

Draft
Balcones Canyonlands National Wildlife Refuge
Invasive and Feral Animal Management Plan

United States Department of Interior
Fish and Wildlife Service
Region 2

July 01, 2013

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1.0 INTRODUCTION

1.1 Background

The negative impacts of invasive and feral animals have been well- documented throughout Texas and around the world. In response to potential human health and safety, economic, and environmental impacts, the Balcones Canyonlands National Wildlife Refuge has developed this document to identify general guidelines to direct management of these species. The purposes of the Invasive and Feral Animal Management Plan are to:

1. recognize that threats may be posed by these species;
2. recognizes that their presence hinders management activities for the Refuge's two primary species (golden-cheeked warbler and black-capped vireo)
3. outline appropriate management strategies; and
4. direct implementation of measures to minimize these threats

The goal of this Management Plan is to control, and where feasible/necessary, eliminate populations of invasive and feral animals on the Balcones Canyonlands National Wildlife Refuge in the most efficient, effective, and humane way possible. For the purposes of this document, feral animals are defined as wild populations of otherwise domesticated species that have through release or escape reverted to a wild condition. Among others, feral species found in Texas include house cats, dogs, goats and hogs. Since all of the species considered under this plan are not indigenous or native to Texas, by definition, they are considered exotic and as defined by Executive Order 13112, feral animals considered under this plan are also considered an invasive species.

In order to meet the species protection and enhancement goals for the Refuge, Refuge staff will strive to maintain feral species at zero population levels. Management to avoid predation and habitat destruction by feral animals has been directed by the U.S. Fish and Wildlife Service (USFWS) as a part of the recovery plans for endangered golden-cheeked warbler (*Setophaga chrysoparia*) and black-capped vireo (*Vireo atricapilla*) (USFWS 1991, 1992). Control may also be deemed appropriate if public health and safety threats or habitat damage becomes evident.

This Management Plan is intended to provide direction to Refuge staff and is anticipated to represent a continually updated and flexible set of directives that are able to meet the needs of a changing environment. As new species or conditions are discovered, this information will be incorporated to provide current status of the conditions and

challenges faced by the Refuge. Nothing in this document is intended to limit the Refuge's ability to control feral animals, but rather is intended to provide guidance on their control. Ultimately every situation will be dealt with on a case-by-case basis utilizing the best available information to assure control techniques are as effective, efficient, and humane as reasonably possible.

All techniques discussed in this document represent currently legal and widely accepted methods of control. Additionally, control of feral animals was contemplated in the Balcones Canyonlands National Wildlife Refuge Comprehensive Plan and Environmental Assessment (2001) and multiple other approved Federal regulations and policies (see Section 1.4). This document simply provides more comprehensive information related to control of these species and assures the Refuge utilizes this information when making decisions to control these species.

1.2 Refuge and Protected Species Descriptions

The Balcones Canyonlands National Wildlife Refuge was established in 1992 under the authority of the Endangered Species Act of 1973 as part of a larger conservation strategy in the Austin area to protect and enhance populations of two endangered songbirds, the golden-cheeked warbler and the black-capped vireo along with other listed and candidate species (City of Austin and Travis County 1996, USFWS 2001). As of July 2013, the Refuge consists of 7,989 ha (19,742 ac) of Federally-owned lands and 1,901 ha (4,699 ac) of Conservation Easements on private lands within a 32,375-ha (80,000-ac) acquisition boundary.

The first goal listed in the Comprehensive Conservation Plan for the Refuge is to “restor(e) and enhance...threatened and endangered species habitat on Refuge lands” (USFWS 2001). This goal is to be achieved not only by protecting existing quality habitat from catastrophic wildfire, nest predators (e.g. cowbirds), and pathogens (e.g. oak wilt) but also by using such tools as prescribed burning, mechanical treatment, planting, and deer herd management to create additional habitat for each species. Additionally, it identifies control of feral, exotic, and domestic animals that can compete with native wildlife and damage its habitat (e.g. dogs, cats, feral hogs, emu, etc.) (USFWS 2001).

Black-capped Vireo:

The Black-capped Vireo occupies secondary successional shrublands on stony plateau tops (Graber 1961, Grzybowski 1991). In the Refuge area, the best habitat (i.e. most densely occupied) consists of shin oak (*Quercus sinuata* var. *breviloba*) thickets

approximately 1 to 3 m tall with dense low foliage layer and with canopy cover in the range of 30-70%. Other woody components in vireo habitat include Ashe juniper (*Juniperus ashei*), elbowbush (*Forestiera pubescens*), fragrant sumac (*Rhus trilobata*), deciduous holly (*Ilex decidua*), rough-leaf dogwood (*Cornus drummondii*), plums (*Prunus sp.*), wafer-ash (*Ptelea trifoliata*), along with small emergent trees such as Texas ash (*Fraxinus texensis*), cedar elm (*Ulmus crassifolia*), Texas sugarberry (*Celtis laevigata*), and Spanish oak (*Quercus buckleyi*), and an abundance of vines such as saw greenbrier (*Smilax bona-nox*), poison-ivy (*Rhus toxicodendron*), and Virginia creeper (*Parthenocissus quinquefolia*).

Early environmental documents for the Refuge indicated that approximately 8,200 ha (18,000 ac) of potential habitat for the Black-capped Vireo occurred within the original 18,640-ha (41,000-ac) acquisition boundary (e.g. USFWS 1991a, b). Subsequent research has indicated that a much smaller proportion of the Refuge--possibly on the order of 900 - 1,800 ha (2,000 – 4,000 ac)--is expected to be suitable for vireo habitat (Sexton 2006, unpubl. data). From 2010-2013, vireo research efforts headed by a team from Texas A&M University have provided the best information of vireo distribution and numbers. This effort, along with other efforts, identified approximately 100 vireo territories on refuge lands.

Golden-cheeked Warbler:

The Golden-cheeked Warbler occupies old-growth closed-canopy woodlands dominated by Ashe junipers and hardwoods such as Spanish oak, shin oak, and live oak (*Quercus fusiformis*), Texas ash, cedar elm, and escarpment cherry (*Prunus serotina var. eximia*). Canopy cover is usually 70% to 100% with canopy height usually 5 to 8 m (TPWD 1995b, Ladd and Gass 1999). Understory and ground cover are often sparse in the heavily shaded woodlands. The habitat is best developed on steep rocky slopes and canyons but may develop on level upland areas in the absence of long-term disturbance. Warblers may occur in more open woodlands (50% to 70% canopy cover) or in tall riparian groves if old-growth junipers occur intermixed with, or adjacent to, the woodland stand.

Early environmental documents for the Refuge indicated that approximately 2,400 ha (5,300 ac) of “actual or potential” warbler habitat were in the original 18,600 ha (41,000 ac) boundary. Based on a review of the satellite classification on which that estimate was based, and maturation of some marginal habitat, a substantially larger area of warbler habitat is probably now in existence in the previous Refuge boundary. A 2012 draft map

of “Golden-cheeked Warbler Habitat Management Areas” for the draft Habitat Management Plan shows approximately 7,287 ha (18,000 ac) of warbler habitat management area within Refuge lands. Additional acreage of suitable warbler habitat occurs on many private tracts within the 36,400-ha (80,000 ac) Refuge acquisition boundary (USFWS 2001).

Warblers occur almost throughout the Refuge. It is a fairly common and characteristic species in juniper-oak woodlands on all sizable Refuge tracts. In 2009, Sexton updated the estimate on Refuge tracts and indicated that a minimum of 810 warbler territories were present on about 16,000 acres of the Refuge managed for the warbler (Sexton 2009).

1.3 Purpose and Need

Feral species have over time hindered management practices on the Refuge and adjacent private properties. The practices discussed in this document are directed toward the conservation of ecological resources to assure the preservation of native plants and animals, particularly the endangered golden-cheeked warbler and black-capped vireo. Of utmost concern is the constant threat these species pose to the long-term viability and sustainability of the warbler and vireo habitat, damage to property, and public and staff safety. In addition, they often compete with native wildlife for food, water, and other resources, as well as cause disturbance to soils allowing for the invasion of exotic plant species and siltation of area springs and water-ways. These animals can serve as disease reservoirs and pose a threat to the health of both humans and other animals. As an example, feral hogs are known to carry at least 13 diseases, including brucellosis, pseudo rabies, tuberculosis, bubonic plague and anthrax (Burns and Loven 1998). The development and implementation of an effective and humane management plan to remove these animals is essential to achieving the Service’s goal of conserving and preserving native wildlife.

1.4 Authority for Action

Service Manual (601 FW1, 602 FW1, and 603 FW1) – National Wildlife Refuge System Mission and Goals and Refuge Purpose, Refuge Planning Overview, and Refuge Management Activities.

Service Manual in preparation (751 FW1 and FW2) – Exotic Species (Part 751), Policy (EO11987), and Introduction and Management at Field Stations.

Refuge Manual (7RM 14) – Pest Control

(14.2) The policy of the U.S. Fish & Wildlife Service is to engage in the necessary control of wildlife within the National Wildlife Refuge System to assure balance of wildlife and fish populations consistent with the optimum management of refuge habitat.

(14.9 b) Control of trespass and feral animals and other animal control operations.

Title 50 CFR Part 30, Section 11 – Control of feral animals.

Feral animals, including horses, burros, cattle, swine, sheep, goats, reindeer, dogs, and cats, without ownership that have reverted to the wild from a domestic state may be taken by authorized Federal or State personnel or by private persons operating under permit in accordance with applicable provisions of Federal or State law or regulations.

Title 50 CFR Part 31, Section 14 – Official animal control operations.

(a) Animal species which are surplus or detrimental to the management program of a wildlife refuge area may be taken in accordance with Federal and State laws and regulations by Federal or State personnel or by permit issued to private individuals.

(b) Animal species which are damaging or destroying Federal property within a wildlife refuge area may be taken or destroyed by Federal personnel.

Executive Order 13112 - Invasive Species

Issued in February, 1999 instructs Federal Agencies to use their programs and authorities to prevent the spread or to control populations of invasive species that cause economic or environmental harm, or harm to human health.

Other guidance documents include the September 2001, Balcones Canyonlands National Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment (USFWS 2001), the March 25, 2008 Feral Hog Management Plan (USFWS 2008), and

the USFWS May 09, 2013 Firearms Policy for Non-law Enforcement Personnel. Additionally, management actions to protect golden-cheeked warbler and black-capped vireo habitat have been directed by the U.S. Fish and Wildlife Service as a part of the recovery plans for these endangered species (USWFS 1991, 1992).

In the State of Texas feral species are non-game, non-protected species. As such, there are no formal hunting seasons and these species can be taken by whatever legal means necessary. Their non-game status exempts them from the laws concerning animal waste and bag limits.

2.0 FERAL ANIMAL MANAGEMENT

2.1 Implementation and management methods

Effective management of species included in this plan will require long-term commitment by Refuge staff and may require multiple concurrent management actions. Methods selected will vary based upon laws and regulations, public use, nature/intensity of the threat, existing land management directives/plans, and the particular circumstances of each tract. No single management recommendation can be made that would apply equally to each species in every location. In all cases, animal removal must be discreet and as humane as possible. Any animals taken will be dispatched in a swift, effective and humane manner. No cruelty will be tolerated. Control activities will be selected based upon practicality of achieving management goals. Among others, the following methods may be selected alone or in combination to achieve management goals.

1. Trapping, aerial shooting, and removal or relocation by Refuge staff or other cooperating Agencies. This may be accomplished in cooperation with other Agencies, including, but not limited to the Texas Parks and Wildlife Department and the U. S. Department of Agriculture's Wildlife Services.
2. Contracted services. The Refuge may elect to enter into a contract with an appropriate Agency or individual to provide removal, relocation, or other management services.
3. Recreational hunting opportunities in accordance with the TPWD Code, Service policies and procedures, and Refuge Hunt/Management Plans.
4. Habitat modifications to minimize or eliminate the desirability of an area.

5. Fencing or otherwise excluding such species from certain areas.
6. Education and outreach programs that inform the public about the impacts of feral animals.

Other information to consider includes:

1. The first priority in all management actions is to ensure the safety of staff and the public.
2. Any ill or injured animal will be dispatched as swiftly and humanely as possible, and with every effort to ensure the safety of staff and the public. All shots should be at a downward angle and/or have an adequate backstop to minimize bullet travel, and if possible shots should be pointed towards the interior of the property. Except during public big game hunts and other extenuating circumstances, to avoid toxic effects of lead bullet consumption by predatory and scavenging birds, all bullets used will be lead-free and nontoxic.
3. Unless part of a public hunt, only authorized Refuge staff, other agency staff and Refuge volunteers are allowed to discharge a firearm in conjunction with these control activities. Discharge of a firearm should be in compliance with the USFWS may 09, 2013 firearms policy for non-law enforcement personnel. All participants must receive a weapon familiarization safety class by a Firearms Instructor or certified Law Enforcement Officer. Law Enforcement Officers will not have to take a familiarization class if they use a USFWS weapon because they are certified with these weapons during annual law enforcement training. Authorized personnel will only use weapons for which they have received familiarization safety training.
4. When and if possible, animals requiring euthanasia should be moved to a safe area, out of public view, and dispatched quickly and with every effort to minimize suffering.
5. If an animal has bitten someone, or if an incidence of rabies or other communicable disease is suspected, the Travis County Health Department (512) 974-2000 and/or Texas Department of State Health Services (512) 458-

7111 should be notified and will direct actions for appropriate examination and testing.

2.2 Cats and Dogs

2.2.1 Purpose

Much of the Refuge is located adjacent to residential subdivisions or will be at some point in the future, and as such, feral cats and dogs present an increasing concern for the Refuge. These animals can have significant effects on native species and pose potential safety hazards to staff and Refuge visitors.

2.2.2 Background

Feral house cats can significantly impact populations of amphibians, reptiles, birds, and small mammals (Fitzgerald 1988). Feral cats have been implicated in the declining numbers of ground and tree-nesting birds and several species of small rodents (Gore and Schaefer 1993, Humphrey and Barbour 1981). Researchers have shown that housecats may compete for food resources with native species (Erlinge et. al 1984, George 1974) and may kill significant numbers of wild animals each year (Bradt 1949, Churcher and Lawton 1987, Coleman and Temple 1996, Davis 1957, Eberhard 1954, Liberg 1984).

Feral dogs and cats may also carry and transmit a number of diseases. These diseases may range from feline leukemia and feline distemper that may be transmissible to wildlife species as well as pets, to diseases that may be dangerous to people such as rabies and toxoplasmosis (Jessup et al 1993, Roelke et al 1993, Warfield and Gay 1986).

Feral dogs often form packs that may pose a threat to Refuge staff, visitors, or neighbors and have been observed on the Refuge.

2.2.3 Monitoring

Feral cat and dog populations are currently believed to be relatively low on the Refuge. As such, no systematic monitoring program is currently warranted. Refuge staff will incidentally monitor Refuge tracts for feral cats and dogs and will notify the Refuge Manager and/or Biologist when identified. Staff will work to manage populations of these animals as soon as they are observed to assure their numbers do not increase.

2.2.4 Management Strategies

On occasion Refuge staff encounter lost pets, or cats and dogs and other domesticated animals that have been “dumped” or otherwise disposed of as unwanted pets. Should the animal appear to simply be lost, Refuge staff will attempt to capture the animal and contact its owners.

Typically, Refuge staff should humanely live trap these animals and release them into the care of a local animal shelter or other appropriate humane care facility. The closest such facility to the Refuge is located in Lago Vista (Life Long Friends Pet Adoption 512-267-6876). Other similar facilities include Williamson County Humane Society (512-260-3602), Central Texas SPCA (512-260-7722), and Christ-Yoder Animal Shelter (512-793-5493).

Occasionally, feral cats and dogs may be encountered that appear to be sick and/or dangerous to Refuge staff or visitors. In such circumstances these animals could be shot on-site, provided it can be done in a safe, efficient, and humane manner. Of greatest concern here is the safety of Refuge staff and visitors. All shots should be directed at a downward angle to minimize bullet travel, and should be directed away from visitor and public use (i.e. roads, subdivisions, etc.) areas. Non-toxic bullets will be used when/if possible, the primary concern here being the safety of Refuge staff and/or visitors. Euthanized animals may be disposed of onsite for local scavengers to consume.

2.2.5 Conclusion

Management of feral cats and dogs is likely to be an ongoing and ever increasing issue for the Refuge. Education and outreach programs that inform the public about the impacts that free-ranging house cats and dogs can have on native wildlife, as well as the unfortunate reality faced by discarded or unwanted pets left to fend in wild environments, can help minimize the incidence of animal “dumping” and help generate public support for appropriate management of feral populations. Cooperative efforts in conjunction with regional animal control programs may effectively reach a wide segment of the public and prove most beneficial.

2.3 Feral Hogs

2.3.1 Purpose

For years feral hogs (*Sus scrofa*) have created significant financial and ecological damage on the Refuge, and management of wild free-ranging populations is a major concern for

the Refuge. Control of feral hogs is currently authorized under the 2008 Feral Hog Management Plan and because of these concerns, control efforts have been conducted on the Refuge for many years. This document is intended to supersede the 2008 Management Plan by providing additional information and guidance that should be followed by Refuge staff.

2.3.2 Background

Feral hogs are members of the family Suidae and include the European wild hog (sometimes referred to as “Russian boar”), escaped domestic hogs, and European-domestic crossbreeds. According to the 2011 National Feral Swine Mapping System (<http://128.192.20.53/nfsms/>) feral hogs are found throughout the southeastern United States from Texas to Florida and north to Wisconsin. Fourteen states currently have a ban or prohibition related to introduction of feral hogs (Miller 1997). There are currently an estimated two million feral hogs in Texas, and they have been reported from 233 of the state’s 254 counties (Mapston 2004).

The family Suidae is native to Europe and Asia and appears to have been domesticated by about 7000 B. C. (Mapston 2004). Early Texas explorers, including DeSoto, Cortez and LaSalle, brought hogs to Texas, and hogs were an important livestock animal for early Texas settlers. Free-ranging and abandoned domesticated hogs became feral over time (Conner 1971, Fehrenbach 1985). Ranchers and sportsmen imported and released European wild hogs for sport hunting in Texas in the 1930’s (Mapston 2004). Escaped or intentionally released European wild hogs began interbreeding with the feral animals already ranging in portions of the state, and a variety of domesticated and wild traits may be observed in feral hogs today.

Mature feral hogs may reach a shoulder height of 36 inches and weigh from 100 pounds to greater than 400 pounds. They vary in color and coat pattern, and males are generally larger than females. Feral hogs have relatively poor eyesight but have a keen sense of hearing and smell. They may breed at six to ten months of age and have an average gestation period of 115 days with a typical litter size of four to six, though litters of as many as 13 have been documented (APHIS 1994, Mapston 2004). Typically producing two litters a year, hog numbers can expand rapidly if left unmanaged (Texas Wildlife Damage Management Service 1998). Feral hogs generally travel in family groups consisting of two sows and their young. Boars are generally solitary, only joining a herd to breed (Taylor 1991).

Feral hogs typically demonstrate a home range of 320 to 12,160 acres, though ranges of 70,000 acres have been reported (Mapston 2004, Taylor 1991). Natural mortality is greatest among individuals three months or younger and average life expectancy is typically 4 to 5 years. Adult mortality is mainly due to hunting, parasites, disease and tooth deterioration. Predation by coyotes and bobcats is a minor limiting factor (Taylor 1991).

Feral hogs are omnivorous, primarily consuming vegetation, mast, roots and tubers, and a wide range of animal species including invertebrates, reptiles, amphibians, birds, small mammals and carrion (Davis 1994, and Everitt and Alaniz 1980, Hellgren 1997, Springer 1977, Taylor 1991). Numerous studies have demonstrated competition with native wildlife for food, water or space (Everitt and Alaniz 1980, Kroll 1985, Springer 1977, Tate 1984).

Feral hogs can have a significant impact on ranching and farming operations. Hogs have been documented to prey upon newly born calves, sheep and goats, feed directly on agricultural crops, and plow up soil and damage plants as they seek roots and invertebrates in the soil (Pavlov et al 1981, Singer 1981, Tisdell 1982). Feral hogs are known to be capable of carrying a number of endemic and exotic diseases and parasites transmissible to domestic livestock and humans (Mapston 2004, Miller 1997, U.S. Department of Agriculture 1992) and aggressive encounters have occurred with field staff to the point at which staff had to climb trees to avoid conflict (COA BCP pers. comm. 2011).

Feral hogs often damage or destroy fences by tearing or ripping through woven or welded wire and by weakening wires and fence posts. Large hogs can breach all but the most heavily built fence, requiring frequent and costly repairs (Mapston 2004).

Feral hogs prefer riparian areas, bottomlands and dense vegetative cover. During hot weather, hogs seek wet areas to create muddy wallows that are used to cool body temperature and to seek relief from insect infestations. This activity can increase soil erosion and can destabilize wetland areas, springs, creeks and other riparian areas and lead to a localized shift in plant succession (Davis 1994, Mapston 2004). This behavior is of special concern to Refuge staff attempting to protect native plant species and populations of spring/wetland associated species found on the Refuge. Feral hog rooting behavior also damages and/or destroys hardwood seedlings needed for long-term habitat sustainability for the endangered golden-cheeked warbler, black-capped vireo, and other

Federal trust species. This activity also exposes soil thereby increasing the spread of exotic and invasive plants.

2.3.3 Monitoring

Because feral hogs are largely nocturnal, surveying and providing accurate census information for wild, free-ranging populations is often difficult. Feral hogs may sometimes best be detected by signs such as wallows, rooting, and rubs (tree trunks or fence/powerline posts where hogs scratch or rub themselves). Hog tracks are similar to deer tracks, but with somewhat more rounded toes and greater width to length ratio. Scat appears very much like that of a small calf, being dropped in several small piles. These are very distinct from deer pellets or predator cord-like droppings (Taylor 1991). Feral hog populations are currently monitored through the use of motion activated game cameras located near feral hog traps and/or game trails. These photos appear to be effective in determining feral hog use of an area and provide information related to abundance. Additionally, Refuge staff report incidental sightings, and other evidence of their presence to the Refuge Manager and/or Biologist. Basic information on Euthanized feral hogs including date, number, sex, location, and size of are also recorded.

2.3.4 Management Strategies

General Information

The feral hog is classified by Texas Parks and Wildlife Department as an unprotected, non-game animal and may be taken by any legal method at any time of the year with no minimum sizes or bag limits. There are currently no toxicants, repellents, fertility control methods or biological control agents registered or approved for use in the U.S. (Mapston 2004).

Texas Animal Health Commission restricts public distribution of swine and requires all swine used for public consumption to be slaughtered in a licensed facility. Such animals must be transported live to an approved facility. Since such a requirement is logistically not feasible, handling live feral hogs puts Refuge staff in a potentially dangerous situation, and maintaining these animals in such a condition puts them under unnecessary stress, all trapped feral hogs will be immediately euthanized in a humane fashion.

All hogs killed on Refuge lands by authorized staff will be disposed of on-site for local predators/scavengers to consume, or will be provided to a research institute for research purposes. Except during public hunts and other extenuating circumstances, all shots will

utilize lead-free nontoxic bullets. Bullets containing lead may be used during the public hunts since the animal will be transported off the Refuge.

Unless harvested during the Refuge's big game hunt, Refuge policy prohibits employees from keeping for their own personal use any animal killed on the Refuge. The only exception to this would be a Refuge sponsored event in which a hog(s) may be kept and consumed during this event.

Fencing

Mesh wire panel in combination with electric fencing and chain link fencing with a sufficient underground buried "skirt" have been shown to successfully exclude hogs from small areas. Unfortunately, these methods are very expensive to install and maintain for large tracts (Mapston 2004). In addition, many portions of the Refuge contain topography or prior land uses that make this type of fencing difficult or impossible to install.

Trapping

Cage traps and pens may be employed to capture feral hogs. A number of portable and site-constructed designs are available. Trapping is most successful near riparian or feeding areas. Pre-baiting traps for several days/weeks by operating traps with disengaged trigger mechanisms increases capture success rates. Common baits include dry or fermented corn or grain, sweet fruit-flavored mixtures such as raspberry Jell-O or Kool-Aid, livestock pellets or cubes, vegetables, fruit or carrion. Active traps must be checked at least once daily, though excessive disturbance near traps may cause hogs to avoid these areas (Mapston 2004). Hogs may also become "trap shy" and frequent movement of traps to new locations and changing baits can improve trap success. As feral hogs are generally most active at night, feeders should be set to throw feed after dark. Doing so also minimizes the consumption of the corn by non-target animals (birds, squirrels, etc.). To reduce the stress of the animal(s), traps must be checked early in the morning, particularly in warmer weather to avoid overheating the animals and assure humane treatment. Additionally, to minimize discomfort of trapped hogs, all traps should be located in shade and/or have water provided. All trap cable mechanisms for the gate trigger should be set such that there is a break-away mechanism to avoid entanglement in the cable. Trapped hogs should be shot in the head at close range to ensure a humane demise.

Leg-hold traps are sometimes used to manage hogs. These traps are inexpensive, relatively easy to install and require little maintenance. However, they may be

indiscriminate, and may capture a variety of wildlife. As such, the use of leg-hold traps, and other indiscriminant devices are not authorized on the Refuge.

Hunting

Feral hogs may be hunted with techniques similar to those used for white-tailed deer. Opportunistic incidental shooting, stand hunting, and still-hunting can be used effectively. Feral hog hunting is currently approved during the Refuge's big game hunt, but on average only a few hogs are taken each year. TPWD allows landowners to hunt feral hogs at night with the use of spotlights once local Game Wardens are notified. Additionally, feral hogs may be taken opportunistically by Refuge staff, but such opportunities are expected to be rare. Refuge policy requires all qualified staff members participating in night shoot must have passed a hunter safety class and possess a valid Texas hunting license. Refuge staff must use a marked government vehicle and be in uniform during any night shooting activity.

Aerial Shooting

Aerial shooting may be effective in controlling feral hog populations. This technique was contemplated in the 2008 Feral Hog Management Plan, but at that time was not considered feasible due to costs. The Refuge currently does not have funds to support such a program; however, should funding become available such technique may be considered in the future. If conducted, such a program would likely be contracted with an agency such as USDA Wildlife Services and the details of such agreement would be negotiated at that time.

Aerial shooting has several advantages in that it can be very selective and done in areas that are inaccessible to other management techniques. However, dense vegetation, as occurs across much of the Refuge, limits visibility and may make aerial shooting less feasible in certain areas. Depending on the amount of damage, the benefits of aerial hunting can far outweigh the costs (Mapston 2004).

To avoid excessive disturbance to nesting golden-cheeked warblers, black-capped vireos, and other migratory birds, aerial shooting would not be conducted from March 1 to September 1 of each year.

2.3.5 Conclusion

Feral hogs have been observed on most Refuge tracts and are likely to occur to some extent on all tracts. Due to the excessive damage caused by feral hogs, Refuge staff is

encouraged to actively work to reduce and control feral hog populations to prevent property damage and to minimize impacts to native wildlife and habitat. Since intensive management efforts often cause feral hogs to shift home ranges or to become more nocturnal in habit (Mapston 2004) a combination of management techniques will likely be required.

3.0 OTHER FERAL ANIMALS

Livestock (i.e. goats, cattle, etc.) are occasionally observed on Refuge tracts. Typically these animals belong to neighboring landowners, but if left uncontrolled overtime these animals could also become feral. As such every reasonable effort should be made to contact the rightful owner. Should such animal(s) have no known owner, the local Sheriff's department should be contacted for trapping and transport to other facilities.

While this plan attempts to be as inclusive as possible and identifies the most common feral animals expected to be encountered on the Refuge, no such plan can anticipate all situations and species that will be encountered. Over time, it is highly likely Refuge staff and visitors will encounter sick and/or excessively dangerous animals not mentioned in the sections above. Under such situations Refuge staff should attempt to control the animal in as humane fashion as is reasonably possible and/or contact appropriate authorities. If the situation is deemed too dangerous, such animals can be shot on site, utilizing the safety protocols identified throughout this document. Alternative management techniques should also be considered to exclude these animals from the site to reduce or eliminate the damage being caused.

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