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METHODS AND STRATEGIES FOR MANAGING FERAL HOG DAMAGE IN GRAIN PRODUCTION AREAS IN CENTRAL TEXAS

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Abstract: Texas Wildlife Services (WS) personnel conduct feral hog damage management projects to protect a variety of resources in Texas. For the past 12 years, WS personnel have conducted feral hog (*Sus scrofa*) damage management projects on an 11,000 acre wildlife management area (WMA) and surrounding farmlands located in central Texas. The WMA is managed by the United States (US) Army Corp of Engineers and Texas Parks and Wildlife Department. Surrounding areas are farmlands and the primary crops grown there are corn and grain sorghum. Feral hogs have damaged area grain crops and the US Army Corp of Engineers property. Annual projects have been conducted to reduce feral hog damage to crops and property. WS personnel have used an assortment of methods and strategies in a management plan to reduce feral hog damage in the area. This paper is a review of those methods, strategies, and the plan.

Key Words: feral hog, invasive species, IPM, strategy, *Sus scrofa*, wildlife.

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INTRODUCTION

Feral hog (*Sus scrofa*) management has received much attention in recent years as hog populations have increased and their distribution has expanded across Texas. Various strategies have been discussed, suggested, and reviewed in the literature, however, few have been implemented and described. Such a strategy has been in place at a site in central Texas since 1995 under the direction of the United States (US) Department of Agriculture's (USDA) Texas Wildlife Services (WS). The basic management strategy was developed in 1995 and it continues to evolve in an effort to maximize its effectiveness. Initial phases involved developing an integrated pest management (IPM) plan and obtaining cooperation from concerned parties. Littauer (1993) recommended an integrated approach to managing feral hog damage. Factors considered when developing the management plan were (1) seasonal timing of feral hog damage, (2) size of the management area, (3) number of WS personnel and amount of equipment that could be assigned to the specific project, and (4) annual variation in the local hog population density due to weather and area crop production. As the management plan has progressed, WS field personnel have identified other factors related to feral hog management in grain production areas. These factors have influenced the development of the management plan and include problems associated with

detection of feral hog damage and conducting hog management activities in grain fields.

MANAGEMENT AREA

The area includes approximately 22,000 ac (8,903 ha) of black land prairie and associated bottomlands in Williamson County, Texas. Approximately 11,000 ac (4,452 ha) in the area are US Army Corps of Engineers property, which are managed by Texas Parks and Wildlife Department (TPWD) as a wildlife management area (WMA). The US Corps of Engineers property includes Granger Lake, a 4,400 ac (1,780 ha) flood control reservoir fed by the San Gabriel River. The remaining lands (approximately 11,000 ac or 4,452 ha) are privately owned lands. Much of the private land is managed for agricultural production, including corn, grain sorghum, cotton, and livestock. Rainfall averages 34 in (86.36 cm) annually and ranged from 19.51 in (49.53 cm) to 51.29 in (130.28 cm) during the 12-year period.

HISTORY OF FERAL HOG DAMAGE

Farmers in the area have experienced feral hog damage to crops and pasture land since the early 1990s (G. Kanapek, area farmer, personal communication). WS personnel have observed and reported feral hog damage in the area since 1995, when they began providing assistance with hog damage management. However, hog activity and

damage varied from year to year based on factors such as weather and area crop production (type and acreage of crops planted). During relatively dry years (i.e. rainfall < 30 in [76.2 cm]), hog activity generally increased in the area because of water availability at the site. During relatively wet years (i.e. rainfall > 30 in), hog activity usually decreased. Also, hog activity and damage was related to the timing of annual rainfall. Annual changes in the types and quantity of crops produced in and around the area influenced the local hog population density. Damage became widespread beginning in the mid-1990s, prior to the beginning of the project.

Since the project began, most of the damage reported in the area has been to corn and grain sorghum crops. However, damage to pasture land and other property has occurred. When WS began feral hog management efforts in 1995, much of the damage occurred in grain fields adjacent to the WMA. Habitat on the WMA provided dense cover and a permanent water supply for hogs in the area. Hogs fed in the grain fields from late afternoon until mid morning and retreated to dense cover during the heat of the day. Hog damage usually began in June and continued until crops were harvested. This damage was sometimes difficult to detect because hogs often traveled to interior areas of grain fields to feed. In some situations, damage was not detected until harvest. Area farmers and WS personnel observed that when hogs began damaging crops at a site, damage generally continued until control measures were initiated.

HISTORY OF MANAGEMENT EFFORTS

Area landowners and farmers began feral hog management efforts in the early 1990s and initially, producers used multiple catch live traps, shooting, and dogs to manage damage. However, frequently hogs came from the adjoining WMA where access was not allowed. To address the hog damage problem, TPWD allowed limited live trapping by authorized trappers and public hunting with archery equipment on the WMA, but few hogs were removed from the area and feral hog damage continued to be a serious problem. Public hunting for feral hogs continues today on the public lands, but little hunting is done during the summer months when crop damage occurs. Public hunting during summer months on the WMA is restricted to archery equipment and probably has had little impact on feral hog densities and damage in the area. At least one study on public hunting for feral

hogs has shown that it had little effect on the feral hog population. Recreational hunting in the Northern Territory of Australia is considered to have no effect on the feral hog population (Choquenot et al. 1996).

Farmers encountered several problems when management was attempted in their grain fields. First, hogs were difficult or impossible to spot in grain fields because of the dense cover the crops provided, which eliminated the option of shooting hogs in the fields. Second, many grain fields were located adjacent to heavy cover associated with bottomlands or overgrown pastures. Third, because it was likely that dogs would pursue hogs into areas where access was not allowed, farmers were reluctant to use this tool.

DEVELOPMENT OF A MANGEMENT PLAN

In 1995, area farmers and land management officials requested feral hog damage management assistance from the WS Program. In the spring of 1995, WS personnel, resource managers, farmers and local elected officials held a public meeting to discuss developing a feral hog management strategy for the area. The meeting included a discussion of feral hog damage in the project area, management efforts attempted to date, obstacles limiting management efforts, strategies for managing hog damage, and additional efforts and methods which could improve hog damage management operations in the area. Local farmers and landowners held a variety of opinions and concerns about the area's hog problem. Some local residents felt the problem was the result of mismanagement of the WMA, which had created ideal hog habitat. Others in attendance felt the problem could be resolved through an intense lethal management program conducted on the WMA. Other individuals who were interested in hunting feral hogs attended the meeting to offer their assistance with hog control.

The following management methods were discussed: multiple catch live trapping, shooting, hunting with dogs, snaring, exclusion (fencing), habitat management (grazing and mowing to reduce cover), aerial hunting, and monitoring the management area for feral hog activity. Strategies considered included a) a lethal management only approach involving a variety of lethal methods such as trapping and shooting, b) a non-lethal only approach involving exclusion and habitat modification, and c) an IPM approach involving a

combination of all lethal and non-lethal methods considered practical for the area. The IPM approach involving use of a variety of methods was determined to be most appropriate for the area. WS personnel encouraged a cooperative effort for implementing the feral hog management plan. This effort involved integrating local land owners' activities on their properties and allowing WS to conduct feral hog management on the WMA and surrounding private lands.

From its onset, WS employees involved with the program believed that one of the most important aspects would be gaining a thorough knowledge of the area. Employees referred to maps, spoke with landowners and land managers and surveyed the project area to become familiar with the site. WS worked diligently to secure access to and survey as many properties as possible and this effort is continued annually. Familiarity with the area has been an important factor related to quickly resolving feral hog damage problems. As a result of the time spent scouting the management area, personnel are familiar with hog travel routes, preferred escape areas, properties where hogs can be pursued and the best areas in which to conduct management activities. This knowledge has allowed employees to promptly respond to damage situations without the delays associated with surveying and securing access permission.

When the program began, many area farmers were using multiple catch live traps and shooting to remove hogs from the area and they were encouraged to continue these efforts. WS personnel met with area farmers and landowners to demonstrate and recommend the use of neck snares for feral hog capture. Farmers agreed to conduct management efforts when and where they could. Also, the WMA manager agreed to construct a net wire fence around the perimeter of the WMA, mow fence lines, and increase cattle stocking rates to reduce cover for hogs. WMA and US Corps of Engineers managers agreed to allow WS personnel to conduct feral hog management activities on the WMA. Many farmers and landowners in the area also gave WS employees permission to conduct management operations on their properties. The result was the implementation of a cooperative feral hog damage management plan. To date, WS personnel have been granted access to more than 4,800 ac (3,156 ha) of private property surrounding the WMA. An important component to the feral hog management plan was access to areas where hogs could be found or areas where they might retreat during management activities.

IMPLEMENTING THE MANAGEMENT PLAN

After development of a management plan in 1995, WS personnel began conducting feral hog management activities such as shooting, snaring and hunting with dogs. As the program progressed they identified some measures that improved hog management in and around grain fields. With the exception of a single project in 2005, WS hog management projects were conducted during the grain growing season. Because feral hog damage usually continued at a site until management measures were initiated, a prompt response to each damage situation was of primary concern. Additionally, the strategy within the management plan included methods and efforts to reduce the likelihood feral hogs would disperse from one site to another site. We believe the current program meets these objectives.

Fencing became a key component in the management plan because it permanently impacted feral hog travel to and from thick cover on the WMA. Fencing improved the effectiveness of snaring, restricted feral hog travel and helped field personnel quickly locate hog travel routes. As a result of fencing, hogs traveled through water gaps or locations where the fence had been raised off of the ground. Hogs are capable of breaking through the fence at any location, but rarely do so. Today, approximately 90% of the perimeter of the WMA is fenced with net wire. It has taken several years to reach this point, but fencing has been an important part of the management plan and each extension has improved overall effectiveness. Additionally, area farmers have recently begun to use electric exclusion fences on the perimeters of fields in areas where hogs have been most active. They have reported that the electric fences have further reduced feral hog damage. In some cases, the effectiveness of dogs has been enhanced by fencing because WS employees could more easily determine escape routes and fencing delayed the escape of feral hogs.

Habitat modification has contributed to the overall effectiveness of the management plan because it has eliminated cover for feral hogs in the area. The elimination of cover has improved the results of feral hog shooting and hunting with dogs. Also, it has resulted in less time spent locating feral hogs. When management operations began in 1995, livestock grazing was limited to 983 ac (410 ha) on the WMA. Currently, 5,965 ac (2,413 ha) are grazed by cattle and large areas of dense cover

have been eliminated. As a result of the elimination of cover, it has been much easier to spot hogs when they travel through the area. Establishment of cleared or open areas around the perimeter of grain fields improved shooting operations and allowed for easier inspection of grain fields.

On one occasion, hog damage became so severe in a corn field that the WS employee who worked the site requested that two intersecting swaths be cut across the field to allow for easier access with dogs and to open shooting lanes. The action allowed the WS employee to quickly resolve the problem.

Dogs have also been a key part of the management plan. Often, the quickest way to stop damage in grain fields has been to work the area with dogs. Their greatest benefit has been the secondary harassment of feral hogs and subsequent movement away from fields where damage was occurring. The use of dogs has been limited because some landowners would not allow access to their properties.

Shooting is a versatile tool that has been used under a variety of circumstances. In the area, WS personnel have used firearms to take hogs over baited sites and at wallows or watering sites. Soured grain or other baits have been used to attract hogs to shooting areas. Personnel have also shot hogs as they passed fence crossings. Recently, in an effort to introduce new technology into the management plan, employees have begun using noise suppressed rifles and night vision equipment to take feral hogs. In some cases, personnel have stalked feral hogs at night as they fed or traveled through locations in the area. Prior to the procurement of these technologies, many of the shooting operations were performed during daylight hours when hogs are least active. During dry periods, personnel hunted artificial water sources scattered throughout the area. These sites were prime shooting sites when water was limited. Area farmers and landowners have also shot feral hogs when they had the opportunity. Shooting was often most effective after crop harvest began because hogs traveled over greater distances to locate food, and cover was reduced as harvest progressed.

Snares have also been an important part of the overall management plan. Just as net wire fences make snares more effective, snares make fences a more effective barrier because hogs quickly become reluctant to cross fences when snares are used regularly in an area. WS employees have

encountered hogs that avoided snares placed in the area and some hogs have gone to great lengths to avoid areas where snares have been used. Area landowners also use snares to take feral hogs in the area.

Area farmers and landowners have trapped feral hogs as part of the management plan. Farmers have used multi-catch live traps of various designs to capture hogs in the area. Traps have been least effective during the times when crop damage occurred because of an abundant food supply. WS personnel occasionally used traps in the area, but area farmers and landowners conducted most of the live trapping operations.

All terrain vehicles (ATVs) and off road vehicles have been an important part of feral hog management in the area. These vehicles allowed personnel to quickly access areas that would otherwise have been difficult to access. The vehicles also allowed personnel to ferry equipment and dogs to remote areas. ATVs were beneficial in monitoring the area for hog activity.

In 2005, WS personnel conducted an aerial shooting effort at the project site because farmers and landowners reported that there were a large number of hogs in the area and they were hopeful the operation would reduce damage. WS had never conducted aerial shooting at the site because vegetation was too dense to locate feral hogs during spring and summer months. The aerial shooting operation was conducted in mid-February, prior to the leafing out of vegetation. The operation resulted in the removal of 36 feral hogs from the area and allowed for an aerial survey, which was helpful in learning more about the area.

RESULTS

Since 1995, WS personnel have removed 301 feral hogs from the area (Figure 1). The number of hogs removed by farmers and local hunters during this period is unknown, but they have occasionally reported some of their hog take and we estimate that they have taken at least as many hogs as WS personnel. In 1996 and 2001, WS did not take feral hogs in the area because farmers did not request assistance following weather related events that affected crop production. In 1998, WS assistance was very limited due to a personnel shortage and only 1 hog was taken. Snares accounted for the largest number (n=105) of hogs taken during the 12-year period. The hog take for the remaining methods during the period was as follows: dogs (n=84), shooting (n=48), aerial shooting (n=36),

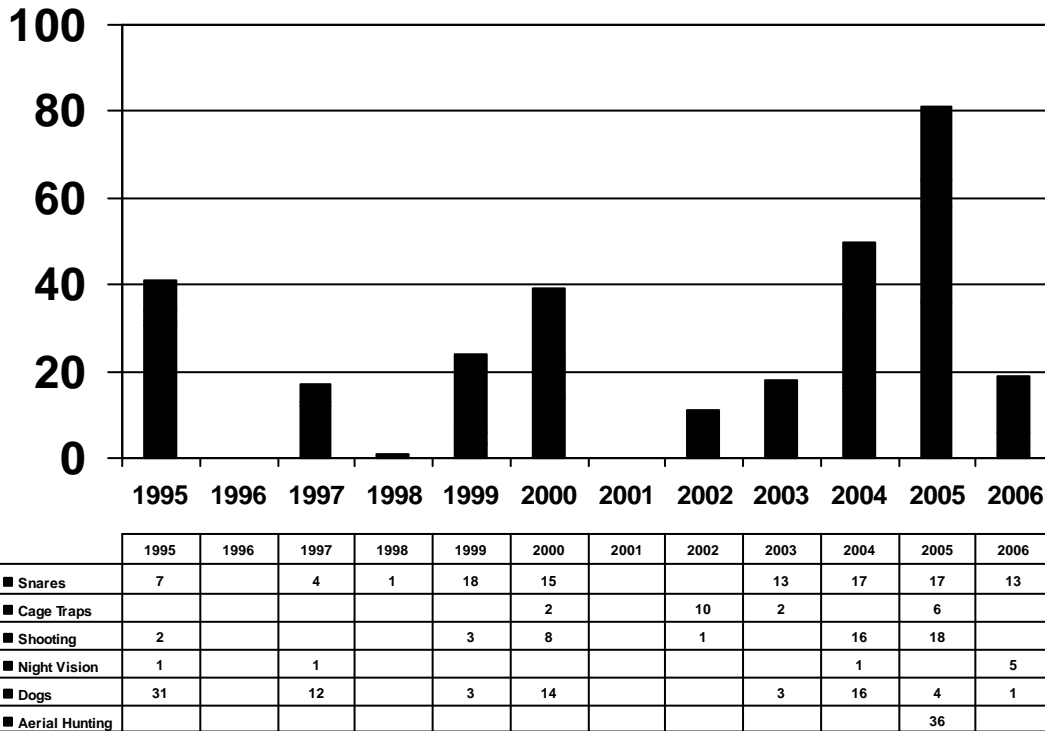


Figure 1. Hog take in an area of central Texas by method, 1995-2006.

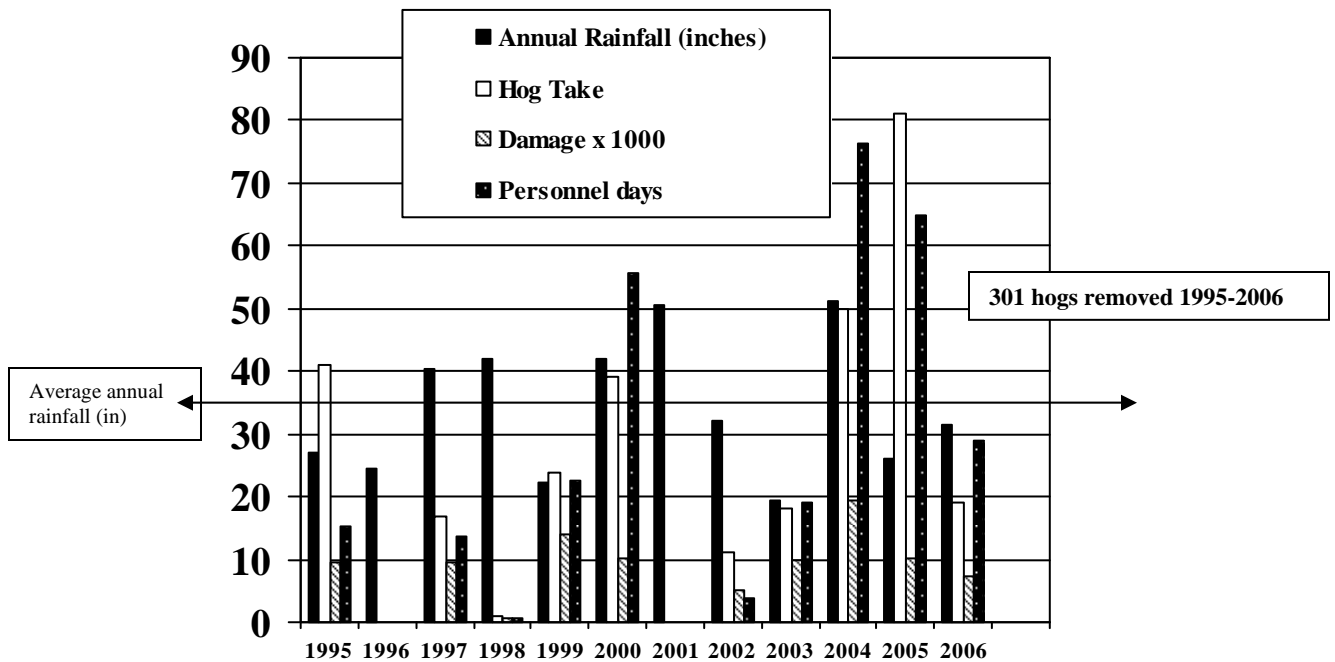


Figure 2. Project site annual rainfall, WS feral hog take, crop damage reported by area agriculture producers, and personnel days worked by year for an area of central Texas, 1995-2006.

cage traps (n=20), and shooting with night vision equipment (n=8). The 36 hogs taken during the 2005 aerial shooting operation were taken in 4.4 hrs of flying time.

Feral hog damage reported by area farmers ranged from no damage reported in 1996 and 2001, when WS personnel did not conduct management projects, to \$19,500 in 2004. As previously stated, WS personnel usually observed more hog activity in the project area during relatively dry years and less hog activity in relatively wet years. Figure 2 is a comparison of rainfall, farmer reported hog damage, hogs taken, and personnel hours by year. The years 2000 and 2004 received above average rainfall (41.82 in [106.22 cm] and 51.29 in [130.28 cm] respectively) and hog take was high (n=39 and n=50, respectively) compared to most other years. However, these years followed the two driest years during the study period, and in each case, dry conditions did not improve until after crops were planted.

Annual WS assistance (personnel days) with feral hog management at the site ranged from 0 days in 1996 and 2001, when personnel did not conduct operations, to 76.25 days in 2004. Number of WS personnel assigned to annual operations varied from year to year based on personnel availability and feral hog activity at the site.

CONCLUSION

The objective of the feral hog management plan was to minimize feral hog damage as it occurred in the project areas. WS personnel and local property owners used a variety of methods to manage feral hogs at each project site. At times, lethal hog management operations became less productive because hogs changed their behavior to avoid snares, shooting, dogs and other lethal methods. However, this behavioral change was a benefit to

the feral hog management program because it was much easier to move hogs away from damage sites. Feral hog management programs must be evaluated against established objectives (Choquenot et al. 1996). We have found, as have others, that it is preferable for these objectives to be set in terms of damage reduction rather than changes in feral hog numbers because reducing feral hogs may not always lead to acceptable levels of reduction in damage caused by hogs (Choquenot et al 1996). There are situations where significant feral hog population reduction may produce the desired management effect. However, many situations require a different management approach. Given the growing feral hog populations found in many areas, the limited resources available to deal with the problems, and seasonal and annual variations in feral hog densities and activity, the management plan discussed in this paper may be effective in addressing feral hog damage problems in other areas.

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