Annual Report
2005

Ecology and management of feral hogs on Fort Benning, Georgia.

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BACKGROUND AND JUSTIFICATION

Self-sustaining populations of feral swine have inhabited Fort Benning, Georgia, since at least the 1950s. Originating from free-ranging domesticated hogs and European boar (*Sus scrofa*) introduced for hunting, these populations recently have grown to the point where sightings are common and areas affected by their foraging are extensive. Because hogs forage by vigorous rooting, they can strongly affect their environment by disturbing soil, impeding regeneration of trees, disrupting understory plant communities, and altering habitat for numerous animal species. Hogs are also opportunistic omnivores, consuming a wide variety of plant and animal species. Of particular concern on Fort Benning, evidence is building that hog populations have the potential to strongly affect threatened and endangered animal and plant species such as the gopher tortoise (*Gopherus polyphemus*) and relict trillium (*Trillium reliquium*).

Because extensive military training is conducted on Fort Benning, effects of hogs on the infrastructure needed to conduct this training (e.g., rooting damage to drop zones and equipment, facilitation of erosion) is also of increasing concern.

The goal of this project is to investigate the efficacy of removal for reducing the impact of feral hogs on threatened populations and sensitive habitats and military training on the Fort Benning military installation. Currently, management of hogs on Fort Benning includes trapping and removal, as well as an open hunting season (over 2,000 hogs were harvested by hunters from 2001 to 2003). Future management efforts include increasing trapping efforts and broadening hunting opportunities, but the extent to which such efforts will be effective is unknown. The capacity for growth in a hog population is prodigious. Feral hogs breed throughout the year, and mature females can produce several litters of up to 16 piglets per year. The level of mortality needed to offset this potential depends on the size and demographic processes (i.e., annual survival, fertility, population growth rate) of the population, none of which are known. These processes must be understood before the number of removals needed to meet management goals can be estimated.

Because complete eradication of feral hogs on Fort Benning is unlikely, the population will continue to affect plant and animal communities. Understanding how these effects are related to the size of the hog population is therefore critical. Little has been published about distribution of hogs across available habitats on Fort Benning, or how effects of foraging are associated with hog densities. Before the negative effects of feral hogs on military training activities and threatened and endangered species can be mitigated, the distribution, density, movements, habitat affinities, and food habits of hogs must be understood.

OBJECTIVES

1. Estimate the relevant demographic parameters and sensitivities of feral hog populations (annual survival, fertility, and population growth rates) necessary to examine the effects of management practices on the Fort Benning area.
2. Evaluate the distribution, movements, and habitat use of feral hogs and associated effects on gopher tortoises and sensitive habitats.
3. Evaluate effects of feral hogs on species of special concern through food habits analysis.
4. Evaluate effects of feral hogs on military training.

5. Determine the efficacy of population control measures in reducing the impact of feral hogs on the distribution and abundance of gopher tortoises, sensitive habitats, and military training.

Objective 1: During May-July 2005, we captured 102 feral pigs in large cage traps baited with dry and fermented corn. Of those 102 pigs, 89 individuals were marked with individually numbered ear tags in each ear to facilitate mark-recapture efforts. An additional 6 individuals were recaptured from the first season of trapping and marking in 2004. Approximately one third of the trapped pigs were recaptured at later dates during the mark-recapture study. The sex ratio was varied between study areas. Pigs ranging from one week old to over 2 years old were caught during the study period (Table 1).

Table 1.

	Northern Study area	Southern Study area	Total
Total # of captures	53	117	170
Total # of individuals	40	62	102
Total # ear tagged	39	50	89
Total # from 2004	1	5	6
Percent recaptured	30.0%	40.3%	36.3%
Sex ratio M:F	1.5 : 1	0.8 : 1	0.9 : 1

This is the second year of demographic data collected for both study sites. In combination with the first year of demographic data, we will be able to examine potential changes in population size from 2004 to 2005. Using demographic data collected over two years will allow us to estimate other demographic processes (e.g., survival rates, recruitment rates, and population growth rate) for both study areas. These data also represent the first year post-treatment condition of the population of the Northern study area.

Digital game cameras were placed across both study areas to be used as a passive recapture method. Photographs of ear-tagged pigs will be used to acquire more accurate estimates of survival rates for all age classes. Photographs of individually

identifiable unmarked pigs along with ear-tagged pigs may be used to get better estimates of population size and density. Between August 2004 and May 2005, digital game cameras acquired approximately 8200 photos. In both the Northern and Southern study areas, pigs appeared in 35% of all photos taken. Of the 91 pigs ear-tagged during 2004, 34 were re-sighted using cameras. Raccoons made up a large portion of the remaining photos. Photographs were also taken of at least 25 different non-target mammal and bird species including deer, coyotes, and crows.

The demographic data will be supplemented by ear tags returned by hunters. Hunters reported killing 14 ear-tagged pigs in the Southern control site. In the Northern treatment area, we killed 12 ear-tagged pigs as part of our lethal removal effort and hunters reported an additional two ear-tagged pigs killed.

Objective 2:

Telemetry

Refinement of techniques for collar attachment and methods for tracking feral pigs continues. Technical specifications originally indicated that battery life for the GPS collars would average 361 days. This was assumed be the limiting factor in determining collar life. Since deployment of collars during the summer of 2004, we have identified two problems with this assumption. Pigs are able to reposition the collars and this is limiting the ability of the collars to obtain GPS fixes. This forces the collar to make additional attempts at obtaining fixes, and is shortening battery life. Pigs are also causing significant damage to the collar housing and antennas, causing decreased signal strength and collar failure. Two collars retrieved so far have had holes worn through the housing, causing the collars to fail and stop transmitting. Trapping immediately after losing the VHF signals retrieved these collars. We continue to work with ATS on refining both collars and collar attachment techniques.

Collars will now be deployed for approximately six months. This time period should maximize data collected from individual sows, but still ensure retrieval before possible collar failures. After six months the collars will be refurbished by ATS. Four collars have assumed to have been lost, and these are being replaced by insurance. Five collars are in the process of refurbishment and/or awaiting redeployment. Six

collars are currently deployed, four in the Northern study area, and two in the Southern study area. As collars are recovered, they will be refurbished and deployed.

Data has been recovered from 13 collared sows. Out of approximately 1976 deployment days, the collars have collected 4500 fixes. This averages to approximately 2.28 fixes per day. Even with the existing technical difficulties, the GPS collars have continued to outperform what we would have been able to do using conventional VHF technology. Radio-collared pigs are still being located weekly through VHF telemetry. This is being done to ensure the GPS collars are functioning properly. We have not begun to analyze the telemetry data, but will begin after collection of the remaining collars from 2004.

Exclosures and Survey Transects

Six square wire fence exclosures have been built in the Southern study area. Exclosure dimensions are 10m by 10m, and the fence is approximately 1m high. The exclosures represent 3 replicates, all in hardwood bottoms near water. The treatment is areas with visible indications of recent pig activity, and the control is areas without visible pig sign. Vegetative cover and extent of pig damage were measured in each exclosure. These measures will be repeated this coming year, in addition to other vegetative assessments.

Damage survey transects were also completed. In each study area, 10 transects were conducted in upland pine sites and 10 transects in hardwood bottom sites. Transects were 50 m long, and any pig sign within 1 m of the transect line was recorded. Extent of pig damage in rooted areas was measured to the nearest 0.25 m^2. Transects will be repeated this winter and again next summer. Information collected through exclosures and survey transects should provide information on potential impacts to sensitive species and habitats.

Objective 3: We are collecting data from trapped and harvested animals to examine dietary habits, reproductive propensity and animal condition. As of September 2005, a total of 176 feral pigs have been removed from Fort Benning. Sixty-seven stomach samples and 53 reproductive tracts have been collected. Our goal is to harvest at least 10 pigs a month from different locations on the base to aid in understanding pig dietary habits. Collection of reproductive tracts and other organs will help to better understand

the reproductive habits and condition of pigs inside and outside the treatment area. Analysis of reproductive tracts and dietary items will commence this fall and be completed during spring 2006.

Objective 4: To date, no data has been collected concerning this objective.

Objective 5: The above data are being assessed on two separate study areas on Ft. Benning. One area is being treated with lethal control, where the intent is to reduce the population as low as possible. The other area will serve as a control with no removal of pigs. As of September 09, 2005, 84 pigs have been removed from the lethal area. Eighty were removed through trapping and 4 through fire-arm harvest. We plan to compare population, movement, dietary, and reproductive data on both sites to assess whether population density influences any of these life-history aspects. The combination of these data should provide insight as to the best means for potentially controlling populations of nuisance feral pigs.

FUTURE WORK (2005-2006)

During winter and spring of 2005-2006, a primary goal of the project is to continue to reduce the feral pig population in the Northern treatment area as much as possible. This will be accomplished through a combination of trapping, shooting, and with the assistance of hunters. Feral pigs will be harvested outside the study areas to acquire additional stomach samples and reproductive tracts.

During the winter and spring of 2005-2006, digital game cameras will be operated continuously to passively recapture pigs. Cameras will be moved to new locations periodically to more completely sample each study area.

By early 2006, a total of 15 collars should be deployed. All collars are scheduled to be recovered by September of 2006. The GPS location data will be used to estimate home ranges, movements, sociality, and habitat use of pigs.

During the summer of 2006, the mark-recapture study will be repeated in both the treatment and control study areas. Trapping and tagging of pigs will be conducted in the same manner as it was during the previous two summers. This third mark-recapture trapping session will allow us to estimate a second annual population growth rate for

each study area, examine any changes in population size or density over a two year period, and continue the estimation of the effects of increased mortality on the treatment area.