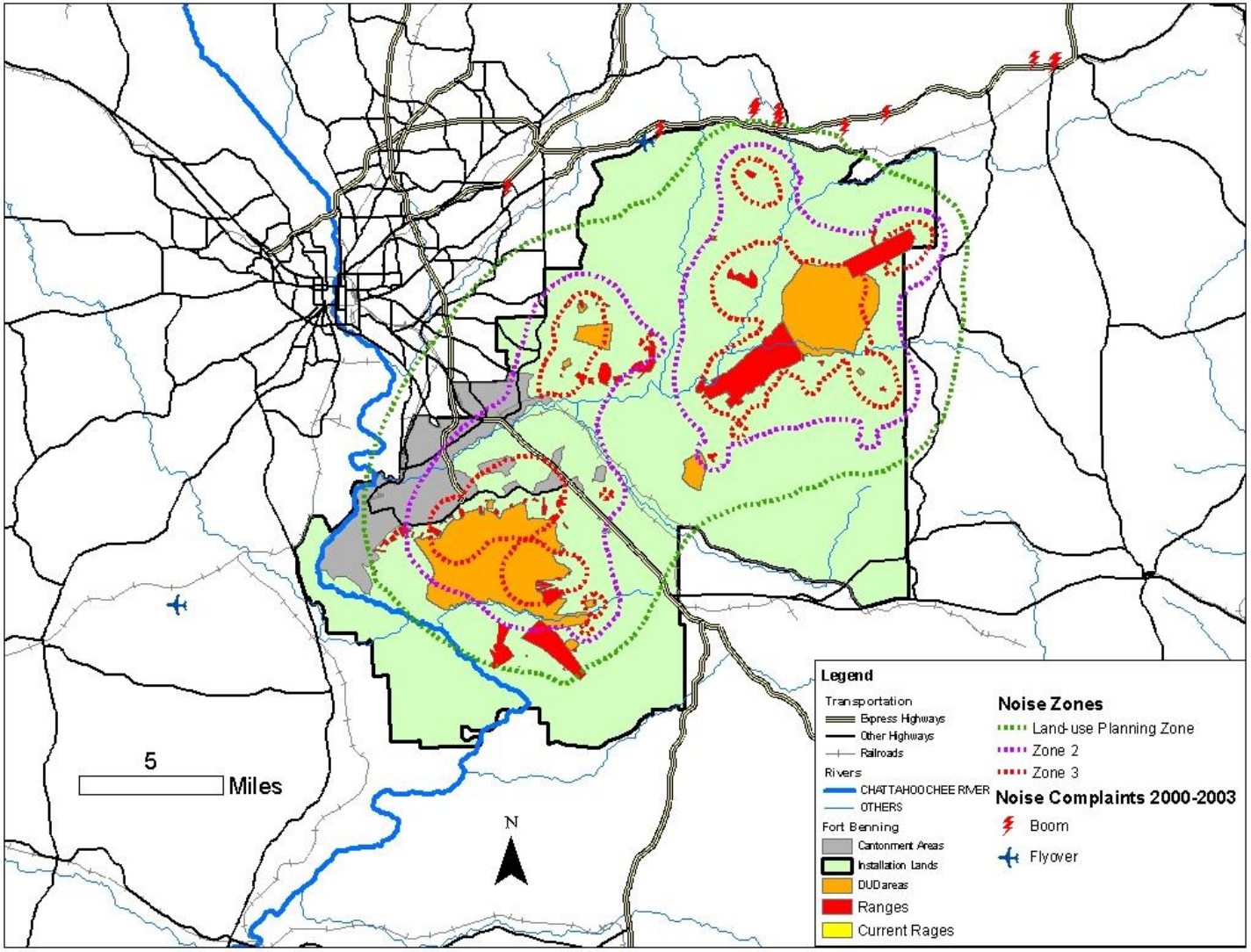

Figure 13. Noise contours and locations of noise complaints. The contours define cumulative impact zones for weapons noise that account for both the DMPRC and a planned upgrade to Hastings range. Land-use Planning Zone: Noise may be considered by the public as an impact on the community environment during times of increased activity, Zone 2: Normally incompatible with sensitive noise receptors, Zone 3: Incompatible with sensitive noise receptors. Sources: AR 200-1.

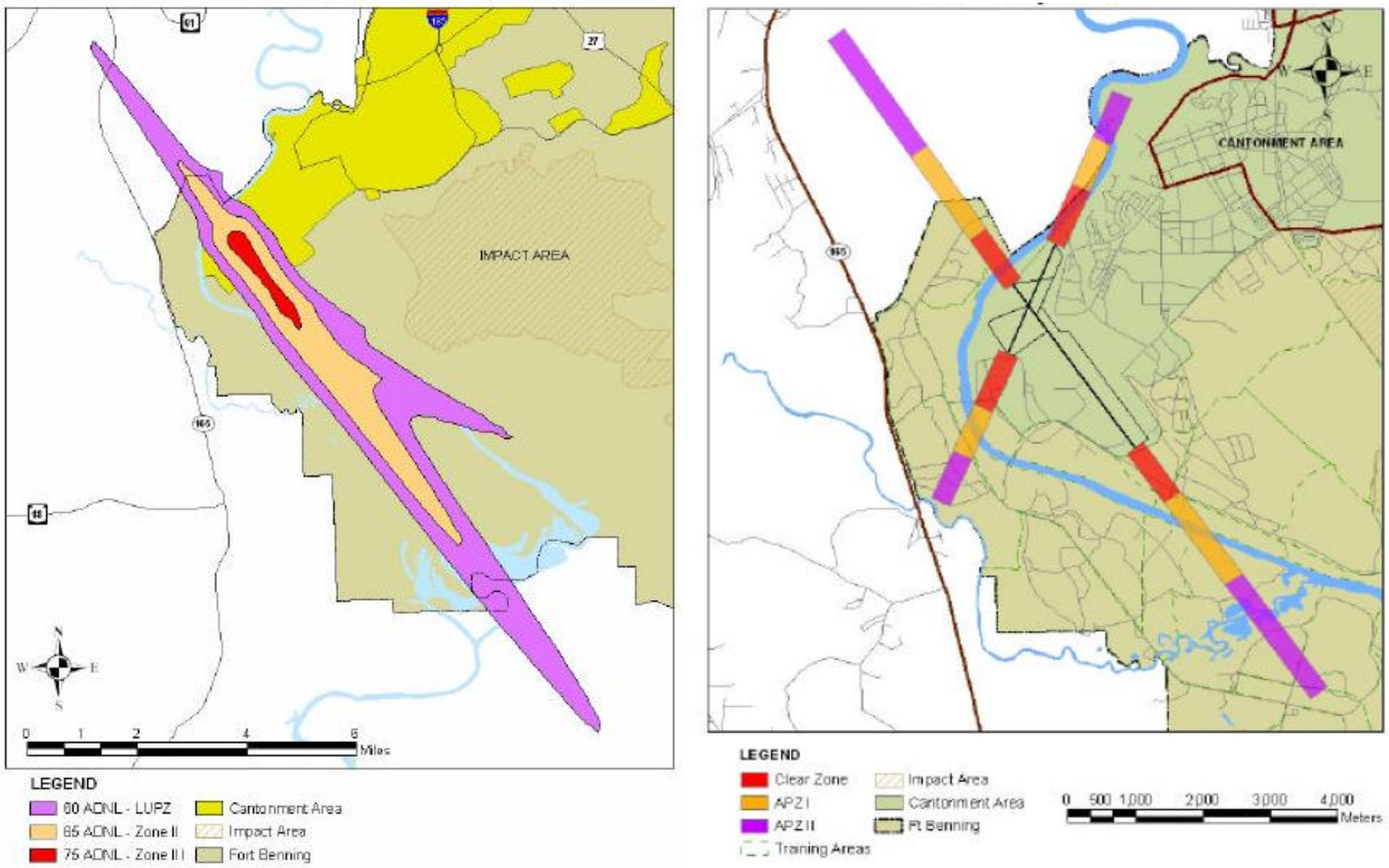

Figure 14. Maps generated by USACHPPM Noise Program showing noise contours (see Figure 12) and Accident Potential Zones (APZ I and II) around Lawson Army Airfield. APZ I is not recommended for residential land use; APZ II may be appropriate for low-density residential.

Fort Benning currently imposes voluntary night-firing restrictions, with exceptions per approval of the Garrison Commander, to minimize disturbance to neighbors. Beyond this voluntary restriction, there have been no recent examples in which noise or aircraft incidents off the installation have created training restrictions on Fort Benning. Awareness and concern is high, however, as indicated by complaints, anecdotal reports, damage claims, and Fort Benning's own investment in noise monitoring, sleep studies, etc. Most recently, a damage claim was received in 2004 for damage to a structure in Cusseta GA, allegedly due to noise blasts.

2.1.2.2 Smoke and Fire

Fort Benning land managers conduct regular prescribed burning as part of their forest management activities. Prescribed burning is essential for wildfire hazard reduction and management of RCW habitat, beneficial to many other wildlife species, and contributes to accessibility, visibility, and usability of training areas for many military activities.

Outside-the-boundary smoke impacts, both safety and "annoyance" issues, are easy to describe but more difficult to spatially quantify. Smoke from prescribed fire and wildfire can significantly reduce visibility, which can cause dangerous motor vehicle accidents especially in high-traffic areas. Major U.S. Highways currently pass through and nearby Fort Benning, in close proximity to areas under prescribed-fire management, and areas at risk for wildfire. Health and "annoyance" concerns arise from both visibility and irritation of airways, both of which can create legal liability for Fort Benning. Public exposure to smoke can also create public concern that eventually leads to political or regulatory issues. The U.S. Environmental Protection Agency proposed a fine particulate matter (PM2.5) non-attainment designation for Muscogee (GA) and Russell (AL) Counties in 2005, which if enacted would have resulted in increased regulations affecting Fort Benning's mission. Such a non-attainment designation would likely lead to limitations in permissible conditions for burning, such that the increasing extent of smoke-sensitive areas would become even more constraining.

Smoke dispersal models predict potential smoke impacts as far as 12 miles away under realistic meteorological conditions and prescribed-burn fuel loads and acreage. In reality, such impacts are rare and extremely difficult to predict. While unusual smoke dispersal phenomena can result in serious smoke impacts at a great distance from the installation boundary, visibility-impairing smoke impacts are more typically confined to distances on the order of one-quarter mile, and these effects are mitigated by burning on wind directions that confine such impacts to non-sensitive areas.

Still, one smoke complaint in 2002 resulted in a 21-day shutdown of prescribed burning during the peak of the burning season. Such a restriction, which did not in this case have a direct impact on training, can have direct impacts on land management goals and installation safety, especially as it effects wildfire frequency. Increasing frequency and flexibility of prescribed burning has been shown to dramatically decrease wildfire frequency. Such land management restrictions represent indirect

impacts on training, and increase the time and expense devoted to land management.

Closely associated with the risk of smoke escaping the installation is the risk of fire itself escaping the installation. As with noise and smoke, risks include human health and property, legal liability, and community relations. While prescribed fire clearly reduces the likelihood of escaped (unmanaged) fire, there will always be a risk of escaped fire, whether wild or prescribed, along the installation boundary.

2.2 Anticipated Training Restrictions

2.2.1 Natural Resources

2.2.1.1 RCW

New range and infrastructure needs will continue to encroach on potential RCW habitat, especially under assumptions of an expanded training mission (Figure 14). Conflict between RCW recovery goals and Fort Benning's training and power projection missions will become increasingly expensive (planning, consultation, mitigation) and difficult to manage.

Lack of RCW habitat outside the installation, with no public lands available to create such habitat and no private landowner incentive to do so, will continue to focus the RCW regional recovery goal on Fort Benning's mission lands. In particular:

- **Residential and commercial development along highway corridors in Russell County (AL-165 and US-431) west of Fort Benning will isolate Fort Benning's RCW habitat from any potential connections to other current and potential RCW areas in Russell, Macon, and Bullock Counties.**

- **Changing land-use in Chattahoochee and Stewart County south of the installation, currently industrial forest, will further isolate Fort Benning's RCW habitat from existing mature pine habitat on private lands ten miles south, which some 20 years ago supported RCWs.**

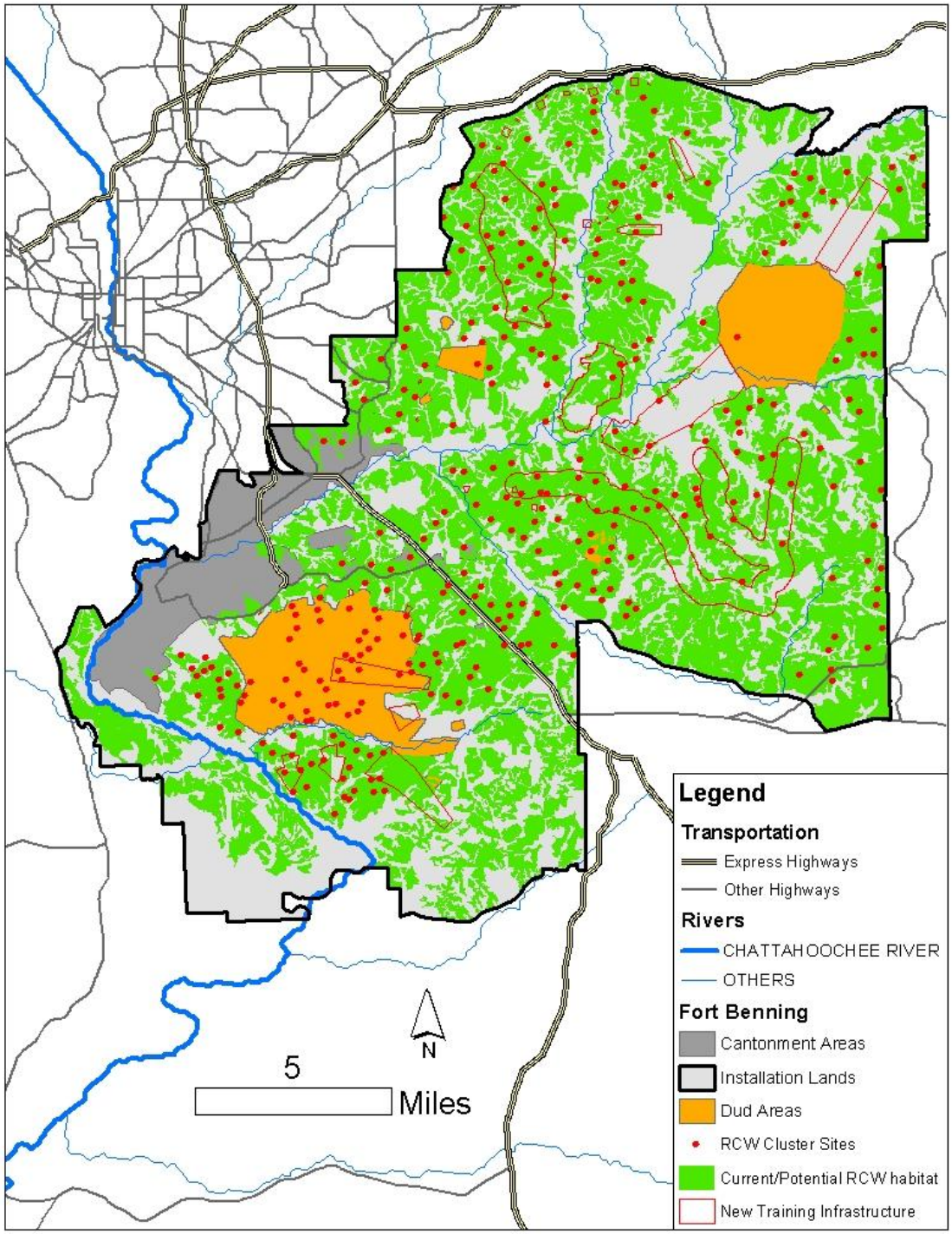

Figure 15. Potential impact of new training infrastructure on RCW habitat. "New Training Infrastructure" polygons represent ranges under construction (DMPRC, ISBC) and ranges and maneuver corridors currently planned for 2006-2012 as best we know today. Overlap of these polygons with current/potential RCW habitat is about 10,000 acres.

- **Residential and commercial development associated with the "Fall Line Freeway" corridor (US-80, GA-96) northeast of Fort Benning will isolate Fort Benning's RCW habitat from privately-owned longleaf pine plantings in the Fall Line sand hills that could provide additional RCW habitat in 30-50 years given appropriate conservation incentives.**

- **Construction of Interstate 14, envisioned for the next decade and currently planned to run from Buena Vista GA to Cusseta GA, and through Fort Benning along the US-27/280 corridor, will hasten growth and development around Cusseta and western Marion County, isolating Fort Benning's RCW habitat from any privately owned forest land that could provide additional RCW habitat in 30-60 years given appropriate conservation incentives.**

Growth and development in all of these directions will create new smoke sensitive areas adjacent to installation boundaries, making RCW habitat management increasingly difficult and complicating compliance with USFWS Biological Opinion on RCW recovery.

These management and compliance challenges, and the continued isolation of the species on installation lands, make it more difficult to sustain the training mission, and translate directly into higher costs and reduced flexibility in accommodating new military infrastructure, including infrastructure projects related to Army Transformation.

Figure 14 suggests that some 10,000 acres of current and/or potential RCW habitat[29] on Fort Benning will be threatened by new ranges and maneuver corridors in the long term. Such threats to RCW habitat will require periodic reassessment in the face of Fort Benning's efforts to accommodate Army Transformation.

2.2.1.2 Gopher Tortoise.

Though the gopher tortoise is not currently a federally-listed species, all trends mentioned above regarding new infrastructure and potential burning restrictions apply to the gopher tortoise as much as they do to the RCW. In addition, the growth and development trends along the Fall Line sand hills outside of Fort Benning, together with new military infrastructure on the installation (especially mechanized training areas on tortoise-compatible soils), will likely have a significant impact on extant gopher tortoise populations and increase the likelihood of its federal listing (Figure 15).

[29] "Current and /or potential RCW habitat" consists of manageable pine-dominated forest stands on upland sites not separated from other habitat by more than 200 feet.

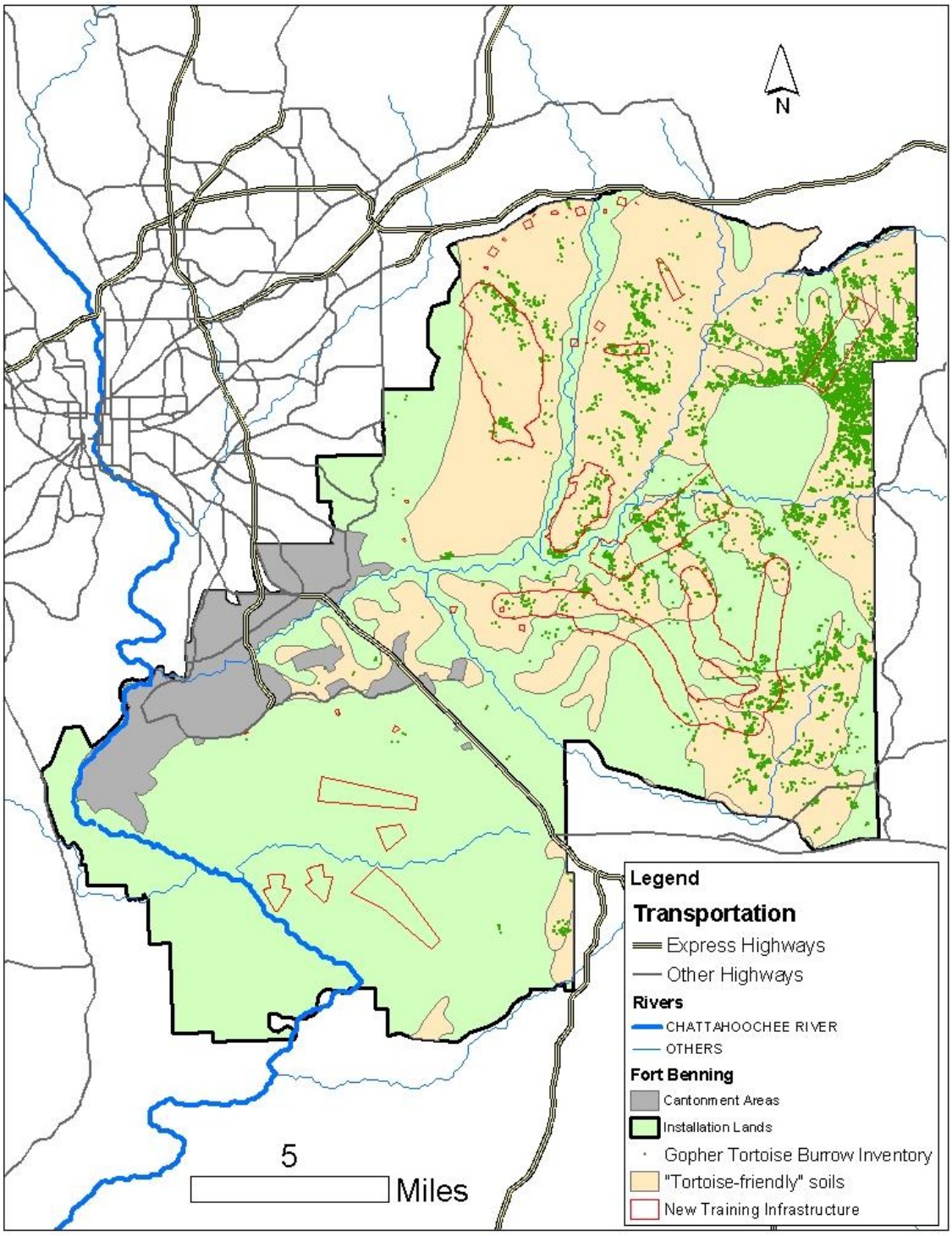

Figure 16. Potential impact of new training infrastructure on gopher tortoise habitat. "New Training Infrastructure" polygons represent ranges under construction (DMPRC, ISBC) and ranges and maneuver corridors currently planned for 2006-2012 as best we know today. Overlap of these polygons with gopher tortoise soils is about 10,000 acres, and about 1500 burrows (as surveyed in mid 1990s).

Should the gopher tortoise become federally-listed, it is likely that both new construction and off-road mechanized training would have to be sharply curtailed, especially across the northern tier of the installation in the vicinity of Hastings Range and the DMPRC. Figure 15 suggests that some 10,000 acres of potential gopher tortoise habitat on Fort Benning will be threatened by the new ranges and maneuver corridors in the long term. The area mapped for new infrastructure includes some 1500 tortoise burrows (based on previous burrow inventories), which would represent some 500 tortoises. Such threats to gopher tortoise habitat will require periodic reassessment in the face of Fort Benning's efforts to accommodate Army Transformation.

Because the species has already been federally-listed as threatened in the western part of its range, Camp Shelby in Mississippi offers an example of what such a listing might mean for Fort Benning. Training restrictions associated with the gopher tortoise at Camp Shelby[30] include:

- No bivouac activity within a colony site (defined as all active/inactive burrows and a 200' buffer around the burrows).
- Areas with heavy bivouac use should be situated 300 meters (~900 feet) from the colony boundary.
- All equipment, vehicles, and personnel kept at least 25 feet from all gopher tortoise burrows (both posted and unposted).
- Mowing of observation/firing points and ranges inhabited by gopher tortoises limited to the time period from 1 November through 30 March.
- Tortoise surveys of ranges inhabited by gopher tortoises must be done monthly, with weed-eating around burrow/apron and mowing with finishing mower.
- No bush hogging within 200 feet of any known burrow during period April 1 – November 1.
- Tortoise relocations negotiated with USFWS on a case-by case basis

An associated risk is the status of the closely-associated gopher frog, which inhabits gopher tortoise burrows in the Hastings Range area of Fort Benning. Should current trends toward habitat loss in the coastal plain and sand hills continue this species might also become listed and create additional restrictions on training and/or infrastructure development in the vicinity of Fort Benning's Hastings Range.

[30] Matt Hinderliter, Gopher Tortoise Biologist, The Nature Conservancy's Camp Shelby Field Office. Personal Communication.

2.2.1.3 Rare Plants

The federally-endangered status of relict trillium, while not currently a significant limitation due to its presence in isolated wetland areas, could become problematic if large new ranges or other infrastructure were planned in areas where the plant occurs (see Figure 10 above). This would be especially true for any projects spanning the northern part of the installation in the Oscar training areas. Even if these trillium populations escaped major impact, access for monitoring, control of invasives, and protection from fire may become far more difficult if they are under firing fans.

Future training impacts associated with other rare plants are likely to occur through federal listing of additional rare species. The most serious impact might be federal listing of Pickering's morning glory, which might restrict mechanized training in xeric sand hill areas not currently restricted. An example is tracked vehicle trails in the L6 training area. Georgia rockcress, already a candidate for federal listing, inhabits some ravines adjacent to Molnar Range near the Chattahoochee River in Alabama, an area under study for new training infrastructure under various scenarios. Of the known rare plant species on the installation, this species is also probably most threatened by feral hog rooting, suggesting that its federal listing might significantly increase monitoring and management costs. The federal listing of croomia might cause restrictions on the W2 training area, where it inhabits slopes and ravines sometimes used in dismounted field-training exercises associated with the Western Hemisphere Institute for Security Cooperation (WHINSEC).

Barring the need for non-forest infrastructure replacing one of its isolated wetland occurrences, future listing of the sweet pitcherplant would probably not have direct impact on training, but would increase the likelihood that land managers would become responsible for recovering the species via additional prescribed burning and other vegetation management since this species depends on the unlikely combination of frequent fire and wet soil.

2.2.1.4 Other Endangered Species.

Future training impacts for other endangered species on Fort Benning would most likely derive from new species occurrences. For example, additional bald eagle nests in certain locations could force the alteration of aircraft flight patterns and restrict access to additional training areas. The same would happen with the establishment of a breeding colony of woodstorks.

2.2.1.5 Water Resources.

Development pressures, new highway construction, impoundments, and sand-mining in the headwaters of Upatoi Creek, Uchee Creek, and their tributaries could add Fort Benning waters to the Impaired List. The same trends would impact rare species that depend on aquatic, riparian, or wetland habitats. Expanding designation of Impaired Streams and listed species will create additional restrictions on training and/or infrastructure development on Fort Benning.

Large infrastructure projects are likely to impact at least some wetland acreage, requiring mitigation projects, i.e. restoration of wetland function in previously degraded or destroyed wetlands, either inside or outside Fort Benning, or purchase of off-post wetland mitigation credits. Such mitigation is costly and may represent another land-use competing with military training activity.

2.2.2 Safety and Human welfare

Growth and development associated with east Columbus (GA), south Phenix City (AL), Fort Mitchell (AL), Cusseta (GA), and Box Springs/Juniper (GA) will increase the likelihood for complaints and/or damage claims due to noise, smoke, fire, etc. Construction of Interstate 14 in coming years, currently envisioned to run from Buena Vista GA to Cusseta GA, and through Fort Benning along the US-27/280 corridor, will further expand that growth and development, widen smoke-sensitive areas, and further increase the likelihood for complaints and/or damages.

Such activity has the potential to restrict training and land management on Fort Benning. Even without the new growth and development, increased noise levels associated with new ranges and increased aviation use of Lawson field is also likely to increase the likelihood for noise complaints and/or aircraft incidents.

Both trends (growth and development in the surrounding area, and increased training on Fort Benning) increase the likelihood that noise complaints, aircraft incidents, and smoke/fire problems (as described in Section 2.1.2) will restrict training.

3 Description of proposed action

We propose to use a combination of no-development easements, conservation easements, and fee acquisition of conservation lands to limit development and protect or restore habitat around portions of Fort Benning's boundary, and in strategically-located corridors extending out from Fort Benning into critical regional conservation areas.

In general, a conservation easement is typically used as the permanent legal encumbrance to restrict development rights, whether the intent is simply to restrict development or to protect/restore habitat for a particular species or ecosystem. However, in this proposal we will use the term "no-development easement" for certain buffering opportunities, to distinguish them from easements used to protect outstanding conservation value, where direct protection of biodiversity outside of the installation is the objective. For the latter projects we will retain the term "conservation easement." In this context, both no-development easements and conservation easements may be purchased from willing landowners or donated by willing landowners in expectation of tax benefits. We will consider both types of easement to be permanent.[31]

The resulting ACUB can be described as the union of three overlapping strategies:

- **Establish a one-to-three mile no-development buffer around much of the installation's boundary, in which no-development easements will prevent incompatible development. This strategy is primarily intended to buffer Hastings Range and other (including new) training infrastructure from outside complaints, and sustain the ability of land managers to utilize prescribed burning. However, opportunities to expand or restore habitat, protect water quality, and buffer Lawson field can also be sought in this buffer area.**

- **Establish corridors of mostly contiguous forest land extending away from Fort Benning, in which conservation easements, incentive programs, and fee acquisition of ecologically-significant lands will provide mature-pine fire-adapted habitat suitable for expansion of the RCW population off-post. Current land use and forest cover suggests potential exists for such corridors extending west into Russell County AL and south into Stewart County GA. By providing habitat on adjacent private lands, such corridors would reduce the conflict between RCW management and new training infrastructure on installation lands.**

- **Establish a network or mosaic of conservation lands, via conservation easements, incentive programs, and fee acquisition of ecologically-significant lands, along the Fall Line extending east of Fort Benning in Marion and southern Talbot Counties in Georgia. This "Fall Line Corridor" will secure the viability of the gopher tortoise and several rare**

[31] Short-term easements (typically not referred to as conservation easements) are mentioned later in this section. Term easements (non-permanent) are typically not eligible for the same favorable tax treatment as conservation easements that permanently extinguish development rights, should any portion of the development value be donated.

plant species, and can provide off-post RCW habitat in the long-term. By providing habitat for gopher tortoise and other species on private lands along the Fall Line, both current and anticipated conflicts between training and habitat conservation on installation lands would be much reduced.

Additional options we recognize, not to be excluded from our proposed action but not emphasized or quantified here, include other types of easements (e.g. easements solely intended to accommodate noise and smoke on private lands) and partnerships or incentive programs by which private landowners may be persuaded to maintain or create compatible land uses. These options are briefly described in Section 3.1.3 below.

3.1 Proposed Action

3.1.1 No-development Easements

Simple no-development easements can be used to prevent neighboring lands with no outstanding conservation value from ever developing into residential areas and other sensitive land uses where noise, smoke, and other nuisances arising from Fort Benning's mission may create public concerns, or where development of infrastructure on neighboring lands would degrade adjacent habitat or threaten viability of protected species on the installation. A no-development easement may restrict development completely, or may simply reduce its density or extent. In either event the risk of harm to human safety and welfare via smoke, fire, noise, or aircraft accidents is reduced, and the ability of lands to serve some ecological function is improved.

Specifically, no-development easements can serve the following functions:

(1) To provide “matrix habitat” (ecological structure and function, though elements critical to the species of concern may not be present) or simply to buffer habitat from land-use inconsistent with its management or viability. Buffer or matrix habitat around areas of higher conservation value ensures the viability of species or habitats that Fort Benning is charged with protecting (the loss, taking, or listing of which would compromise the ability to train).
(2) To improve watershed function and water quality by reducing impervious surface area, minimizing soil disturbance, or modifying agricultural practices. This function improves water resources flowing into Fort Benning, reducing the likelihood that state or federal agencies will impose regulations, permitting requirements, etc. related to sediment discharge or other potential impacts of military training or infrastructure projects.

(3) To reduce likelihood of noise, aircraft, smoke, and fire impacts and complaints, and reduce the extent of areas sensitive to such impacts, thereby reducing the likelihood that annoyance or safety issues will force Fort Benning to curtail the training and land management activities that created them.

No-development easements will be acquired and held by TNC or by a land trust in partnership with TNC or by other eligible entities such as state or county governments. Landowners from whom such easements will be acquired include homeowners, private non-industrial farmland or timberland owners, owners of recreational hunting land, real estate developers, land investors, and industrial landowners. For example, MeadWestvaco controls approximately 90,000 acres of industrial forestland within ten miles of the installation boundary, and forestry companies (or land-holding companies to which they've recently conveyed some tracts) own 140,000 ac within the same area. Preliminary discussions have been conducted with MeadWestvaco, and will continue. Contacts with other forestry companies in the buffer zone will be made. Many of these industrial forest lands are for sale, or have recently been sold, a nationwide trend in the forest products industry that has seen company lands transferred to investment companies, investment trusts, and pension funds. The scale and frequency of these transactions suggest that acquiring interest in these properties is a time-sensitive strategy.

No-development easements will be used in areas where development or use of the property is incompatible with Fort Benning's mission requirements and foreseeable future mission requirements, and where the landowner is willing to sell or donate development rights. In addition, the following situations in particular suggest a no-development strategy is more appropriate than the conservation strategies discussed in the following section:

- land is not restorable to high conservation value
- landowner wishes to continue training-compatible land uses which preclude habitat restoration
- landowner wishes to address habitat restoration through short-term agreements or other means, rather than by permanent conservation easement.

3.1.2 Conservation Easements and Acquisitions

We use the term "conservation easement" to draw a distinction from "no-development easement" because the easement language will include specific requirements intended to promote biodiversity conservation goals in perpetuity. In some cases, fee acquisition of lands may be appropriate for lands of especially significant conservation value, if a seller is willing

and if the land can be owned and managed with conservation objectives by TNC or some other partner. Conservation easements may be purchased from willing landowners or donated by willing landowners in expectation of tax benefits.

The biodiversity conservation goals that should drive the acquisition of conservation easements or conservation lands are those most relevant to Fort Benning's endangered species recovery goals, and its responsibility to plan for the viability of other sensitive species and prevent their listing. Conservation targets most appropriate for protection via this strategy, and the training impacts that would be mitigated by their protection, are the following:

3.1.2.1 RCW

Conservation easements and acquisitions can extend the regional habitat that is presently almost exclusively restricted to Fort Benning. Given appropriate landowner incentives, RCWs that the USFWS considers part of Fort Benning's recovery population will begin inhabiting habitat off-post, gradually easing the burden on Fort Benning to devote training lands and potential firing-range sites to RCW recovery. More detailed training impacts of RCW, current and anticipated, are discussed in Section 2.1.1.1. and 2.1.2.1.

3.1.2.2 Gopher Tortoise

Conservation easements and acquisition will preserve and expand existing tortoise colonies off-post, especially in the Fall Line sand hills area of Marion and southern Talbot Counties. New, restored, or protected habitat areas will also be populated with tortoises to increase their regional numbers and secure viability of the species in this region. Without doing so, the risk is high that the species will become federally listed and sharply limit training flexibility in mechanized training areas, Hastings Range, and new infrastructure likely to be needed across the northern part of Fort Benning. More detailed training impacts of gopher tortoise, current and anticipated, are discussed in Section 2.1.1.2. and 2.1.2.2.

3.1.2.3 Rare plants

Conservation easements and acquisitions will preserve and expand existing rare plant populations off-post. Benefits include facilitating the recovery of the relict trillium, which will increase the flexibility of Fort Benning to utilize hardwood bottoms for some forms of training, and reduce monitoring and management responsibilities. Additionally, and perhaps more importantly, these land protection efforts will secure the viability of several at-risk species whose numbers are declining throughout

the region. Without that security, the risk is high that such species will become federally listed and reduce training flexibility in many areas, some (such as those preferred by Pickerings morning glory and Indian olive), of which are upland.

3.1.3 Other options

In addition to easements for development rights and conservation, or outright fee purchase for conservation, several other options are available to explore as opportunities arise.

3.1.3.1 Other easements

Smoke and noise easements allow the easement holder to put smoke or noise onto privately-owned property; however, such easements would not allow the easement holder to violate applicable Federal and state laws and regulations, such as the Clean Air Act. Existence of an easement of this type on a piece of property would theoretically reduce the likelihood that the property would be developed for residential use by reducing the desirability of lots to individuals.

These kinds of easements could be used to discourage urban/residential development in targeted areas within no-development buffer zone, especially where landowners might not be willing to sell fee interest or easements. They may also reduce complaints from existing residents of an affected property. How such easements should be structured, what rights are actually transferred to the easement holder, and how that transfer is affected by existing laws and regulations, are issues that may require further study. Acquisition cost would probably be relatively low in comparison to purchasing development rights or a conservation easement. More information should be sought before pursuing them aggressively over a large buffer zone. Such easements may be more appropriately sought by Fort Benning directly, rather than through a partnering entity under the ACUB program.

Easements can also be short-term. Easements traditionally sought by land trusts or public agencies to prevent development and/or conserve habitat for the public good are almost always in perpetuity (because any donated value associated with the easement then becomes more clearly eligible for tax benefits). However where there is no expectation of tax benefits, a short-term easement might be purchased which prevents development (or allows some adjacent "nuisance" condition like smoke or noise) for a fixed period of time. Short-term easements are clearly not the best solution for conservation organizations seeking permanent habitat protection or management flexibility, but in some cases they may offer the only solution to forestall incompatible land-use in the short-term.

3.1.3.2 Short-term agreements and assistance

Programs such as Safe Harbor and Partners for Fish and Wildlife, both administered by USFWS, can be structured as short-term agreements that provide protection for property for a defined period of time, usually 15 to 30 years. These could be used as "bridges" for properties on which the current owners are unwilling to make a commitment in perpetuity. Advantages include costs covered by other agencies (in these examples, the USFWS), and a well-defined period of wildlife habitat protection. Disadvantages include lack of permanency, and the landowner's ability to buy out of the agreement.

Safe Harbor, or something like it, may be required in addition *to* conservation easements on any privately-owned RCW habitat or potential RCW habitat. A Safe Harbor program for RCWs, which exists in Georgia but is still being developed for Alabama, provides landowners management flexibility while ensuring a conservation benefit for this endangered species. Safe Harbor is designed to ease private landowner fears of excessive government regulation if an endangered species is found on their property. Uncertainty of compliance with the federal Endangered Species Act can be unsettling to a landowner who has or might have suitable habitat for an endangered species but also may want to manage their property for other objectives. To make Safe Harbor even more attractive, the Georgia Department of Natural Resources has established an incentive program through a grant from the USFWS to provide financial assistance to landowners who implement beneficial habitat management practices for RCWs. These incentives assist with prescribed burning and other management activities like hardwood control in upland areas, which will provide mature, open pine forest habitats required by the woodpeckers.

Partners for Fish and Wildlife is a voluntary program that provides technical and financial assistance to private landowners to voluntarily restore wetlands and other fish and wildlife habitats on their land. The program emphasizes the reestablishment of native vegetation and ecological communities for the benefit of fish and wildlife in concert with the needs and desires of private landowners. Projects consist primarily of habitat restoration and enhancement, but may include habitat creation.

A number of other state and federal programs exist by which private landowners can be encouraged to protect biodiversity or manage for endangered species, usually in the form of financial or in-kind assistance. For instance, the USFWS Private Stewardship Program provides grants and other assistance on a competitive basis to individuals and groups engaged in local, private, and voluntary conservation efforts that benefit federally listed, proposed, or candidate species, or other at-risk species. While such assistance may not insure long-term or lasting protection, they may be an important first step in demonstrating that viable conservation options exist for willing landowners. For the purposes of ACUB

development, we recommend a thorough review of available assistance and funding sources available each year for private landowners with potential to contribute toward ACUB goals, regardless of their association with easement or fee acquisitions.

3.1.4 Location and description of areas to be protected.

3.1.4.1 No-Development Buffer Zone

Areas in which no-development easements will be sought are those where future residential or commercial development might (1) create public concern about noise, smoke, etc. leaving the installation, (2) complicate prescribed burning on the installation, (3) increase the risk of degraded water quality entering the installation, or (4) degrade wildlife habitat on the installation through loss of habitat buffer (creation of hard edges).

The locations and sources of noise, aircraft, smoke, and fire hazards associated with Fort Benning were described in Section 2.1.2.1 above. The Land Use Planning Zone for noise, and Accident Prevention Zone II for aircraft, are logical perimeters for noise and aircraft-related hazards. For prescribed burning, a relatively narrow one-mile buffer, wider along drains where smoke can settle, would be adequate to provide increased flexibility in wind directions when planning prescribed burns near the installation boundary. For planning purposes, we can also assume a one-mile buffer would be adequate to protect sensitive habitat and wetland areas from the "hard edge" associated with encroaching infrastructure. Drainage ways extending upstream from the installation may suggest the need for additional buffering to protect watershed function.

Taken together, these concerns suggest a one-to-three mile buffer area in which no-development easements should be sought to prevent incompatible encroachment related to noise, smoke, water quality, and habitat buffering. The no-development buffer will be widest in areas of known or projected noise impact, along drainage ways, and around the APZ associated with Lawson Army Airfield. The buffer is omitted where encroachment associated with the cities of Columbus and Phenix City already exists. This “No-Development Buffer Zone” is illustrated in Figure 16.

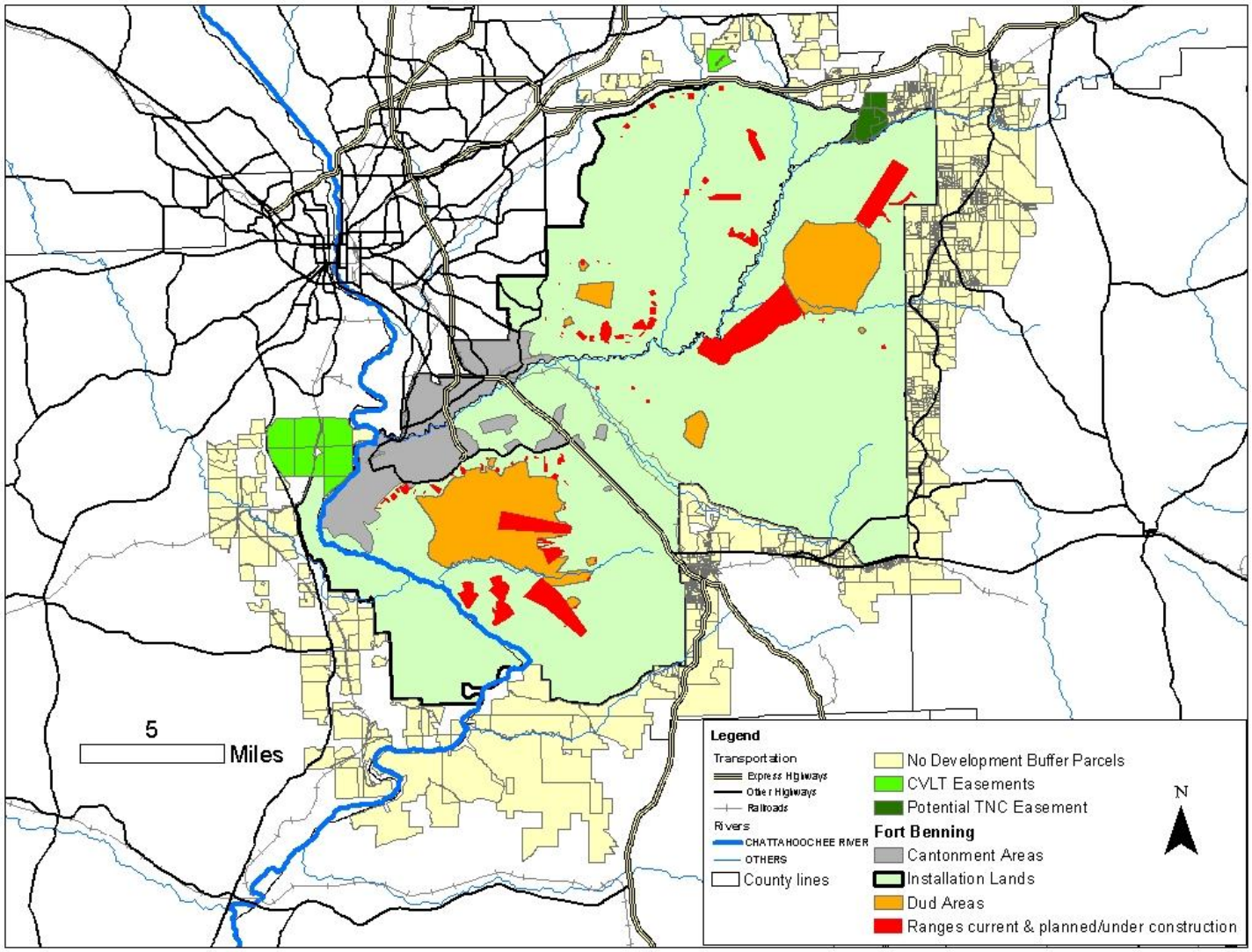

Figure 17. "No-Development Buffer Parcels" surrounding Fort Benning, for which no-development easements will be sought from willing landowners. These parcels were identified by selecting any land parcel that intersects a one-to-three mile buffer extending outside the installation boundary, excluding the northwest side adjacent to Columbus. The buffer extends to three miles to accommodate noise contours and/or watershed protection. Parcels less than 100 acres are not shown in Russell County AL and Muscogee County GA. Parcels on this map represent the population from which ACUB "no-development easement" projects can be sought; they are not all intended to represent viable or desirable

projects. Easements existing (held by Chattahoochee Valley Land Trust , CVLT) or under negotiation (to be held by The Nature Conservancy, TNC, are shaded.

Where prescribed burning associated with management of private-land conservation targets is expected to occur, additional buffers adjacent to these more outlying areas, or are intermingled with them, may be necessary. In addition water quality and habitat-buffering concerns can occur both adjacent to the installation boundary and further away, intermingled with other private-land conservation targets. Hence additional no-development easement acreage, not shown in the Figure 16, may be sought intermingled with the conservation zones quantified in sections 3.1.4.2 and 3.1.4.3 below.

Also, a recent amendment to the Official Code of Georgia, Section 36-66-6, states that community leaders must notify the Installation regarding zoning proposals and/or land use changes within 3,000 feet of a military installation boundary or APZ (Senate Bill 261, signed into law in 2003). Such notifications can be used to inform ACUB implementation within the no-development buffer zone.

3.1.4.2 RCW Corridors

A number of different quantitative objectives could be used for RCW habitat restoration outside of Fort Benning (e.g. mitigate impacts of future training infrastructure development, mitigate impacts of forest decline, accelerate achievement of recovery goal, etc.). The most practical objective from both conservation and military training perspectives is to facilitate the expansion of the installation's population into the most likely potential habitat, to join that population with its closest neighboring population allowing genetic interchange, and hence shift a portion of Fort Benning's RCW recovery responsibility off the installation into a protected private-lands corridor. This objective suggests that the creation of one or more habitat corridors into Russell County[32] should be the overriding strategy. This strategy is contingent not only on USFWS concurrence and permanent conservation easements on private land, but also on the establishment of RCW clusters on the Alabama side of Fort Benning as a "source population" for birds inhabiting the private-land habitat.[33]

The configuration of potential habitat corridors in Alabama is currently under study via landowner contacts, acquisition of land parcel data, and image-based land cover maps. Ecological constraints on this spatial configuration (particularly corridor width) are unknown. Until further investigations can be made with the latest behavioral models of RCW

[32] Potential also exists for a habitat corridor directed south into Stewart County GA, targeting private lands managed for quail habitat located 10 to 12 miles away from existing RCW habitat on Fort Benning. This strategy may be worthy of analysis in the future.

[33] Ralph Costa, USFWS RCW Recovery Coordinator, personal communication.

viability (Walters et al. 2002), there is a large degree of speculation and uncertainty surrounding the configuration of such corridors.[34]
Figure 17 depicts a large potential "RCW Corridor" within which vegetation cover and land ownership suggest some type of corridor creation is reasonable. The area depicted is over 130,000 acres, far larger than we can realistically plan to protect or restore in the foreseeable future. For planning purposes, we can envision two extremes: (1) A contiguous 30-mile swath of protected land, say 2 miles wide, would comprise approximately 40,000 acres. (2) A string of thirty 500-acre, half-mile radius RCW circles, each one touching its neighbor, would require only 15,000 acres.[35] A realistic goal is some intermediate area value, variable in width due to land ownership patterns. An area of 25,000 acres is a reasonable planning goal. Depending somewhat on configuration, a protected area of 25,000 acres would accommodate some 50 RCW circles, within which 6000 acres of good quality foraging habitat would need to be available at any given time.[36] An addition of 50 clusters to Fort Benning's population is also consistent with calculations of RCW clusters under threat from potential long-term training impacts (Figure 14) and by uncertainties associated with forest decline.[37]

The extent of longer-term RCW habitat restoration opportunities to the south and east (without the existing "quail plantation" areas for near-term connectivity targets) can be assumed coincident with the previously identified no-development zone, and the gopher tortoise zone described below. The same constraints on connectivity of habitat would apply as this habitat develops. Land protection opportunities for long-term RCW habitat restoration will be pursued opportunistically within the no-

[34] Ibid.

[35] The 500-acre circle used here is the idealized configuration of protected land surrounding a single cluster of cavity trees, within which 120 acres of foraging habitat should be supplied in perpetuity (with at least half of it within a quarter-mile radius inner circle). More details acceptable foraging habitat configurations for various levels of site productivity, species, and silvicultural systems may be found in the RCW Recovery Plan (USFWS, 2003). It is conceivable that such a "string of pearls," if viable as an RCW recovery area, might also be viable with an occasional gap as wide as two miles. Such gaps should be minimized however, and for planning purposes we assume that none exist, even in this "minimally adequate" extreme. Any such configuration will also depend on a healthy and productive population at the installation-end of the corridor, continually "pumping" birds into the new habitat (Ralph Costa, personal communication).

[36] These figures presume a 200-acre foraging habitat guideline for planning purposes. Federal land guidelines specify 120 acres for medium to high site index land, and 200-300 acres for low site index land. Even though this habitat will be managed on private lands (where the foraging habitat requirement is only 75 acres), we are augmenting a recovery population on federal land, hence the private-land guidelines do not apply (Ralph Costa, personal communication).

[37] (Pete Swiderek, Conservation Branch Chief, EMD, DPW, Fort Benning; personal communication.)

development and gopher tortoise zones. No specific acreage or cost accounting will be provided here for such long-term habitat restoration.

3.1.4.3 Gopher Tortoise (Fall Line) Corridor

Land parcels with appropriate soils for gopher tortoise habitat restoration northeast of Fort Benning are delineated in Figure 18. These areas represent appropriate areas for conservation acquisitions to secure gopher tortoise viability and associated ecological goals for the Fall Line region.

From Figure 15, the overlap of tortoise-friendly soils and potential training impact or infrastructure on Fort Benning represents about 10,000 acres, or about 15% of the tortoise-friendly soils on the installation. This area of overlap also encloses about 20% of the approximately 8400 tortoise burrows inventoried by USFWS in 1995-96. An additional 28,000 acres could be threatened by adjacent incompatible land use in an approximate one-mile band of tortoise-friendly soils inside the installation boundary. Encroaching land uses (residential/commercial development) would increase the difficulty of prescribed burning the habitat in this zone, and increase the likelihood of tortoise mortality upon movement outside the installation.

A reasonable goal for the ACUB is to mitigate the potential long-term loss of tortoise habitat due to training impact, and to buffer tortoise habitat along the installation boundary. A “habitat replacement” strategy could be accomplished by acquiring conservation easements or fee interest in land, primarily in Talbot and Marion Counties GA (Figure 18). Only very limited portions of Muscogee County GA would be pursued, because existing development and development pressure, even along the northern boundary of Fort Benning, limits available habitat and makes cost of land interests excessively high.

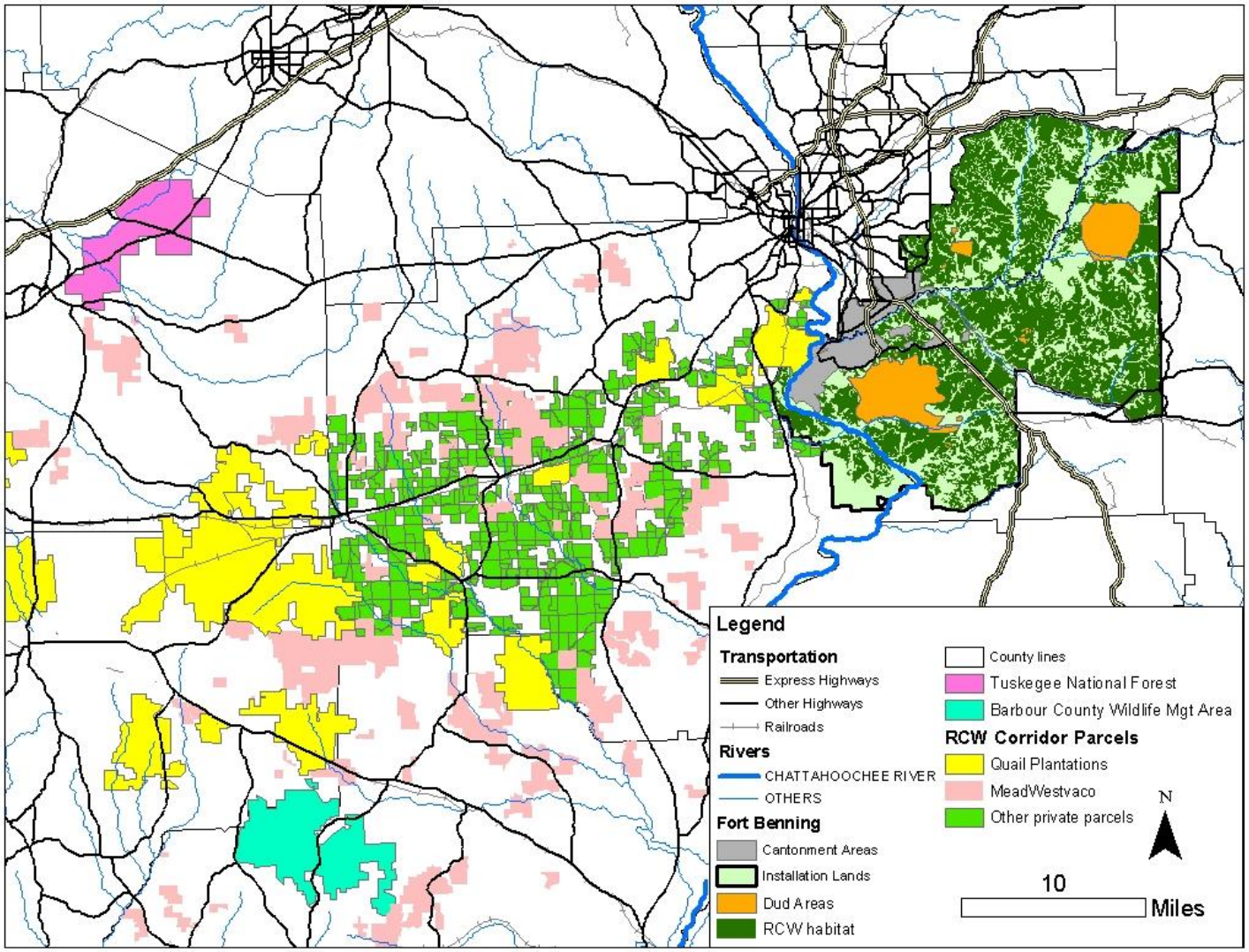

Figure 18. Potential RCW corridor extending west from Fort Benning, including MeadWestvaco commercial forest land, and large private "Quail Plantations" managed primarily for hunting bobwhite quail. "Other private parcels" shown are those greater than 100 acres in size with highest potential for connectivity. Together the Quail Plantation, MeadWestvaco, and other private parcels represent the population from which RCW-relevant ACUB projects (fee or easement acquisitions by TNC or other conservation partners) can be sought from willing landowners. They are not all intended to represent viable or desirable projects. Tuskegee National Forest and Barbour County WMA are already protected lands and are shown only for context.

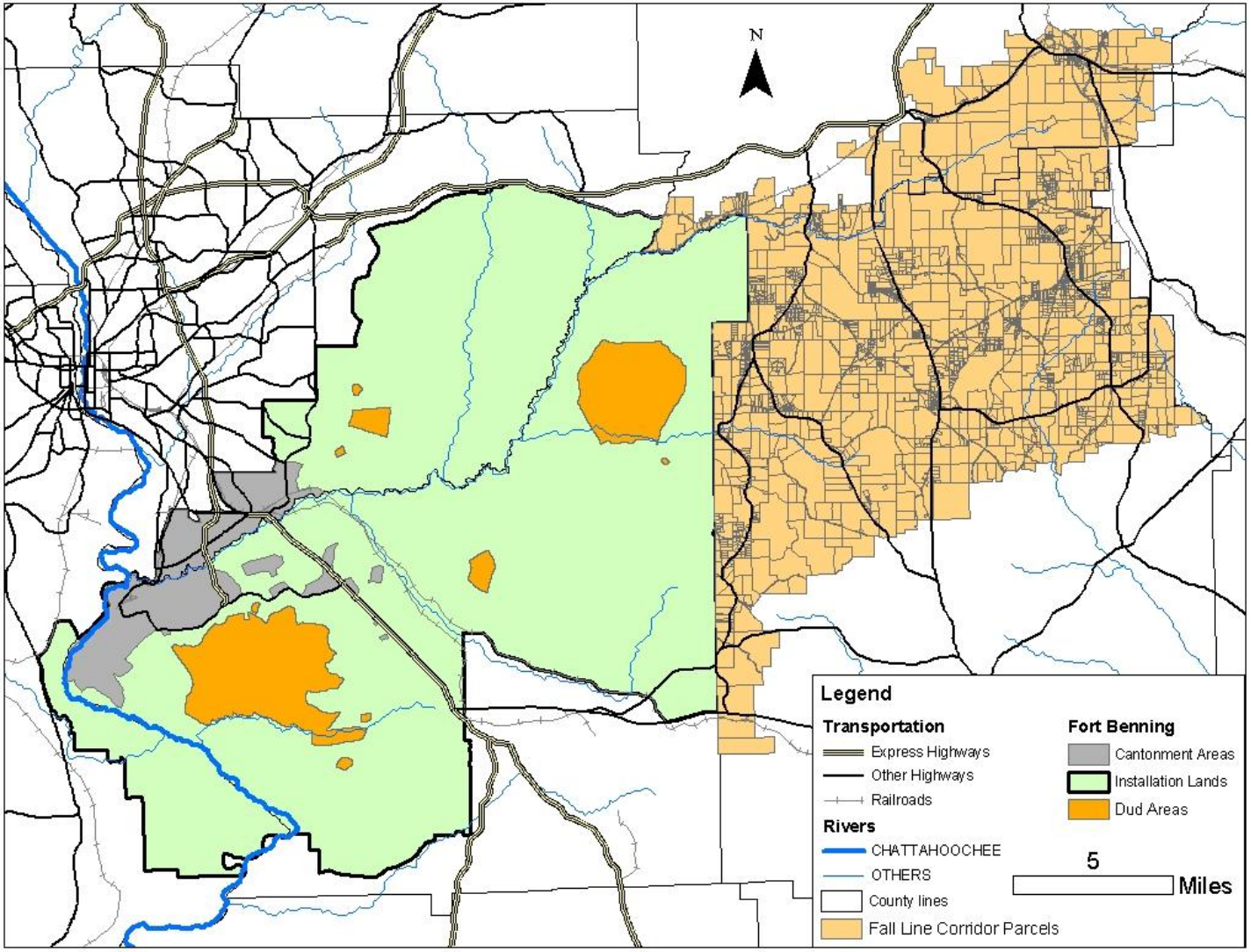

Figure 19. Fall Line corridor parcels, identified by having soil conditions appropriate for gopher tortoise habitat and/or Fall Line streams. Associated species, as well as wetland values and rare plant communities, can be protected in the same area. These parcels represent the population from which ACUB projects (fee or easement acquisitions by TNC or other conservation partners) with Fall Line conservation relevance can be sought from willing landowners; they are not all intended to represent viable or desirable projects.

On Fort Benning, we would estimate the 10,000 acres of tortoise habitat in jeopardy to contain around 500 tortoises (assuming one tortoise for every three of about 1500 burrows in that area). One might reasonably question whether or not land acquired and managed for gopher tortoise protection could eventually be "saturated" with tortoises at its theoretical carrying capacity, which may be as high as 5 tortoises per acre. In that scenario, supporting 500 tortoises would require only 100 acres! In reality, it is doubtful that 100 acres of contiguous optimal and manageable habitat could be located, acquired, and managed as necessary to achieve this density. Even the best examples of tortoise habitat on Fort Benning, when restricted to areas clearly occupied by inhabited tortoise burrows (far more exclusive than the "tortoise-friendly soils" map), frequently have less than 1 tortoise per acre, and those areas are typically non-contiguous, distributed in small clusters according to soil conditions, topography, vegetation, and land use. Clusters of inhabited burrows within a recent study area represented approximately three acres per tortoise.[38] Assuming that protected areas off Fort Benning could be managed in similar conditions at comparable tortoise density (a reasonable expectation), the 500-tortoise target could be protected with 1500 acres of non-contiguous habitat, assuming it is very well managed, with appropriate ground cover and appropriate time for the population to develop without significant disturbances. When accounting for configuration and distribution of soils and burrow clusters, a reasonable minimum area to capture those 1500 acres would be double that figure, or around 3000 acres. Hence intend to protect at least 3000 acres for gopher tortoise habitat conservation, preferably in units of at least 80-100 acres, each eventually supporting at least 50 tortoises. Smaller-sized or lower-population areas are less likely to be viable populations.[39]

This land can be protected by easement or fee acquisition, but *management* for gopher tortoise habitat, most notably the regular application of prescribed fire, is essential. Ultimate responsibility for prescribed burning would rest with the landowner, but it is conceivable that TNC and/or Fort Benning could provide financial or in-kind assistance under some circumstances. It is important to note that we are not necessarily recommending relocating tortoise populations from occupied habitat on Fort Benning to unoccupied or partially occupied habitat outside Fort Benning, although such relocation strategies have been shown to succeed. From a conservation standpoint we would prefer to see newly

[38] Unpublished data, Paula Kahn, Auburn University. Such density calculations are only approximate, as they require subjective delineation of areas that include burrows in which tortoises were captured. The study area was within the footprint of the new Digital Multipurpose Range Complex in the northeastern part of Fort Benning.

[39] Discussion of gopher tortoise habitat requirements based on discussions with Craig Guyer and Paula Kahn (Auburn University) and Bill Birkhead (Columbus State University). Our estimates are also consistent with the findings of Eubanks et al. 2002 regarding necessary size of reserves.

protected populations on private lands develop naturally with improved habitat management, augmenting any existing populations.

Tortoise habitat is relatively easy to restore and manage on appropriate soils. Suitable habitat can be created in a few years by applying standard land management methods including site preparation, artificial regeneration, and prescribed fire. Gopher tortoises also can successfully inhabit lands managed for pine forest products if care is taken to maintain pine basal area at a level low enough to promote the development of a sufficiently dense herbaceous understory. Proper management is essential for gopher tortoises to thrive on protected areas (McCoy and Mushinsky 1992); fire is the most important management practice in this regard because of its role in maintaining an open overstory and dense herbaceous understory.

3.1.5 *Potential Partners*

The Nature Conservancy (TNC) is an eligible entity for the development of an ACUB with Fort Benning. TNC is a conservation nonprofit organization whose mission is to "preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive" (TNC 2001). TNC is the largest environmental nonprofit in the US and has offices in all 50 states as well as throughout the Western Hemisphere and parts of the Pacific Rim. Since 1995, TNC has had a Cooperative Agreement with the DoD to "provide effective and efficient protection and management of biodiversity within the context of the DoD's environmental security and military missions."

Fort Benning is a priority conservation site in two TNC ecoregional plans and is recognized as a regional center of biodiversity in some measure because of its long history of military training and management. It is in TNC's interest, and consistent with its conservation mission, to protect Fort Benning's status as an active Army installation. Through a decade of cooperative work between TNC and the Army (Table 3), Fort Benning has made significant strides in ecosystem restoration and the implementation of ecosystem management. These gains would be at significant risk if the installation's mission were compromised. Development of an ACUB would strengthen not only Fort Benning's training mission, but also TNC's mission to protect regional biodiversity.

Table 3. Projects and Cooperative Agreements related to Fort Benning, between The Nature Conservancy and the U.S. Army Infantry Center.

Project	Dates	Current Cooperative Agreement
RCW surveys and monitoring, artificial cavities, pitcher plant monitoring and management	1993-1996	NA
INRMP Development and Implementation	1996 – present (several iterations)	DAMD17 – 00 – 2 – 0044
Environmental Awareness	1999 - 2003	NA
Uneven-aged Forestry	2000 - 2004	NA
Vegetation Characterization	2000 - present	DAMD17 – 00 – 2 – 0017
Ecological Monitoring	2004 - present	W81XWH – 04 – 2 – 0051

A number of other organizations may be appropriate as additional eligible entities in partnership with DoD and TNC in the development of this ACUB. Various local or regional land trusts have already made inroads in the private landowner community by acquiring conservation easements. Often these land trusts have conservation goals that emphasize undeveloped or minimally developed landscapes and working farms and forests, more so than TNC's focus on rigorous biodiversity conservation. These land trusts include (but are not limited to) Chattahoochee Valley Land Trust, Georgia Land Trust, Alabama Land Trust, Alabama Forest Resource Center, and Trust for Public Lands. Additionally, state governments may have conservation-oriented land-acquisition goals consistent with the ACUB, and are often in a better position to own and manage any lands that may be available for fee-simple purchase.

Potential private partners, with incentive through ACUB funds, other public funds or incentive programs, or simply community involvement benefits, include MeadWestvaco, the largest local forest landowner, W.C. Bradley Company, with local land and real estate interests, and Enon Plantation, a commercial hunting preserve.

3.2 Alternative Actions

3.2.1 No action

Under this alternative, Fort Benning would not pursue establishment of an ACUB and would instead continue other efforts to minimize encroachment, such as the Joint Land Use Study (JLUS). JLUS is a community-driven land-use planning study, funded in part by the DoD in communities with military installations where encroachment-related mission impacts are deemed likely or imminent. JLUS proposes voluntary use of land management mechanisms for the community and Fort Benning to reduce or avoid encroachment, such as notices, disclosures and zoning. The JLUS alone would not ensure the level of protection against encroachment proposed in this ACUB, but the

JLUS is another important tool to address encroachment. A Fort Benning area JLUS has been approved and is scheduled to begin in 2005 or 2006. Under this No Action alternative, TNC would continue its partnership with Fort Benning but would confine its activities to management, monitoring, and planning for natural resources inside Fort Benning with no attention to encroachment issues outside the installation. Incompatible uses will spread around the eastern, southern, and western boundaries of the installation. Smoke and noise complaints will rise, and Fort Benning will have to curtail training and land management activities (chiefly burning) that support training and conservation. Gopher tortoises and various rare plant species will decline outside the installation as land use changes alter their habitat, and they will eventually be federally listed. Gopher tortoise and RCW habitat inside the eastern boundary of the installation will be degraded due to intensifying residential land use. Mechanized training will be sharply curtailed by internal encroachment from these species on Fort Benning. Increased training and infrastructure needs on the installation, and the dynamics of forest senescence and pathology, will begin to limit RCW habitat with no adjacent habitat or potential habitat outside the boundary to relax this pressure. Desired Future Ecosystem Conditions described in the INRMP will not be reached. For additional detail see Section 2.2.

4 Explanation of funding requirements

4.1 Cost estimates

No-Development Buffer

Costs for no-development easements vary, but a "rule-of-thumb" is one-half of the fee value of the land. If land costs in the vicinity of Fort Benning average $2,000 per acre, then purchased easements would average $1000 per acre. It is unrealistic to expect that a solid contiguous buffer could be protected throughout this zone (75,000 acres). Habitat-protection and encroachment-mitigation value accrues even with partial protection of the buffer, so long as it is constructed “inside out” and concentrated in areas where experience demonstrates that easement acquisition is likely and hence contiguous protected areas could be created. Also, some landowners may be interested in donating such easements, if the tax advantages (income tax, property tax, estate tax) can be demonstrated. Developing the experience and detailed planning necessary to better define the no-development buffer zone and its acquisition is beyond the scope of this ACUB proposal, but for planning purposes we can estimate that $15 million should be sought (to protect at least 20% of the mapped zone, or 15,000 acres, via purchased no-development easements). Cost of monitoring easements and managing the program for 15,000 acres of these easements would be approximately $100,000 per year once it reached that size, depending on the number and size of easements and the complexity of easement restrictions.

RCW Corridor

Assuming an average land acquisition cost of $2000/acre and conservation easement cost of $1000 per acre, and assuming that 20% of the land would be acquired in fee while 80% would be covered by easements, cost of protecting 25,000 acres of land in Russell County for creating a habitat corridor for the RCW would be $30 million. Annual costs for management (dominated by prescribed burning) and easement monitoring would be approximately $200,000 for a program of this size, depending on size and number of parcels.

Gopher Tortoise (Fall Line Corridor)

Assuming an average land acquisition cost of $2000/acre and conservation easement cost of $1000 per acre, and assuming that 20% of the land would be acquired in fee while 80% would be covered by easements, cost of protecting 3,000 acres of land for the gopher tortoise using this combination of easement and fee acquisition would be $3.6 million. Annual costs for management (dominated by prescribed burning) and easement monitoring would be approximately $25,000 for a program of this size, depending on size and number of parcels.

4.1.1 Cost for interests in land

There is substantial overlap among these strategies (e.g. much of the land in the "no-development buffer" may also be sought for gopher tortoise habitat as well as an RCW corridor). However, we don't realistically foresee any of these strategies being implemented on 100% of the target areas, so we can justify viewing each independently. Using the assumptions mentioned for the mix of easements and fee acquisitions and for land and easement values, the total cost of land interests for the ACUB is tabulated in Table 4.

Table 4. Approximate cost of land protection (interests in land) for developing Fort Benning's ACUB. Includes purchased easements and purchased fee land. All calculations presume $2000/acre land value with easement value at 50%. Documentation, administration, monitoring, and management costs not included.

Land Protection Strategy	Acres to Protect	Projected Cost
No-Development Buffer (all easement)	15,000+	$15,000,000
Gopher Tortoise Habitat (80% easement, 20% fee)	3,000	$3,600,000
RCW Habitat Corridor (80% easement, 20% fee)	25,000	$30,000,000
Total ACUB (excluding any donated easements)	43,000	$48,600,000

4.1.2 Additional land protection costs

Costs associated with documenting, monitoring, and managing protected lands are not included the table above. For planning purposes we can estimate that one-time costs of land or easement acquisition will be $40/acre, annual easement-monitoring costs are $6 per acre and periodic management costs (dominated by prescribed burning) are $20 per acre. These recurring costs would be maintained in perpetuity. Extrapolating these numbers to the entire project—making reasonable assumptions on rate of land protection projects, average size of projects, frequency of management, and annual funding mechanism—could add between five to ten percent to the total projected cost.

The extent to which the Army would be responsible for such additional costs on ACUB lands, and how these tasks would be funded in the long-term, is still being explored. For example, whether DoD funds can be used for easement monitoring, if conducted as usual by funding an endowment at the time the easement is formed, is uncertain. Also, public funds from other agencies can often be acquired for habitat management.

Also not included here are staffing costs for TNC personnel (or those of other entities working in partnership with the Army and TNC) involved with conservation planning, field reconnaissance, negotiation, analysis, partner liaison, etc. Depending on the rate of land protection for ACUB development, this need could represent a full-time job for one to four land protection specialists. Currently the Army funds one such position (under Fort Benning's INRMP Implementation cooperative agreement with TNC, Table 3), with part-time assistance from other TNC staff. The INRMP Implementation cooperative agreement is in place through 2006.

4.1.3 Rate of ACUB development

For planning purposes, we assume that the current TNC staff will carry out ACUB development for the five-year period 2006-2010 (requiring one or more new cooperative agreements for all but the first year of that period). We estimate that some 30 easements, protecting approximately 7000 acres, could be acquired over that five year period with existing staff, assuming success of our community outreach initiatives (see Section 4.4 below) and some assistance from other local land trusts. The non-staff funding for this five year period, including easement preparation, documentation, monitoring, and management, assuming a mix of all three land protection strategies, would be approximately $8 million, ramped up from $1 million in each of the first two years, to $1.7 million in each of the next two years, to $2.6 million in the fifth year. This five-year plan would accomplish only about 20% of the total identified ACUB need, suggesting that new staffing and/or partnering initiatives will be necessary to protect the entire ACUB within an acceptable (e.g. 10-year) time period.

Table 5. Five-year plan for initial implementation of Fort Benning ACUB Proposal, assuming current TNC staffing and local land trust activities. Assumes equal emphasis, and average costs, for all strategies in Table 4. All costs in millions of dollars.

Year	Number of Projects	Acres Protected	Cost for interests in land	Other protection costs	Total Cost	Partner contributions to be sought (including in-kind assistance*)	Army Responsibility
2006	3	900	1.0	0.1	1.1	0.1	1.0
2007	5	1200	1.4	0.1	1.5	0.5	1.0
2008	8	1800	2.0	0.2	2.2	0.5	1.7
2009	8	1800	2.0	0.2	2.2	0.5	1.7
2010	10	2400	2.8	0.3	3.1	0.5	2.6
5yr Total	34	8100	9.2	0.9	10.1	2.1	8.0

* Partner contributions to include private fund-raising, public funding sources, and in-kind assistance including the value of donated easements.

4.1.4 Anticipated partner funding.

Current and potential partners are described in Section 3.1.5 above. Direct financial and in-kind contributions for land interests are possible from:

- The Nature Conservancy (via local private fund-raising for land protection of conservation value to the local community). Local TNC fundraising in the past has been on the order of $10,000 to $25,000 per year to support non-DOD projects, although much larger amounts were raised in the 1990s as part of the Chattahoochee River Campaign, a joint effort between TNC and Trust for Public Lands to protect significant lands along the Chattahoochee River between Atlanta and Columbus. Some $500,000 of these funds are still available to TNC; TNC is seeking flexibility to divert this amount (provided by a single donor) to conservation projects with value to both Fort Benning and the community. Additional fundraising at this scale can be sought pending approval of this ACUB Proposal.

- Other conservation non-profits (e.g. The Conservation Fund, Trust for Public Lands, Atlanta Botanical Garden, Meadowview Biological Station). Many organizations in addition TNC seek private capital purely to bring private lands into conservation management by fee or easement acquisition. The Conservation Fund has been particularly successful in recent years at brokering large conservation land deals with industrial and institutional forest landowners, including some in the south. The Trust for Public Lands partnered with TNC on the Chattahoochee River Campaign in the 1990s and maintains a Chattahoochee River project which may be extendable to the Fort Benning area. More narrowly-focused botanical societies have shown willingness to invest in the protection of particularly significant rare plant

populations, including some recent botanical discoveries by TNC along the Fall Line near Fort Benning, an area long regarded as highly significant to the regional conservation of pitcherplants, Atlantic White Cedar, and other species whose ranges play out in this unusual area (Sheridan and Patrick 2000).

- Private landowners (via donation of conservation easements in expectation of tax advantages, and/or conservation purchases with subsequent easement donation or sale). Many of these contributions may be brokered by other land trusts (see Section 3.1.5) in addition to TNC.

- Large timberland owners, including institutional investors, interested in the management of large forested estates capable of producing a steady stream of timber revenue but with all other development value extinguished. TNC and other conservation interests are seeking relationships with such entities to permanently protect working-forest landscapes.

- State of Alabama, via Alabama's "Forever Wild" fund dedicated to protecting lands of conservation significance. Alabama's program has been in existence for over ten years and has protected over 100,000 acres of land in Alabama via fee acquisition for parks and preserves. Authorized through 2012, it is funded primarily by tax revenue from offshore oil and gas extraction, and is currently providing $10-15 million annually for land protection in Alabama.

- State of Georgia, via Georgia's new Land Conservation Program, authorized by the Governor in April 2005 to protect lands of natural, cultural, or historic significance. Georgia's new program is currently funded at $100 million, of which about $40 million is available for outright purchase of land or easements. The balance is a revolving loan fund that can be used facilitate conservation purchases that lack near-term funding. Georgia's program can include purchased conservation easements, so long as some provision is made for public recreational use or access.

- Federal sources for protection of conservation lands, e.g. Land and Water Conservation Fund (LWCF), and Forest Legacy. LWCF is the primary means by which the federal government acquires conservation lands; funding has been lower than usual in recent years but $142 million is still available in 2006 for federal and state acquisitions and similar or greater levels will likely be sought in the future. Forest Legacy funding is sought by states to acquire or protect private forestlands at risk of development. This fund is also receiving lower-than-usual support from Congress but is funded for 2006 at $57 million. With appropriate state and local political support it is possible that either or both of these funds could be used to provide financial leverage for an ACUB project of high conservation value.

4.1.5 Other Anticipated partner contributions

The private funding sources mentioned above (especially TNC, other non-profits, and landowners maintaining fee interest in protected lands) are the most likely sources of other protection costs such as easement monitoring and land management. The funding need and likely source can be broken down into several distinct scenarios:

- *Conservation easement donated to TNC, a partner non-profit, or a public agency, in expectation of tax advantages.* In this case the easement donor is often asked to fund an endowment that pays for easement monitoring and administration. In some cases TNC may divert other private funds to fund the endowment. Management remains the landowner's responsibility, with TNC often providing assistance (e.g. prescribed burning) if they are the easement holder. To fund that assistance, TNC may seek a combination of public and private funding year-to-year. It is conceivable that Army funds or in-kind assistance could be sought to support management as long as TNC has a presence at Fort Benning. The funding mechanism would likely be a five-year cooperative agreement such as those in place now.

- *Conservation or no-development easement purchased by TNC, a partner non-profit, or a public agency using ACUB funds.* In this case, the easement seller is not likely to be willing to fund an endowment so other non-Army funds would likely be sought by the easement purchaser. Management remains the landowner's responsibility; again TNC might provide assistance if they are the easement holder, possibly with Army support as described above.

- *Fee acquisition by TNC, a partner non-profit, or a public agency using ACUB funds.* In this case, after one-time administrative costs associated with the purchase, an endowment may or may not be necessary to cover management costs. Non-Army funding would likely be sought for any such endowment as part of any partner contributions toward the acquisition. With or without an endowment, management responsibilities will fall to the new owner. If TNC owns or manages the property, it is conceivable they may seek Army funding to support management via renewable cooperative agreements, though an endowment funded without Army support would probably be sought for minimally-adequate management needs.

Should new legislation authorize the Army to fund endowments for management and monitoring of installation buffer lands, any of the scenarios above might be supplemented by that strategy.

4.2 Implementation

4.2.1 Project Review

While TNC is granted considerable latitude in reconnaissance and preliminary landowner contacts for potential ACUB projects, the responsibility to recommend projects for ACUB funding will lie with an ACUB Implementation Review Team consisting of representatives from Fort Benning DOT, DPW (Environmental Management Division), and SJA. Recommendations will be made to the Garrison Commander, and will be informed by TNC's best available information on opportunity, leverage funding, training benefit, conservation value, and the priority guidelines described below. Review of overall ACUB implementation success by the Department of the Army's ACUB Program management staff will be conducted annually, with a biannual in-depth on-site review.

4.2.2 Prioritization

The strategies identified above are spatially explicit (Figures 16, 17, and 18) and include overlapping areas that share the distinct goals associated with each strategy. Figure 19 illustrates the intersection and overlap of these strategy areas, from which six separate priority zones can be designated.

Each of the six "priority zones" provide opportunities to prevent or divert encroaching incompatible land use, and/or to protect, secure, or restore habitat that will ultimately benefit Fort Benning's training mission. The six zones can be described and ranked as follows:

1. Northeastern Buffer with Fall-Line Habitat. This zone is highest priority and represents the intersection of the No-Development Zone with the northeast Fall-Line corridor. Proximity to Hastings Range, potential for development associated with the Fall Line Freeway, and Fall Line habitat potential combine to make it high priority. If significant conservation targets exist, the probability for conservation-partner funding is high.

2. Western Buffer with RCW Habitat. This zone is also high priority, and represents the intersection of the No-Development Zone with the western RCW corridor. Opportunity to expand RCW habitat off-post, potential for development associated with Phenix City and Fort Mitchell, and proximity to Lawson field combine to make it high priority. Probability of success is somewhat lower than #1, due to exacting requirements of RCW recovery regulations.

3. Northern Noise Buffer. This zone is high priority due to its association with Hastings Range, Ruth Range, potential future ranges, and other training

activities, and its current rapidly-developing status. With a few notable exceptions, it lacks broad habitat significance and in some cases may be too-far developed already. Much of it is already a smoke-sensitive area. High land values make this a high-cost area for purchasing land interests.

4. Fall Line Habitat Corridor (northeast of Zone 1). This zone is primarily of conservation significance, offering opportunities to secure Gopher Tortoise viability, watershed protection, and other Fall Line conservation targets. It ranks highly also because of significant funding leverage available from conservation partners interested in protecting rare plant communities in this area.

5. RCW Habitat Corridor (west of Zone 2). This zone is primarily of conservation significance, offering further opportunity to expand RCW habitat (and other mature-pine habitat conservation targets) off-post. It is also included because of significant funding leverage available from conservation partners interested in protecting and connecting such habitat throughout east-central Alabama. It ranks lower than #4 because probability of success is somewhat lower due to exacting requirements of RCW recovery regulations.

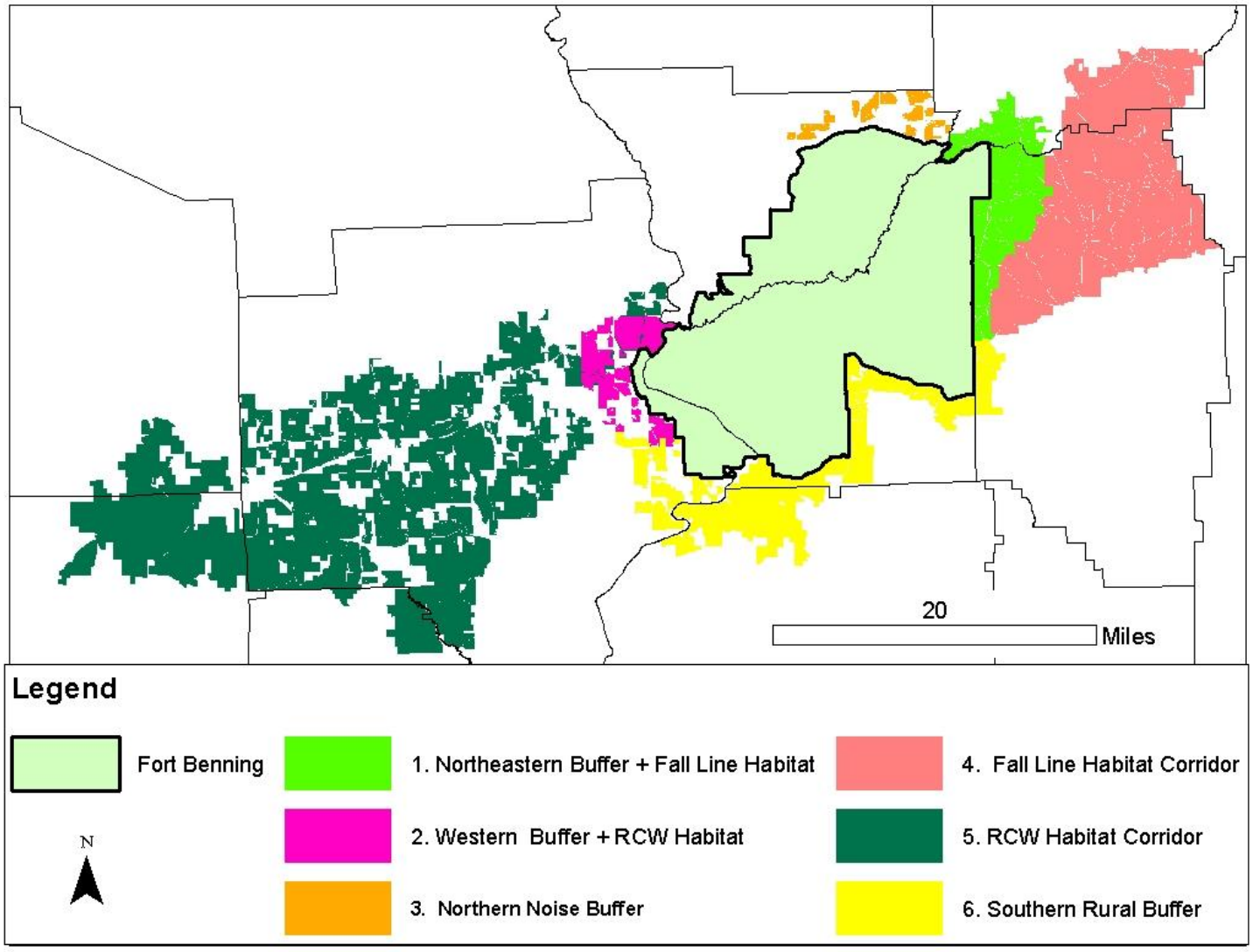

Figure 20. Priority Zones arising from intersection and spatial arrangement of three ACUB Strategies.

6. **Southern Rural Buffer** (south of Zones 1 and 2). This zone's significance as a noise buffer is lower because it is currently less developed than Zones 1 and 2 and a greater distance from noise-generating activities. But potential for noise-issues still exist and smoke issues can very definitely exist. It offers mostly long-term habitat significance, opportunities for conservation-partner leverage are far less than Zones 1, 2, 4, and 5. Current land-use is mostly rural except for the U.S. 27/280 corridor, and landowner attitudes may be an obstacle to ACUB projects. If the latter concern can be addressed, parts of this area also may have future Army land acquisition potential, due to large parcel size, rural land use, and minimal conflict with conservation priorities.

5 Potential issues of concern or controversy, including any issues of potential Army-wide impact

5.1 Public Relations

Public relations surrounding the acquisition of fee and easement interests by TNC or other conservation partners will need to be managed carefully. Emphasis in public communications should reflect the fact that all purchases will be made from willing sellers, and that land use will be conservation and buffering, not military training. While opportunities for military training on acquired conservation lands may exist, they should not be presumed and should be handled on a case-by-case basis depending on conservation objectives and desires of the landowner.

5.2 Probability of Success

Success of this initiative depends on the availability of willing sellers of property and interests in property identified as high priority for acquisition. These sellers have not been identified, nor have landowners in the ACUB been polled to determine general attitudes toward acquisition of fee and easement interests in the area.

5.3 Tax Receipts

Property tax receipts for property placed under conservation easement can be reduced. Nonprofit organizations that hold property for conservation purposes are not obligated to pay property taxes, which also reduces total tax receipts.

5.4 Addressing Issues of Concern

Partly to address these concerns, and partly for its own needs, TNC is pursuing a regional marketing strategy for conservation and land protection, designed to

emphasize regional conservation goals, quality of life in the area, natural heritage, and outreach to environmentally-concerned citizens, conservation-minded landowners, and philanthropy-minded donors. This strategy is independent from DOD or Ft Benning interests, but will ultimately serve to increase the effectiveness of ACUB development by generating private funding and increasing acceptance of TNC conservation strategies by landowners and community leaders.

6 Timeline with milestones for the proposed action

The timeline provided here begins four years ago with initial identification of encroachment threats. Going forward (2006+), it presumes an annual review and evaluation of current implementation priorities.

2001 Fort Benning INRMP identifies encroachment threats
2002 TNC's Fort Benning Project begins initial investigation of private land protection opportunities
2003 First draft of Encroachment Plan, TNC-commissioned GIS study of adjacent landownership, land-use, and land characterization
2004 Encroachment Plan revised and re-worked as ACUB Proposal; TNC Land Protection Specialist hired. Contacts with local landowners and community leaders. TNC commissions second GIS study for more specific land protection targets.
2005 ACUB Proposal formally submitted for approval. Field reconnaissance, landowner contacts, regional conservation planning.
2006 Public participation via JLUS, etc. IONMP for Fort Benning finalized. INRMP for Fort Benning revised. Fort Benning to request $1 million for acquisition of easements and conservation lands.
2007 Fort Benning to request $1 million for acquisition of easements and conservation lands. Partner contributions (in-kind and direct financial) sought to provide additional $0.5 million, to fund endowments, facilitate management, and supplement acquisition of land interests.
2008 Fort Benning to request $1.7 million for acquisition of easements and conservation lands. Partner contributions (in-kind and direct financial) sought to provide additional $0.5 million, to fund endowments, facilitate management, and supplement acquisition of land interests.
2009 Fort Benning to request $1.7 million for acquisition of easements and conservation lands. Partner contributions (in-kind and direct financial) sought to provide additional $0.5 million, to fund endowments, facilitate management, and supplement acquisition of land interests.
2010 Fort Benning to request $2.6 million for acquisition of easements and conservation lands. Partner contributions (in-kind and direct financial) sought to provide additional $0.5 million, to fund endowments, facilitate management, and supplement acquisition of land interests.

2011-2015:

Staff-up and re-focus, based on prior annual ACUB reviews, to achieve full ACUB implementation by 2015.

7 Plan for scoping and public participation

The Joint Land Use Study (JLUS) process, and public outreach by The Nature Conservancy, will provide opportunities for public scoping and participation in the development of the ACUB for Fort Benning. Additional public/stakeholder involvement and/or NEPA reviews deemed necessary will be sought as the ACUB program is implemented.

7.1 Compliance with NEPA

- Under the provisions of 32 CFR Part 651, *Environmental Analysis of Army Actions,* 29 Mar 02, an environmental analysis is required for Army actions that affect human health and the environment, unless categorically excluded. In accordance with 32 CFR §651.29(a), the proponent must satisfy certain screening conditions when determining whether to use a categorical exclusion (CAT-X). The proponent has applied the screening conditions to the proposed ACUB:

  a) This action is not segmented to meet the definition of a CAT-X;

  b) No exceptional circumstances, as defined by 32 CFR §651.29(b), exist that preclude the use of a CAT-X; and

  c) Because this proposal involves acquisition of real property where the land use will not change substantially,[40] a CAT-X is available. See 32 CFR Part 651, Appendix B, paragraph (f)(5).

- Accordingly, a Record of Environmental Consideration will be filed with the following information and conditions:

  a) Fort Benning will coordinate with USFWS on individual ACUB projects when any Federally listed species are potentially affected.

  b) Each ACUB project will be submitted to EMD NEPA for review to determine extent, if any, of land use change involved and to document any possible impacts on RCWs or other enviro resources.

[40] We are assuming that "substantial change in land-use" does not include change from one rural land-use to another, e.g. open farm land to working forest, or working forest to ecological preserve. In general the land use changes created by this ACUB will involve gradual changes in vegetative cover and changes in the frequency and intensity of forest management practices (e.g. timber harvesting, prescribed burning).

c) If an extraordinary circumstance is later found to exist, or a substantial change in land use is later proposed, appropriate NEPA analysis will be conducted.

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APPENDIX G

REFERENCE INFORMATION

APPENDIX G1 REFERENCES

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APPENDIX G2 GLOSSARY OF TERMS

Abandoned Borrow Area. — An excavated area that has not been used in the last two years and that may have vegetation (volunteer pines, native vegetation) growing within its boundaries. The supply of fill material in this type of borrow area may have been depleted.

Active borrow area. — An area that has been excavated in the past year.

Adaptive management.—Treating management goals and techniques as hypotheses that are confirmed or falsified by success or failure (Walters 1986).

Anerobic respiration.—A special form of respiration that occurs in the absence of air or free oxygen.

Annuals.—Plants that germinate from seed, grow, mature, and set seed in a single season then die.

Aquatic nuisance species.—Non-indigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters. Definition taken from Title 16 of the United States Code, Chapter 67 "Aquatic Nuisance Prevention and Control," Section 4702 "Definitions."

Backing fire.—A fire spreading or set to spread into (against) the wind, or downhill.

Backpack pump or bladder bag.—A 5-gallon container with shoulder straps and slide pump used in remote areas to mop up or suppress fires.

Bark char.—The height of the blackened bark on the tree bole caused by the heat from a fire.

Basal area.—cross-sectional area of all stems of a species or all stems in a stand measured at breast height and expressed in square feet per unit of land area, usually per acre.

Belt weather kit.—Belt-mounted canvas case with fitted pockets for anemometer, compass, sling psychrometer, slide rule, water bottle, pencils, and book of weather report forms.

Best Management Practices (BMP).—Methods, measures, or practices to prevent or reduce water pollution, including but not limited to structural and non-structural controls, operation and maintenance procedures, and other requirements, scheduling and distribution of activities. Usually BMPs are applied as a system of practices rather than a single practice.

Biological diversity (biodiversity)—The variety of life at every hierarchical level and spatial scale of biological organization: genes within populations, populations within species, species within communities, communities within landscapes, landscapes within biomes, biomes within the biosphere (Wilson 1992). Often limited to native biodiversity, not diversity per se (Noss and Cooperrider 1994).

Biennials.—Plants that require two growing seasons to germinate, mature, and set seed, then die.

Blackline.—Preburning of fuels either adjacent to a control line before igniting the main prescribed fire or along a roadway as a deterrent to human-caused fires. Blackline denotes a condition in which there is no unburned fine fuel.

Borrow Area. — An excavated area where material has been excavated for use as fill at another location. This term is synonymous with borrow pit; however, a shallow excavated area can be on the side of a hill and not resemble a pit. To include both types of areas the term borrow area is used in this plan.

Bulk density.—The mass of dry soil per unit of bulk volume including the air space after drying. Generally, the higher the bulk density, the greater the level of compaction.

Burn boss.—Person responsible for managing a prescribed fire from ignition through mop-up.

Cambium.—The layer of growing cells under the bark of woody plants.

Cantonment area.—The developed areas of Fort Benning.

Chip.—small piece of wood used to make pulp or wood composites (made either from wood waste in a sawmill or pulpwood operation or from pulpwood specifically cut for this purpose) or fuel (made either from sawmill waste or from chipping trees in the woods).

Chip-n-saw.—process whereby small logs are converted into cants by chipping the outer portion of the log, and then the cants are sawn into lumber as part of the same operation.

Chloroplasts.—Structures within plant cells that contain the pigment chlorophyll.

Chlorosis.—Plant symptom of yellowed leaves caused by nutrient deficiency or other plant malady.

Cone.—seed-bearing structure of conifers consisting of a central stem, woody or fleshy scales, bracts, and seeds; an aggregation of sporophylls.

Conelet.—immature cone (strobilus) in conifers—note term is usually applied to the young female cone from the time of scale closure after pollination until the initiation of rapid development of the cone following fertilization a few months before maturity.

Contain.—Confine a pest species (and for undesirable plants any propagules) to an identified area of infestation.

Container seedling.—seedling grown in a receptacle containing the soil, etc., in which it has developed from seed.

Control.—As appropriate, includes eradicating, suppressing, reducing, or managing a pest species populations; preventing the spread of pest species from areas where they are present (containing); and taking steps (such as restoration of native species and habitats) to reduce the adverse effects of pest species and to prevent further introductions.

Convection column.—The rising column of gases, smoke, and debris produced by a fire. The column has a strong vertical component indicating that buoyant forces override the ambient surface wind. A convection column forms a specific part of the smoke plume.

Crown scorch.—Browning of needles or leaves in the crown of a tree or shrub caused by heat from a fire.

Cut-to-length (CTL).—harvesting system in which felled trees are processed into log lengths at the stump before they are carried to the road or landing; an alternative to full-tree logging.

Dormant.—The period during which a plant makes no active growth. Dormacy is a protection mechanism influenced by such factors as water availability, light duration, and temperature.

Dormant season.—A condition in the life of an organism or its parts (sometimes termed the resting stage) when a tissue predisposed to proliferate does not do so and visible growth and development are temporarily suspended. This condition occurs during the winter months (winter dormancy).

Drip torch.—Hand-held apparatus used to ignite fires by dripping flaming liquid fuel (burning fuel), at an adjustable rate, on the materials to be burned. The fuel is generally a mixture of 65 percent diesel and 35 percent gasoline.

Duff layer.—The layer of decomposing organic materials lying below the litter layer and immediately above the mineral soil that is comprised of the fermentation and humus layers of the forest floor.

Ecosystem health—Occurrence of normal ecosystem processes and functions (Costanza and others 1992). "Normal" ecosystem function means ecological processes, such as primary production of biomass; nutrient recruitment, retention, and cycling; and disturbance regimes, occurring as they have occurred historically. Wilderness areas potentially provide the historic benchmarks (Leopold 1941). According to Leopold (1941), a science of ecosystem health would determine the ecological parameters within which land may be humanly occupied without making it dysfunctional. Ecosystem health also may be characterized by its "counteractive capacity:" the capacity to absorb external perturbations and rapidly resume normal activities after being substantially assaulted (Rapport 1995). In summary, the concept of ecosystem health, defined in terms of the occurrence of normal ecosystem processes, can be specified only by reference to natural areas where the concept of biological integrity is understood.

Ecological (biological) integrity—Native species populations in their historic variety and numbers naturally interacting in naturally structured biotic communities (Angermeier and Karr 1994). According to Angermeier and Karr (1994), diversity describes only the elements of the biota and biological integrity more inclusively comprises ecological processes. Moreover, as indicated in the preceding sentence, these authors use the term biological integrity; however, because ecological processes are involved, ecological integrity is a more descriptive term.

Ecological rehabilitation—Process of returning, as nearly as possible, an ecosystem to a state of health (Michigan Department of Natural Resources 1994). Meffe (1995) defines ecological rehabilitation as incomplete restoration: "A partial movement along the trajectory from degraded to the original state is termed 'rehabilitation.' " "Original state" is probably the same thing Anderson (1991) means by a "pre-settlement" biotic community (Callicott and others 1999).

Ecological restoration—Process of returning, as nearly as possible, a biotic community to a condition of ecological integrity (Society for Ecological Restoration 1997). According to Angermeier and Karr (1994), the goal of ecological restoration is to produce a self-sustaining system as similar as possible to the native biota (or more broadly, natural communities with intact ecological processes); however, the pervasive effects of human actions make it difficult to characterize naturally evolved conditions. Because of the inability to define "naturalness" in an absolute sense, Anderson (1991) proposes assessing degrees of naturalness using criteria that can be quantitatively measured across a continuum. These criteria look essentially at the differences between biotic communities in the presence and absence of humans and their culture. A plausible conclusion from such an assessment (as far as selecting appropriate restoration targets is concerned) is that prior to European settlement relatively stable ecological interactions between native and "naturalized" species, among them resident humans, were established in the Americas. As a result, the pre-European settlement conditions represent appropriate targets for restoration.

Determining what is native and non-native (introduced, exotic, or alien) also can be problematic. When can an introduced species, whether by means of natural or cultural means, be considered naturalized? Callicott and others (1999) suggest an ecological criterion: "To what extent is the species in question a good citizen of its new biotic community? Does it displace or adversely affect its native and naturalized neighbors?"

Ecological sustainability—Meeting human needs without compromising the health of ecosystems (Callicott and Mumford 1997). An ecologically sustainable project or activity does not compromise ecosystem health.

Ecosystem.—spatially explicit, relatively homogeneous unit of the earth that includes all interacting organisms and components of the biotic environment within its boundaries—note an ecosystem can be of any size, e.g. a log, pond, field, forest, or the earth's biosphere.

Ecosystem management—Managing, where appropriate and at the appropriate geographic scales, either for ecological integrity or for ecosystem health and managing human exploitation of natural resources so that the primary goal is the ecosystem health of exploited areas.

The definition of ecosystem management is controversial. Grumbine (1994) originally defined ecosystem management in terms of biological integrity as:

> [A process that] integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term.

Stanley (1995), however, points out that biological integrity is not an explicit goal of ecosystem management as envisioned by numerous Federal agencies that have embraced the concept. Callicott and others (1999) used a revised definition by Grumbine (1997) to suggest a middle path: "Managing ecosystems with the primary goal of maintaining their health and relegating commodity extraction to a subordinate goal." Although from the standpoint of commodity production this definition seems to fit Fort Benning well, the Installation's primary mission of military training also may be viewed within the same context. In other words, military training cannot occur in the absence of healthy ecosystems.

As true as the last statement above is, the regional importance of Fort Benning's biotic resources make managing strictly for ecosystem health insufficient. Callicott and others (1999) seem to assume that the world can be divided neatly into nature reserves (where ecological integrity is the management goal) and human inhabited and exploited areas (where ecosystem health is the management goal). Depending on the perspective chosen, Fort Benning can function in either way. The choice is in part scale-dependent. Accordingly, for its practical application at Fort Benning, ecosystem management is defined herein more broadly.

Ecotone.—The transition zone between two adjoining communities.

Edge effect.—The modified environmental conditions or habitat along the margins (edges) of forest stands or patches. The conditions/habitat required for many wildlife species.

Ephemeral areas.—Commonly referred to as drains, draws, or dry washes that typically have no well-defined channel and flow only for short periods following precipitation. Leaf, straw, and other forest litter are typically present or sporadically displaced in the ephemeral area. Aquatic insects are not present in these areas.

Eradicate.—Completely eliminate a pest species within an area of infestation.

Evaporation.—The change of liquid water to vapor.

Evapotranspiration.—The combined loss of water from the soil through evaporation and plant leaves through transpiration.

Fine fuels (flash fuels or one-hour time lag fuels).—Fast-drying, dead fuels that have a time lag constant of 1 hour or less. These fuels ignite readily and are consumed rapidly when dry. Included are grass, draped pine needles, and small twigs less than ¼ inch in diameter.

Fire behavior.—A general term that refers to the combined effect of fuel, weather, and topography on a fire.

Firebreak.—Any natural or constructed discontinuity in a fuel bed used to segregate, stop, or control the spread of fire or to provide a control line from which to suppress a fire.

Fire flap.—A fire swatter type hand tool used for batting out or smothering grassfires.

Fire rake.—A long-handled combination rake and cutting tool, the blade of which is usually constructed of a single row of 4 sharpened teeth.

Firing technique.—The type(s) of fire resulting from one or more ignition(s) (e.g., backing fire, flanking fire, heading fire).

Flanking fire.—A fire front spreading or set to spread, at roughly right angles to the prevailing wind.

Flocculating.—The act of clumping together individual soil particles. Soil amendments that cause flocculation generally improve soil structure.

Foraging Area. — The land area within a ½ mile radius of a red-cockaded woodpecker cluster.

Forest litter.—The top layer of the forest floor directly above the duff layer, composed mainly of recently fallen leaves and pine needles, but also includes dead twigs and bark fragments.

Fuel load.—The oven dry weight of all existing fuels (living and dead) in a given area, usually expressed in tons per acre.

Growing season.—A condition in the life of an organism or its parts when a tissue predisposed to proliferate shows visible growth and development. This condition occurs during the spring and summer months. Forest stands with hardwood/midstory control problems should be treated with prescribed fire during the growing season to achieve hardwood topkill.

Hazard reduction.—Treatment of living and dead forest fuels to reduce the likelihood of a fire starting and to lessen its damage potential and resistance to control.

Heading fire. —A fire front spreading or set to spread with the wind or upslope.

Herbaceous.—Grasses and other plants that contain little woody tissue.

Hydrophytes.—plants adapted to survive in very wet or indundated soil conditions.

Ignition pattern.—The manner in which a prescribed fire is ignited. The distance between ignition lines or points and the sequence of igniting them—as determined by fuel, topography, weather, ignition system, firing technique, and other factors influencing fire behavior and the objectives of the burn.

Inactive borrow area. — An area that has not been excavated in the past year but within the past two years. These areas still have suitable fill material that could be excavated.

Installation Environmental Coordinator.—Senior Installation environmental official officially designated by the Installation commander to coordinate and oversee the implementation of the natural resources component of Fort Benning's Pest Management Program.

Installation Pest Management Coordinator.—Individual officially designated by the Installation commander to coordinate and oversee the Installation's use, storage, and disposal of pesticides; record keeping of pesticide use, pesticide applicator certification and training, and medical surveillance of Installation pest control personnel; and contract provisions for pest management activities performed by non-Department of Defense personnel.

Integrated Pest Management.—Planned program, incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. Integrated Pest Management uses targeted, sustainable (effective, economical, environmentally sound) methods including education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control, and where necessary, the judicious use of least-hazardous pesticides.

Introduction.—Intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.

Invasive species.—Non-native species whose introduction does cause or is likely to cause economic or environmental harm or harm to human health.

Inversion.—A layer in the atmosphere through which the temperature increases with altitude. The lowest altitude at which the departure is found is called the base of the inversion.

Keetch-Byram Drought Index (KBDI).—A numerical rating of the net effect of evapotranspiration and precipitation in producing cumulative moisture depletion in deep duff or upper soil layers. The KBDI ranges from 0-800. The 600-800 range indicates a severe drought. Generally the use of prescribed fire is suspended when the Index reaches 500.

Ladder fuels.—Fuels that provide vertical continuity between the ground and tree crowns, thus creating a pathway for a surface fire to move into the overstory tree crowns.

Line-plot survey.—sampling procedure employing lines of sample plots generally laid out at regular intervals along survey lines.

Listed species.—Any species federally listed or proposed to be listed as threatened or endangered under the Endangered Species Act (16 U.S.C. Section 1531 et seq.) or any state listed threatened or endangered species (Georgia) or protected species (Alabama) occurring, or possibly occurring, on or near Fort Benning.

Macroclimate.—The general climate conditions that extend over a large area (i.e., several thousand square miles).

Macropores.—Large pore spaces between clumps of soil particles filled either by air or water.

Mesoclimate.—The general climate conditions or weather surrounding and influencing the installation.

Mesophytes.—Plants adapted to survive in soils that are neither excessively dry nor excessively wet.

Microclimate.—The area immediately surrounding the individual plant or planting.

Mixing height.—The height to which relatively vigorous mixing of the atmosphere occurs.

Mop-up.—Extinguishing or removing burning material, especially near control lines after an area has burned to make it safe or to reduce residual smoke.

Native (indigenous) species.—With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

Naturalized species.—A non-native species that is so ubiquitous within the ecosystem(s) to which it has been introduced historically that it behaves as if it is part of the ecosystem. Moreover, although localized control measures may still be feasible when necessary to protect specific natural resources, neither complete eradication nor broad area control is possible. Naturalized species can be non-disruptive (do not directly compete with native species or alter ecological processes) to the ecosystems in which they occur or they can pose a threat to the

ecological integrity of the ecosystem (directly contribute to native species loss or alter ecological processes with potential long-term adverse ecological consequences).

Nomex.—Flame resistant clothing offering protection against flames, falling embers, coals, and radiant heat.

Non-native (alien, exotic, introduced, non-indigenous) species.—With respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem. A species is considered non-native when it is located outside its natural range or its natural zone of potential dispersal. The definition includes all domesticated and feral species and all hybrids, except those that are a result of naturally occurring crosses between native species.

Noxious weed.—Any living stage (including, but not limited to, seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, that is of foreign origin; is new to or not widely prevalent in the United States; and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation, or the fish and wildlife resources of the United States, or the public health, and includes kudzu (*Pueraria lobata* Dc). Definition taken from Title 7 of the United States Code, Chapter 61 “Noxious Weeds,” Section 2802 “Definitions.”

Nuisance vertebrate species.—Any vertebrate species (that is, an animal with a backbone) occurring within the cantonment areas, except for those rodent species that occur within housing units and other facilities, that because of actual or potential adverse effects to military readiness, personnel and pet well-being, real property, supplies, equipment, or vegetation requires some degree of control. Conservation Branch, Fish and Wildlife Section is responsible for the control of those nuisance vertebrate species included in the preceding definition, except for stray dogs and cats which are the responsibility of the Directorate of Public Safety, Animal Control (Military Police). The control of animal species not included within the definition is not addressed in this operational plan.

One thousand-hour time lag fuels.—Large dead combustible material consisting of roundwood greater than 3 inches in diameter and the layer of the forest floor that extends 4 inches below the surface (e.g., branches, snags and stumps).

Parasites.—An organism that derives its energy by living in or on another organism usually to the host organism's detriment.

Particulate Matter.—Any liquid or solid particles temporarily suspended in the atmosphere.

Pathogens.—A specific cause of disease.

Perennials.—Plants that survive more than two years.

Pesticide.—Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests and are labeled specially for use by the U.S. Environmental Protection Agency (EPA). Also, any substance or mixture of substances used as a plant regulator, defoliant, desiccant, or biocide. Note: The Armed Forces Pest Management Board does not review or approve disinfectants or biocides.

Pesticide applicator.—Any individual who applies pesticides or supervises the use of pesticides by others and who has been authorized to do so by successfully completing a training program approved by the Environmental Protection Agency that is followed by formal certification by either the Department of Defense or a state with an Environmental Protection Agency-approved certification plan.

Pest management.—Prevention and control of disease vectors and pests that may adversely affect the Department of Defense mission or military operations including readiness, listed species or other natural resources of concern, personnel and pet well-being, and real property, supplies, or equipment.

Pest Management Consultant (Command Consultant).—Professional Department of Defense pest management personnel (for Fort Benning, located at Training and Doctrine Command [TRADOC]), who interpret and provide program standards for installation pest management programs, provide technical and management guidance for the conduct of installation pest management operations, and, except when prohibited by regulation, review and validate the qualifications of installation Department of Defense-certified pesticide applicators (that is, they serve as Certification Officials).

Pest management plan.—Long-range, comprehensive installation planning and operational document that establishes the strategy and methods for conducting a safe, effective, and environmentally sound integrated pest management program. Department of Defense Instruction 4150.7 requires written pest management plans as a means of establishing and implementing an installation pest management program. This operational plan constitutes the natural resources component of Fort Benning's Pest Management Plan.

Pest Management Quality Assurance Evaluator.—Department of Defense employee, trained in pest management per Department of Defense standards, who protects the government's interest through on-site performance evaluation of commercial pest management contracts or other contracts that involve the use of pesticides.

Pest.—Any plant, animal, or other organism (except for human or animal disease-causing organisms) in a location where it is not wanted.

Photosynthesis.—The process by which green plants use light energy, carbon dioxide, and water to produce carbohydrates.

Phytotoxic.—Compounds toxic to plant tissue.

Pith.—Spongy plant tissue that functions chiefly as storage.

Plume.—The gases, smoke, and debris that rise slowly from a fire while carried along the ground because the buoyant forces are exceeded by those of the ambient surface wind. A convection column forms a specific part of the plume.

Plume trajectory.—The direction the transport winds carry the smoke plume.

Pole.—tree of above average straightness and quality that has 3 times (in feet) its DBH (in inches) of clear, straight stem. That is a 12-inch DBH tree must have at least 36 feet of clear, straight stem to be considered a pole. Once classified as a pole, tree may be cruised to either

large or small sawtimber specifications. Poles may be expected to bring a 20-25 percent premium if they occur in enough quantity and frequency to be worth sorting.

Potential Foraging Area. — Land areas that are capable of producing pine trees and are available for planting.

Predators.—An organism which preys on other organisms.

Prescribed burn.—The controlled application of fire to wildland fuels in either a natural or modified state, under specified environmental conditions that allow the fire to be confined to a predetermined area and at the same time produce the intensity required to attain planned management objectives.

Professional pest management personnel.—Department of Defense military officers commissioned in the Medical Service or Biomedical Science Corps or Department of Defense civilian personnel with college degrees in biological or agricultural sciences who are in a current assignment that includes pest management responsibilities exercised regularly. Department of Defense civilian employees also shall meet Office of Personnel Management (OPM) qualification standards. Based on assignment, some professional pest management personnel are Pest Management Consultants.

Protoplasm.—The contents of plant cells including the nucleus. Most all chemically functioning parts of the plant cell occur in the protoplasm.

Pulpwood.—roundwood, whole-tree chips, or wood residues that are used for the production of wood pulp.

Regeneration, artificial.—act of renewing tree cover by establishing young trees through planting seedlings.

Regeneration, natural.—the act of renewing tree cover from natural seeding.

Regulated pine stand.—pine stand being managed technically by controlling stocking, harvests, growth, and yields to meet even-aged management objectives. There is a scheduled rotation age for each regulated pine stand.

Rehabilitate. — To bring back to a former condition.

Restoration. — A reconstruction or representation of an original form.

Restricted-use pesticide.—A pesticide that the Administrator of the Environmental Protection Agency (in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act of 1976 (FIFRA) as amended (7 U.S.C. Section 136 et seq.) or a state regulatory agency determines to have the potential to cause unreasonable adverse effects on the environment or human health (when applied in accordance with the directions for its use) and therefore requires additional regulatory restrictions. Only those individuals that have been formally certified in accordance with either the Department of Defense or a state with an Environmental Protection Agency-approved certification plan, or are in an apprenticeship period during which they make applications only under the direct supervision of a certified applicator, are legally authorized to apply a restricted-use pesticide.

Riparian rights.—The rights of individuals to the water resources in a river, stream, or lake.

Rotation.—in even-aged systems, period between regeneration establishment and final cutting.

Sawtimber.—trees or logs cut from trees with minimum diameter and length and with stem quality suitable for conversion to lumber.

Scrub oak.—small or stunted oak tree species, normally found in poor, dry sandy soils and generally of unmerchantable size and quality.

Site index.—species-specific measure of actual or potential forest productivity (site quality), expressed in terms of the average height of trees included in a specified stand component at a specified index or base age.

Silviculture.—art and science of controlling the establishment, growth, composition, health, and quality of forest and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Single tree selection.—individual trees of any or all size classes are removed at a conservative rate in a manner that promotes growth of remaining trees and forest sustainability. Only those trees that need to be removed to improve the development of the stand toward a continuous or perpetual forest are marked for harvest. From a regeneration standpoint, in most cases, tree removal will be used to release established regeneration rather than to create openings for regeneration to become established.

Site preparation.—hand or mechanized manipulation of a site, designed to enhance the success of regeneration—note treatments may include burning, chemical spraying, chopping, disking, and scarifying and are designed to modify the soil, litter, or vegetation and to create microclimate conditions conductive to the establishment and growth of desired species.

Site preparation burning.—A fire set to expose adequate mineral soil and control competing vegetation until seedlings of the desired species become established.

Smoke Dispersion Index (SDI).—A numerical index related to the ability of the atmosphere to disperse smoke. The SDI ranges from 1 to 6. With a forecasted SDI of 6, a prescribed burner can expect excellent smoke dispersion during the burn.

Smoke impact distance.—The distance the smoke will travel downwind or down drainage based on the fuel type, firing technique, size of burn area, and SDI.

Smoke management.—Application of knowledge of fire behavior and meteorological processes to minimize air quality degradation during prescribed burning.

Smoke screening.—The process of determining the distance and direction of a possible smoke impact, identifying smoke sensitive areas (SSA) within that impact, and making necessary changes to eliminate or minimize the impact.

Smoke sensitive area (SSA).—An area in which smoke from outside sources is intolerable.

Soil horizon.—A layer of soil, approximately parallel to the surface, with properties that differentiate it between the layers above and below.

Soil series.—A group or category of soil based on its characteristics.

Species.—Group of organisms all of which have a high degree of physical and genetic similarity, generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms.

Spot firing.—Lighting a series of small spot fires that burn in all directions as they come together. Spacing of spot fires depends on weather and fuel conditions and vary from 20 to 120 feet.

Stand structure.—horizontal and vertical distribution of components of a forest stand including the height, diameter, crown layers, and stems of trees, shrubs, herbaceous understory, snags and down woody debris.

Stomata.—Minute openings on the undersurface of leaves through which the exchange of gases and moisture takes place.

Street tree inventories.—Inventorying of urban trees including the collection of such information as species, size, and condition used to manage street tree populations.

Strip-heading fire.—A series of lines of fire upwind (or downslope) of a firebreak or backing fire that will burn with the wind toward the firebreak or backing fire.

Strobilus (pl. strobili).—cone of a conifer.

Suppress.—Prevent the spread of forest insects and/or diseases and limit the degree of impact to timber resources where outbreaks do occur.

Surface wind.—A wind measured at a surface observing station, customarily at some distance (usually 20 feet) above the ground to minimize the distorting effects of local obstacles and terrain.

Time lag.—The drying time, under specified conditions, required for a dead fuel to lose about 63 percent of the difference between its initial moisture content and its equilibrium moisture content.

Top kill.—The gradual or sudden dieback of the uppermost portion of a plant, especially hardwood trees or other woody plants.

Transpiration.—A process by which water is given off by plant leaves through stomata.

Transport wind speed.—A measure of the average rate of the horizontal movement of air throughout the mixing layer.

Underplanting.—setting out of young trees under an existing stand—note the trees themselves are termed underplants.

Undesirable animal.—Any animal occurring on mission lands that because of actual or potential adverse effects to listed species or other natural resources of concern, military readiness, personnel well-being, real property, supplies, or equipment requires some degree of control.

Undesirable plant.—Plant species that are classified as undesirable, noxious, harmful, exotic, injurious, or poisonous pursuant to state or Federal law. Species listed as endangered by the Endangered Species Act of 1973 (16 U.S.C. Section 1531 et seq.) shall not be designated as undesirable plants and [the term] shall not include plants indigenous to an area where control measures are to be taken. Definition taken from Title 7 of the United States Code, Chapter 61 "Noxious Weeds," Section 2814 "Management of undesirable plants on Federal lands."

Uneven-aged management system.—planned sequence of silvicultural treatments designed to maintain a continuous forest of multiple age classes, while considering values other than just timber production.

Urban forestry.—art, science, and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide society.

Weed.—Any plant that is growing in a place where it is not wanted and interferes with management objectives for that place. The term has no scientific meaning. Weeds commonly are considered to share certain attributes: they are adept at colonizing disturbed habitats (though not all plants that are colonizers are weeds), such as plowed fields and roadsides; they are numerous and grow aggressively; and they are bothersome and have no economic value. A plant does not have to be non-native to be considered a weed.

Xerophytes.—Plants adapted to survive in soils that are excessively dry.

APPENDIX G3 ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Meaning
AAP	Army Alternate Procedures
ABCT	Armored Brigade Combat Team
ACHP	Advisory Council on Historic Preservation
ACUB	Army Compatible Use Buffer
ACSIM	Assistant Chief of Staff for Installation Management
ADCNR	Alabama Department of Conservation and Natural Resources
AEC	Army Environmental Command
AFPMB	Armed Forces Pest Management Board
AIRFA	American Indian Religious Freedom Act
APHIS	Animal Plant and Health Inspection Service
AR	Army Regulation
ARC	Army Reconnaissance Course
ARPA	Archeological Resources Protection Act
ASSON	Aerial Spray Statement of Need
ATV	All-Terrain Vehicle
BASOPS	Base Operations Contractor
BBS	Battalion Battle System
BMP	Best Management Practices
BO	Biological Opinion
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CAT-X	Categorical Exclusion
CB	Conservation Branch
CBMPP	Construction Best Management Practices Plan
CCA	Candidate Conservation Agreement
CCC	Civilian Conservation Corps
CFLCP	Chattahoochee Fall Line Conservation Partnership
CFR	Code of Federal Regulations
CME	Contract Manpower Equivalent
CRD	Community Recreation Division
CRM	Cultural Resources Management
CWA	Clean Water Act
DA	Department of the Army
dbh	Diameter Breast Height
DFC	Desired Future Conditions
DFEC	Desired Future Ecosystem Condition
DMPRC	Digital Multipurpose Range Complex
DoD	Department of Defense
DoDI	Department of Defense Instruction
DES	Directorate of Emergency Services

Acronym or Abbreviation	Meaning
DFMWR	Directorate of Family, Morale, Welfare and Recreation
DPTMS	Directorate of Plans, Training, Mobilization, and Security
DPW	Directorate of Public Works
DRM	Directorate of Resource Management
DUD	Live impact area
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMD	Environmental Management Division
EO	Executive Order
EOD	Explosive Ordnance Disposal Company
EMS	Environmental Management System
ENP	Everglades National Park
EPA	Environmental Protection Agency
EPAS	Environmental Performance and Assessment System
EPD	Georgia Environmental Protection Division
EQCC	Environmental Quality Control Council
EQR	Environmental Quality Report
ESA	Endangered Species Act (1973)
ESMC	Endangered Species Management Component
ESMP	Endangered Species Management Plan
ESPCP	Erosion, Sedimentation and Pollution control Plan
FBRSMS	Revised Standard for Managed Stability Criteria for Fort Benning
FBRD	Fort Benning Range Division
FHA	Foraging Habitat Analysis
FNSI	Finding of No Significant Impact
FORSCOM	Army Forces Command
FR	Federal Register
GADNR	Georgia Department of Natural Resources
GERB	Garrison Environmental Requirements Build
GESA	Georgia Erosion and Sedimentation Act (of 1975)
GFC	Georgia Forestry Commission
GHMTA	Good Hope Maneuver Training Area
GIS	Geographic Information Systems
GSWCC	Georgia Soil and Water Conservation commission
GTT	Gopher Tortoise Team
HMU	Habitat Management Unit
HQDA	Department of the Army Headquarters
TRADOC	Training and Doctrine Command
IBCT	Infantry Brigade Combat Team
ICRMP	Integrated Cultural Resources Management Plan
IMCOM	Installation Management Command
INRMP	Integrated Natural Resource Management Plan

Acronym or Abbreviation	Meaning
IPM	Integrated Pest Management
IPMC	Integrated Pest Management Coordinator
ISO	International Organization for Standardization
ISR	Installation Status Review/Report
IT	Incidental Take
ITAM	Integrated Training Area Management
JBO	Jeopardy Biological Opinion
JLUS	Joint Land Use Study
KBDI	Keetch-Byram Drought Index
LCTA	Land Condition Trend Analysis
LEED	Leadership in Energy and Environmental Design
LMB	Land Management Branch
LRAM	Land Rehabilitation and Maintenance
MBTA	Migratory Bird Treaty Act
MCoE	Maneuver Center of Excellence
MEA	Management Emphasis Area
MICC	Mission and Installation Contracting Command
MIL-HDBK	Military Handbook
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAF	Non-Appropriated Funds
NAGPRA	Native American Grave Protection and Repatriation Act
NEC	Network Enterprise Center
NEPA	National Environmental Policy Act
NGO	Non-Governmental Organization
NHPA	National Historic Preservation Act
NOD	Notice of Deficiency
NOI	Notice Of Intent
NOV	Notice of Violation
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
NWI	National Wetland Inventory
ORISE	Oak Ridge Institute for Science and Education
PAIO	Plans, Analysis and Integration Office
PBG	Potential Breeding Group
PC	Protected Clusters
RCI	Residential Communities Initiative
RCRA	Resource Conservation and Recovery Act
RCW	Red-Cockaded Woodpecker
REA	Request for Environmental Analysis

Acronym or Abbreviation	Meaning
REC	Record of Environmental Consideration
SC	Senior Command
SCP	Soil Conservation Program
SDI	Smoke Dispersion Index
SDWA	Safe Drinking Water Act
SERDP	Strategic Environmental Research and Development Program
SHPO	State Historic Preservation Officer
SJA	Staff Judge Advocate
SOCOM	Special Operations Command
SON	Statement of Need
SOP	Standard Operating Procedure
SPB	Southern Pine Beetle
SRA	Sustainable Range Awareness
SRM	Sustainable Range Maintenance
SRP	Sustainable Range Program
T ES	Threatened and Endangered Species
TDA	Table of Distribution and Allowances
TES	Threatened and Endangered Species
TMDL	Total Maximum Daily Loads
TNC	The Nature Conservancy
TRADOC	Training and Doctrine Command
UEA	Unique Ecological Area
UPC	Unprotected Clusters
USACE	United States Army Corps of Engineers
USAIC	United States Army Infantry Center and School
USDA	United States Department of Agriculture
USFS	United States] Forest Service
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordnance
WHINSEC	Western Hemisphere Institute for Security Cooperation
WMU	Watershed Management Unit