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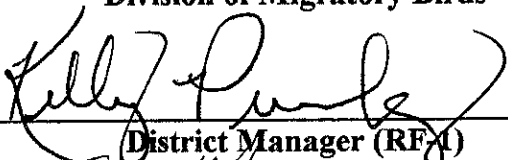
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Nuisance Animal Control Plan
For
Pond Creek National Wildlife Refuge

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I. Introduction

Pond Creek National Wildlife Refuge (NWR) became the 501st National Wildlife Refuge administered by the U. S. Fish & Wildlife Service (Service) on August 8, 1994 under the authority of the Emergency Wetlands Resources Act of 1986. At that time, 2,300 acres were acquired through a combination of donations and fee title purchases facilitated by The Conservation Fund. These initial lands were retained in a "caretaker" status until the passage of the Omnibus Parks and Public Lands Act of 1996, which authorized the transfer of 25,000 acres from Weyerhaeuser Timber Company to the Service. Pond Creek NWR contains approximately 28,000 acres and is located in Southwestern Arkansas in Sevier County along the Little and Cossatot Rivers. Virtually all of the refuge's local drainage flows into Pond Creek. The refuge consists of contiguous forested lands dissected by an intricate system of rivers, creeks, sloughs and oxbow lakes in an extensive bottomland hardwood forest.

The forest communities are complex and change rapidly over short distances in response to small elevation changes and slight differences in hydrologic regimes. Approximately 6,000 acres of planted, off-site loblolly pine plantations are currently located throughout portions of the refuge; however these plantations are currently being converted to mixed species hardwoods through commercial timber harvesting. The remaining forest consists of typical bottomland hardwood forest species interlaced with few natural loblolly pine trees. The primary wildlife-dependent recreation activities provided to the public include wildlife observation, wildlife photography, hunting, fishing, environmental interpretation and education.

Pond Creek NWR is currently part of the South Arkansas National Wildlife Refuge Complex, which consists of four refuges and multiple easement areas scattered across the southern ½ of the state. Pond Creek NWR along with other refuges in this part of the south fall within the Red/Sulphur/Little River Joint Venture. The Red River valley has always been an important and traditional waterfowl migration corridor due in part to its unique position placing it on the boundaries of both the Central and Mississippi flyways. In addition to waterfowl, numerous neotropical migratory birds also find Pond Creek NWR an important site for nesting and/or migration stopovers.

Additionally, Pond Creek NWR occurs within the Service's Arkansas-Red River Ecosystem which encompasses portions of nine states and four U. S. Fish and Wildlife Service Regions. The Ecosystem Plan was finalized in 1996 and contains the following statement referring to U.S. Fish and Wildlife Service field stations and personnel in this area: "The vision of this Team is the efficient and effective management of federal trust fish and wildlife resources of the ecosystem to conserve and restore biodiversity for the benefit of the people." This plan establishes several major objectives, including: "Focus Species Conservation and Restoration" (specific strategies developed for migratory birds, inter-jurisdictional fisheries, listed species and species of concern), and "Conserve and Restore Focus Habitats" (specific strategies developed for several communities, including wetlands and bottomland hardwood habitats).

Among the significant contributions of the refuge to the North American Waterfowl Management Plan and the Arkansas-Red Ecosystem Plan will be restoration, enhancement, and

protection of vital bottomland hardwoods for migratory birds; the establishment of moist soil areas as habitat for waterfowl; and inventories and investigations of neotropical migratory birds. (refer to the Comprehensive Conservation Plan for additional information).

II. Policies and Regulations Governing Animal Control.

The policy of the Service is to engage in the control of wildlife within the National Wildlife Refuge System to assure balanced wildlife and fish populations consistent with the optimum management of refuge habitat. The objectives of implementing nuisance animal control are to prevent/minimize negative impacts to refuge wildlife resources and priority public use programs and eliminate non-compatible/prohibited uses. Authorization of animal control practices on national wildlife refuges are governed by multiple laws and agency policies with codification contained in **Title 50 of the Code of Federal Regulations**. Refuge staff is mandated to eliminate/minimize impacts by feral/free ranging domestic animals. Specific applicable cites from the **CFR** include:

- (1) **Part 31-Wildlife Species Management, Subpart B-Terms and Conditions of Wildlife Reduction and Disposal, 31.14 -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.
- (2) **Part 30- Range and Feral Animal Management, Subpart B-Feral Animals, 30.11-Control of feral animals.** (a) 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 regulation.
- (3) **Part 30-Range and Feral Animal Management, Subpart B-Feral Animals, 30.12-Disposition of Feral Animals.** Feral animals taken on wildlife refuge areas may be disposed of by sale on the open market, gift or loan to public or private institutions for specific purposes, and as otherwise provided in section 401 of the act of June 15, 1935 (49 Stat. 383, 16 U.S.C. 715s).
- (4) **Part 28-Enforcement, Penalty, and Procedural Requirements for Violations of Parts 25, 26, and 27, Subpart D-Impoundment Procedures, 28.43-Destruction of dogs and cats.** Dogs and cats running at large on a National Wildlife Refuge and observed by an authorized official killing, injuring, harassing or molesting humans or wildlife may be disposed of in the interest of public safety and protection of the wildlife.
- (5) **Part 26-Public Entry and Use, Subpart B-Public Entry, 26.21-General trespass provision.** (b) No unconfined domestic animals,

including but not limited to dogs, hogs, cats, horses, sheep and cattle, shall be permitted to enter upon any national wildlife refuge or to roam at large upon such an area, except as specifically authorized under the provisions of 26.34, 27.91 or 29.2 of this subchapter C.

Other authorizations also include the Arkansas Game & Fish Commission rules & regulations and refuge specific rules & regulations codified in 50 CFR.

In Arkansas, any wild animal creating a problem by committing damage to personal property, except migratory birds and endangered species, is considered a nuisance animal. By state regulation, beaver, muskrat and nutria causing damage to personal property can be taken at any time by shooting during daylight hours or trapping by water set traps and snares. Feral, free-roaming hogs may be taken anytime during the year on personal property. In addition, feral hogs on public lands may be taken at any time during any open hunting seasons with weapons legal for the season open. A hog that has escaped from its pen is considered to be feral after five days in the wild.

Executive order 11643 regulates the use of chemical toxicants to control animal damage on Federal lands. Control and selective trapping of feral and free ranging domestic animals are authorized under the Refuge Manual, 7 RM 14.7E. In addition, feral animals without ownership that have reverted to the wild (i.e. feral swine) 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 regulation as outlined by title 50 CFR, Part 30, Section 11. The Manual also stipulates that domestic free ranging animals such as dogs and cats that are impacting refuge wildlife and other resources may also be disposed of by authorized personnel (see 50 CFR 28.43 cite above).

III. Refuge Goals and Objectives

The items listed below represent a few of the objectives for Pond Creek National Wildlife Refuge. A complete listing of all objectives and mandates applicable to the management of this refuge are contained in the Comprehensive Conservation Plan (CCP) and EA. All objectives reflect the Service's commitment to achieve the mandates of the National Wildlife Refuge System Improvement Act of 1997, the mission of the National Wildlife Refuge System, the Arkansas-Red Ecosystem Plan, the North American Waterfowl Management Plan, Title 50 of the Code of Federal Regulations, Service directives, and the purpose, vision, and goals for Pond Creek National Wildlife Refuge.

1. Manage approximately 29,000 acres of refuge forests and waters to maintain viable populations of native flora and fauna consistent with sound biological principles and other objectives of the Comprehensive Conservation Plan.
2. Maintain and manage approximately 20,000 acres of existing bottomland hardwood forests for a diversity of wildlife species, particularly waterfowl, wading birds, and migratory forest birds.

3. Maintain and/or enhance conditions (habitat, nesting areas, and protection zones) as needed to meet the needs of candidate species of concern, threatened and endangered species. To provide habitat and protection for threatened species: Bald eagle, and Candidate species of concern: American Alligator, Rafinesque's Big-eared Bat, Alligator Snapping Turtle, and Rabbitsfoot Mussel.
4. Manage for resident wildlife species (e.g. white-tailed deer, turkey, raccoon, and squirrel).
5. Manage furbearer populations to achieve habitat management objectives and stable relationships between flora and fauna.
6. Aggressively pursue reductions in non-native plant and animal populations to minimize impacts to native flora and fauna.
7. Provide high quality hunting opportunities consistent with sound biological principles.
8. Protect the area's wetlands and resource values through land protection strategies.
9. Develop and implement a quality wildlife-dependent recreation and environmental education program that leads to enjoyable recreational experiences and a greater understanding and appreciation of fish and wildlife resources.

The proposed actions contained in this plan fully contribute to accomplishment of the objectives of this refuge. Furthermore, these proposed actions are considered essential by the staff to address rapidly growing levels of unauthorized, non-compatible free ranging dog and feral hog impacts to the wildlife resources and public use programs of the refuge. Objective 7 of the CCP/EA (see # 6 above) addresses pursuing reductions in non-native flora and fauna impacting refuge priority programs. Specific strategies are discussed in this document addressing these issues including establishing trapping programs, if necessary, to deal with feral hogs and implementing law enforcement /animal control actions to control free ranging and/or feral dogs and cats. Objectives 1 and 6 of the CCP address the need to control beaver populations and implement actions such as trapping/shooting to control population levels. These actions were addressed in the CCP, identified as critical management actions to be taken, went through full public review and multiple public meetings and are fully incorporated in this step down plan detailing specific actions to guide refuge staff. No other public review is required since this plan does not change or add new program directives.

IV. ASSESSMENT

Since the establishment of Pond Creek National Wildlife Refuge, damage has occurred and been noted from the following species: beaver, feral swine, domestic livestock and free ranging domestic dogs. During the initial refuge establishment process, free ranging cattle along with escaped/released exotics such as emu were a significant issue throughout the entire refuge area.

Damage to bottomland hardwoods and wetland habitats by beaver are observed annually when beaver cut/girdle trees and build dams resulting in flooding of bottomland forests. Certainly flooding occurs naturally in bottomland hardwood forests but it is seasonal and for relatively short durations. Beaver dams impound water year round resulting in constant saturation of the primary root zone and in general, will result in the total loss of all trees in the impounded area within 1 - 1½ year. Refuge staff estimates that approximately 1000 - 1500 acres of refuge floodplain forest has been converted to beaver pond habitat over the last 12- 14 years with virtually all of this conversion occurring within a 5 year period just prior to refuge ownership when the previous corporate landowner ceased active beaver control activities. Both nutria and beaver cause additional damage to levees and roads through tunneling resulting in an eventual road collapse or closure of drains. In the absence of a beaver control program, staff estimates that a minimum of 10,000 - 12,000 acres of additional bottomland hardwood forest would likely be converted to beaver ponds.

Feral hog population numbers continue to increase in spite of liberal take provisions in refuge hunting programs. Current population levels result in very high competition levels between the swine and native wildlife for food items and habitat. Additional problems occur due to continued outright destruction of habitat by rooting and wallowing and as a potential vector for numerous wildlife and domestic livestock diseases.

Free ranging domestic and feral dogs running through the refuge have caused an innumerable amount of problems by trespassing, harassing wildlife, take of wildlife such as young of the year and impacting user opportunities for priority uses such as hunting and wildlife observation. Feral dogs are non-native and by agency policy/federal law will be removed. Free ranging dogs not under the direct control of users as authorized in refuge specific regulations are prohibited and violate multiple statutes contained in 50 CFR. They are subject to impoundment, citing of owners for trespass and/or destruction by refuge personnel.

Based on staff assessment and directives contained in the CCP, all indications support the fact that a program of reduction of domestic/wildlife-caused damage is warranted to meet refuge objectives and minimize impacts to refuge outputs.

V. DESCRIPTION OF REDUCTION PROGRAMS

A. BEAVER

1. Description

The beaver is the largest native rodent in North America with weights averaging 35-50 pounds. Beavers have a relatively long life span, with individuals known to have lived to 21 years. Most, however, do not live beyond 10 years. Female beaver give birth to 3 or 4 kits between March and June. Beaver generally live in colonies with 4 to 8 related individuals in each colony. Beaver can be found in any drainage with permanent year round water sources on or adjacent to Pond Creek NWR. These drainage systems typically provide access to tree species that are preferred food resources including

sweetgum, box elder, swamp privet, cypress, cottonwood, black willow and other 'soft' hardwoods. Throughout most of the beavers range, this species has been viewed as beneficial in that impoundments provide habitat for many aquatic related wildlife species. Loss of native predators coupled with virtually no trapping take has resulted in major population increases throughout the south, including at Pond Creek NWR. Population levels at Pond Creek are such that well over 50% of the existing floodplain forest is in danger of being converted to beaver impoundments. The impacts of beaver in many cases are now more severe because of manmade structures such as levees and ditch banks to den in and road culverts, canals and ditches to dam up. Due to the number of beaver on Pond Creek NWR, they cause an extensive amount of damage to the habitat and structures by dam building, bank burrowing, tree cutting and flooding bottomland hardwoods.

Many consider beaver a keystone species due to the fact that they have the ability to greatly alter the structure and function of aquatic habitat and to an extent, the neighboring terrestrial habitat by their dam construction. These structure changes create habitat for numerous other species such as reptiles, amphibians, fish, furbearers, waterfowl, shorebirds and other species. However, some immediate impacts to aquatic systems are that beaver can raise stream temperatures on outflows (of dams) verses inflow temperatures. These changes can have appreciable impacts to some fish species. Dams can also alter fish community composition by changing habitat, restricting stream flow within the impacted system and increasing water temperature due to increased sunlight penetration (through tree deadening). Beaver pond fish communities tend to be generally less productive with lower species richness, and smaller size classes of fish than free flowing stream systems.

Other negative impacts from beaver include changes in distribution of tree species and other flora composition within the immediate area of the impoundment due to ground water level elevation and direct loss of native, bottomland hardwood forest due to year round flooding. Mixed species hardwood forest stands are typically replaced with emergent herbaceous or shrub communities such as buttonbush and swamp privet within the impounded area following forest stand mortality. Large-scale loss in forested acreage directly impacts habitat availability and the ability to meet objectives set for forest birds and affects the ability of the refuge to achieve major wildlife objectives.

2. Damage Prevention and Control Methods Recommended and Alternatives

A multi-faceted program involving several methods of control will prove to be the most practical approach.

A. Exclusion

Total eradication of beaver from the refuge is not the goal of the control program presented here but rather maintaining populations at a level that

minimizes additional habitat conversion and loss of invaluable floodplain hardwoods. Current acreages of emergent shrub communities provided by existing beaver impoundments and naturally impounded areas are more than adequate to provide this needed habitat component. Even if eradication were proposed, such an effort would be impractical and unsuccessful given the constant influx of new animals from surrounding areas into remote, inaccessible wetland communities that occur throughout Pond Creek NWR. The reader should remember that beaver populations are extremely high throughout the south leading to a constant reoccupying of suitable habitat by dispersing young. Experience across the last 8 years indicates that annual removal of 100 - 150 animals through a combination of methods should be adequate to minimize additional habitat conversion.

B. Cultural Methods and Habitat Modification

Because beavers usually alter or modify their aquatic habitat so extensively over a period of time, most practices generally thought of as cultural have little impact on beavers. Beaver dams will be removed as early as possible in the growing season each year, generally during mid-May - June. Removal efforts should be delayed until after heavy spring rains common in this area. Dam removal will be by hand, explosives, or mechanical means. A wide track bulldozer and/or backhoe will be used when practical and explosives or hand clearing will be used on areas that are difficult to reach with equipment. Most dams will have to be removed 2-3 times annually due to being rebuilt or at least until all stream flow ceases. Continual destruction of dams and removal of dam construction materials will sometimes cause a colony or individual beaver to move to another site. However, this does not get rid of the problem, it only moves it to another location. Structural devices (perforated PVC pipe or similar devices) placed in the drainage channel blocked by the dam may be an alternative to allow water flow through a dam site. Experience has shown this is not cost effective and in most cases, simply does not work because beaver mud-in around the outlet.

C. Repellents

There are no chemical repellents registered for beavers. Past research efforts have tried to determine the effectiveness of potential repellent materials, however, none were found to be effective, environmentally safe, or practical.

D. Toxicants

None are registered. Research efforts have been conducted to find effective, environmentally safe and practical toxicants and currently there are none that meet these criteria.

E. Trapping

The use of traps or shooting by staff is the most effective method of removing beaver from any given area. Shooting by staff during high water periods perhaps is the best approach since take of non-target species is minimized. Unfortunately, flooding regimes (frequent but short duration inundation), topography (frequent ridge/swale) and dense forest cover at Pond Creek NWR renders this control method ineffective. Thus, trapping is the most effective and practical method. The effectiveness of any type of trap for beaver control is dependent on the trapper's knowledge of beaver habits, food preferences, ability to read beaver sign, use of proper trap, and trap placement. A variety of trapping methods and types of traps are effective for beavers, depending on the situation. In addition to removal by refuge staff, beaver is classed as a furbearer in Arkansas and therefore is legal to take during the refuge trapping season. Since establishment of refuge public use programs, trapping effort at Pond Creek has been very minimal due to extremely low fur prices resulting in virtually no removal by the public.

Take of beavers by trappers with a Special Use Permit will be allowed. The conibear trap (lethal) size 330 is one of the most effective types of traps used on beaver today and when restricted to water sets only, it minimizes take of non-target species. Professional trappers and others who are principally trapping for beaver commonly use it. Designed primarily for water use, it is equally effective in deep and shallow water.

Double-spring leg hold traps have been used for hundreds of years and are still very effective when properly used by skilled trappers. A # 3 double (long) spring or coil spring type leghold trap or larger with a jaw spread up to 8 ½ inches is legal to use on drowning sets. The drowning set is a leghold trap attached to a locking slide attached to a slide wire or cable secured at the edge of the water and attached to a weight in the deep water. The water depth should be sufficient to drown a beaver.

Snaring can be a very cost-effective method for capturing beavers. Snaring equipment costs far less than other trapping equipment and is more convenient to use in many situations. Snares must be used with great care (egg. mandatory use of hard stops on snare cable to eliminate total closure) to avoid capturing nontarget species.

Live trapping will not be utilized because relocating beaver would only move this problem to another location. Beaver presently occupy all areas of favorable habitat.

F. Shooting

Removing beaver from specific locations with firearms is very effective. Beaver may be taken by refuge hunters, incidental to take while hunting other species open for hunting on the refuge at that time. However, few hunters ever kill beaver while hunting other species (i.e. deer, squirrel, turkey). Refuge personnel will shoot beaver on a selective basis to augment the overall removal effort.

B. NUTRIA

1. Description

Nutria is a native of South America and was introduced into the United States in 1899 in order to supplement the nation's fur market. Most were raised on commercial fur farms. With the collapse of the fur market in the 1940's, many were released by fur farmers into numerous watersheds across the country.

Nutrias are exclusively a herbivore. However, as is characteristic of many of the aquatic rodents (muskrats and beaver), they will eat a small percentage of mollusks and insects. Nutria can consume up to 2.5 to 3.5 pounds of food per day or approximately 25% of their body weight daily. Most foods consist of cattails, reeds, lotus, and other water plant species. Nutria has fairly long life spans with some documented to live to 15-20 years of age. The average life expectancy is 2-years.

Reproduction cycles in nutria will occur year round, with young becoming sexually mature at 4-months of age. Females have a gestation period lasting 130 days. A postpartum estrus occurs within 48 hours after giving birth and most females probably breed again during that time. Thus, they are very prolific. Litters range from 1-13 with an average of 4-5 young per litter. Young are capable of swimming and moving almost immediately.

The control of nutria is specifically addressed under the 109th Congress, 1st session HR 1591. Congress amended the Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990 to reauthorize and improve that act.

2. Damage Prevention and Control Methods Recommended and Alternatives

Conducting population control through a sustained control program should keep the population in check. A multi-faceted program involving several methods

can prove to be a practical approach. Current population levels at Pond Creek are relative low with little overall habitat impact, thus existing conditions do not warrant extensive control efforts even though this is an exotic species. Population status and thus need for control efforts could obviously change across time.

A. Exclusion

As with all exotic species, total eradication of the nutria should be the overall goal primarily for the enhancement of the environment. However, to exclude nutria from the creeks, lakes, sloughs and rivers on Pond Creek NWR would be impossible. The best that can be done would be to keep the population in check so the amount of damage caused to the habitat by nutria is kept to a minimum.

B. Cultural Methods and Habitat Modification

Several engineering/maintenance methods and techniques may be used to discourage nutria from using or causing damage to Refuge real property at particular locations. The levee banks where nutrias are actively burrowing should be sloped and the burrows should be filled. However, this practice will only force nutria to shift locations creating additional problems elsewhere. All drainage areas and watercourses that hold water can be used by nutria as travel routes or home sites. Destroying beaver dams to reduce and in some cases eliminate beaver ponds will impact some nutria.

C. Repellents

No chemical repellents for nutria are currently registered. Other rodent repellents (such as Thiram) may repel nutria, but their effectiveness has not been determined. Use of these without the proper state and federal pesticide registrations is illegal.

D. Toxicants

Chemical control with zinc phosphide could be utilized, if needed, by refuge staff to control nutria. At this time, zinc phosphide is the only known federally registered toxicant allowed for control of nutria. Problem areas could be identified and sign of nutria activity pin-pointed. Floating bait boards could then be anchored to the bottom and spaced 50-100 feet apart along small waterways or near areas where nutria have active-runs, slides, burrows, or feeding areas. Pre-baiting of these boards is suggested to bring nutria to the bait. The bait will consist of sweet potatoes, carrots, corn oil, and zinc phosphide. This form of

control is an alternative that could be used if population levels were to reach a point where major impacts were occurring. This approach is not being proposed for use by this plan but is simply mentioned here to briefly summarize additional alternatives if merited in future years.

E. Trapping

Trapping is the preferred method of removing nutria from any given area. This is the most effective, practical, and environmentally safe method of nutria control. The effectiveness of any type of trap for nutria control is dependent on the trapper's knowledge of nutria habits, food preferences, ability to read nutria sign, use of proper trap, and trap placement. A variety of trapping methods and types of traps are effective for nutria, depending on the situation. All state and refuge trapping regulations apply to the general public.

Trapping of nutria by refuge staff and trappers with a Special Use Permit will be allowed. The conibear trap (lethal), size 330 or 220, is by far the most effective types of traps used on nutria today. Professional trappers and others who are principally trapping nutria commonly use it. Designed primarily for water use, it is equally effective in deep and shallow water. This trap kills nutria almost instantly.

Double-spring leghold traps have been used for hundreds of years and are still very effective when properly used by skilled trappers. A # 2 double long spring trap or coil spring type leghold trap with a drowning set can also be an effective tool placed at logs used for sunning. The drowning set is a leghold trap attached to a locking slide attached to a slide wire or cable secured near the edge of the water and attached to a weight in the deep water. The water depth needs to be sufficient to drown the nutria.

Snaring can be a very cost-effective method for capturing nutria. Snaring equipment costs far less than other trapping equipment and is more convenient to use in many situations. Snares must be used with great care to avoid capturing nontarget species.

Live trapping will not be utilized because relocating nutria would only move this problem to another location. Nutria presently occupy most areas of favorable habitat.

F. Shooting

Nutria will be shot by refuge personnel opportunistically as part of the overall control program and when safe to do so. Nutria may also be taken by refuge hunters, incidental to take while hunting other species

open for hunting on the refuge at that time. However, few hunters ever kill nutria while hunting other species (i.e. deer, squirrel, turkey).

C. MUSKRAT

1. Description

The muskrat is the largest microtine rodent in the United States. The overall length of adult muskrats is usually from 18 to 24 inches. Large males will sometimes be more than 30 inches. The laterally flattened tail usually accounts for 10-12 inches of the length. The weight of muskrats varies from 1 ½ to 4 pounds for adults. However, most muskrats average 2 ½ pounds. Muskrats in the wild may live up to 4 years. Muskrats are very prolific. Most females produce 5 or 6 litters annually and may have up to 15 young per litter.

Muskrats can live almost any place where water and food are available year-round. Being primarily herbivores, muskrats will eat almost any aquatic vegetation as well as some field crops grown adjacent to suitable habitat. Muskrats are primarily herbivores, but will also feed on crayfish, mussels, turtles, frogs, and fish in areas where vegetation is scarce.

Muskrats are hosts to large numbers of endo- and ectoparasites and serve as carriers for a number of diseases, including tularemia, hemorrhagic diseases, leptospirosis, ringworm disease, and pseudotuberculosis. Most common ectoparasites are mites and ticks.

Damage caused by muskrats is primarily due to their burrowing activity.

2. Damage Prevention and Control Methods Recommended and Alternatives

Through a sustained control program, the refuge goal is to reduce populations of muskrat on refuge lands to an acceptable level where minimal damage is occurring to refuge resources. A multi-faceted program involving several methods can prove to be a practical approach. As with nutria, population levels are currently not causing unacceptably high resource impacts and no effort will be made toward overall population reduction beyond maintaining liberal take provision in all consumptive public use programs. This subject is being covered here to provide alternatives to refuge staff in the event unacceptable impacts do develop because of population expansion.

A. Exclusion

It is impossible to exclude muskrats from the creeks, lakes, sloughs and rivers on Pond Creek NWR.

B. Cultural Methods and Habitat Modification

The banks of active muskrat burrows should be sloped to cave in the tunnels. This practice will make muskrat move to another location. However, this practice doesn't solve the problem, it only moves the problem to another location. Any drainage that holds water can be used by muskrat as a travel route or home site. Eliminating standing water in drainages will make muskrats move on, but this practice is impossible to do in most areas of the refuge and once again, only moves the problem to another location.

C. Repellents

No chemical repellents currently are registered for muskrats, and none are known to be effective, practical, and environmentally safe.

D. Toxicants

The only toxicant federally registered for muskrat control is zinc phosphide at 63% concentrate. This chemical toxicant is used on nutria as well. To use this product, problem areas would be identified and signs of muskrat activity pinpointed. Method of use/application is identical to that described above for nutria and will not be reiterated here.

E. Trapping

There have probably been more traps sold for catching muskrats than for catching any other furbearing species. A number of innovative traps have been constructed for both live trapping and killing muskrats, such as barrel, box, and stovepipe traps. Trapping is the preferred method of removing muskrat from any given area. This is the most effective, practical, and environmentally safe method of muskrat control.

Trapping of muskrats by refuge staff at specific problem sites such as dens in road shoulders or levees will be implemented. Muskrat is listed as a furbearer in Arkansas and is therefore, legal take for refuge trappers. The effectiveness of any type of trap for muskrat control is dependent on the trapper's knowledge of muskrat habits, food preferences, ability to read muskrat sign, use of proper trap, and trap placement. A variety of trapping methods and types of traps are effective for muskrat, depending on the situation. All state trapping regulations apply.

The most effective and commonly used types of traps for muskrats are the conibear trap (lethal), size 110 or 120, and the #1 ½ or #2 long-

spring or coil spring trap. Professional trappers and others who are principally trapping muskrat commonly use it.

Musk rats are probably the easiest aquatic furbearers to trap. A trap set in the run, the house or den entrance, or even under a feeding house, will usually catch a muskrat in 1 or 2 nights. The stovepipe trap is very effective if set correctly and has the potential of catching multiple muskrats nightly depending on the size of trap and number of muskrats using the den.

F. Shooting

Muskrat may be shot at specific problem locations by refuge personnel on a selective basis to solve a particular problem such as bank denning in levees or roads. This practice will be expanded if the population begins to cause habitat or real property damage to the point that warrants a population reduction.

D. FERAL SWINE

1. Description

Wild pigs include feral hogs (domestic swine that have escaped captivity) and wild boar, native to Eurasia but introduced to North America to interbreed with feral hogs. Feral hogs were first introduced into North America (Florida) by de Soto in 1593. Later introductions occurred throughout early settlement in Georgia and the Carolinas. These populations established free-ranging populations in the Southeast. In addition, open range practices were common throughout the South until the early 1960's when most states passed laws prohibiting such actions. The Russian "Wild boar" was released in North Carolina in 1912 and undoubtedly has been illegally released at multiple other locations across the South also. At this time, it is difficult to physically determine distinguishable characteristics between some domestic, feral, and feral Russian crosses. True identity in most cases is only resolved by genetic testing. For the purpose of all descriptions, all hogs occurring on refuge property are considered and referred to as feral hogs.

The feral hog is one of the most prolific mammals in North America with females having up to 2 litters per year consisting of 4-10 young per litter. The gestation period is only 115 days. Young sows can breed before they are 6 months old. Given adequate nutrition, a wild hog population can double in just 4 months. Approximately 70% of the feral hog population must be removed annually just to keep the population in control. Their size and conformation depend on the breed, degree of hybridization with Russian boar, and level of nutrition during their growing season. The color of young feral hogs may be any color depending on the degree of hybridization. The color of young boar is

generally reddish brown with black longitudinal “watermelon” stripes. The stripes begin to disappear as the young develop and the red changes to brown and finally to black.

The home range of a feral hog varies from approximately 300 acres to 12,000 acres with water and food being the primary driving factors of movement. Feral hogs are omnivores and as a result, their food habits are wide ranging. Coupled with their ability to feed opportunistically, they literally have the ability to eat any plant or animal within their home range. Probably $\frac{3}{4}$ of their feeding occurs on underground roots, tubers and insects. In the fall of the year, however, they feed almost exclusively on the annual acorn crop. Other food items include grape, prickly pear, and persimmon. Of the hundreds of species of plants hogs consume, the acorn crop is perhaps a major limiting factor. Consumption of large quantities of acorns assists in fall weight gain, which is essential for late winter survival as well as the physiological condition of the sow prior to parturition in late January.

One of the most detrimental impacts of wild hogs is the direct competition to native species of wildlife. This competition impacts not only the principle game animals on the refuge such as deer, turkey, and squirrels, but also feral hogs can greatly alter native plant communities resulting from rooting and other feeding activities.

2. Damage Prevention and Control Methods Recommended and Alternatives

Due to the reproduction rate of swine and the dense habitat on the refuge, total elimination of feral swine would be an impossible task to perform. Therefore, the only feasible alternative is to attempt to reduce the population to a level that minimizes or reduces damage to local agricultural crops, livestock pastures, reforested lands, waterways, and foods used by native wildlife. A multi-faceted program involving several methods will likely prove to be the most practical approach of reducing the population to an acceptable level.

Estimates of numbers that should be removed annually to reduce population size to a level that minimizes overall impacts are 'best' guesses. Staff estimates that a minimum of 150 -200 should be removed annually through a combination of methods. Again, this is only an estimate based upon observation and will be adjusted based upon results. Given the fact that feral hogs occur throughout the state, total eradication is likely impossible since animals will continuously move into the area from other occupied habitat.

Control efforts for hogs are extremely time consuming and expensive. Inadequate staffing levels coupled with austere budgets will impact effectiveness of all control efforts but this must become a priority activity at Pond Creek to curtail negative impacts to priority wildlife species.

A. Exclusion

To have feral hogs excluded from the refuge would be an impossible task. The only way to keep hogs from coming onto the refuge would be to build an animal proof fence. To build a fence around the refuge or place an electric fence to keep hogs out would not only be astronomically expensive, but also logistically impossible due to the creeks, rivers and sloughs meandering through the refuge.

B. Frightening

No methods are effective.

C. Repellents

No repellents are registered.

D. Toxicants

There are no toxicants currently registered for controlling wild hogs in the United States.

E. Trapping

Cage Traps; Trapping with cage traps, especially where hog densities are high is probably the most effective control method during the spring and summer months. Two types of cage traps are available.

A stationary corral-type trap and a portable box-type trap are used the most. The potential to trap multiple hogs are great with these type traps. Documented cases of multiple captures are common. Corral-type permanent traps have captured 104 hogs in a single night and the box-type portable trap has captured 14 hogs in a single night. Traps may not be effective, however, during the fall and winter when acorns or other preferred natural foods are available. Hogs seem to prefer acorns to grain and other baits.

For refuge purposes, a portable box-type trap is likely the best choice. This type trap can be moved throughout the refuge as hog sign is observed at different locations. The portable box-type trap will be removed from the refuge prior to and during the hunting seasons to avoid conflict with hunters. These traps should be baited with grain or scrap vegetables. An adequate amount of bait is necessary to entice the hogs to enter the trap. Pre-baiting a site also helps to entice several hogs to use the site thus increasing the possibility of obtaining multiple captures.

Due to staff and funding constraints, refuge conducted control efforts alone will not be adequate to reduce population levels. In addition to refuge-conducted efforts, this plan proposes implementing public trapping of feral hogs under the authority of a Special Use Permit (no cost to permittee). Permits would be issued to individuals selected by drawing (if more than 5 individuals applies) to trap feral hogs during specific times of the year when the refuge is not open to hunting. These individuals would be authorized an allotted amount of time (perhaps three weeks for each permittee) and possibly specific location or area of the refuge in which to trap. The details of these activities would be adjusted as needed based upon experience with the activity to adequately regulate the use and optimize feral hog removal. Every hog trapped must be dispatched on site prior to moving. No hogs would be transported alive. This regulation is critical to prevent releases at other locations.

Steel Trap; Trapping with steel leghold traps is not recommended for hogs. Traps large enough to hold a hog are not only illegal by state regulation but also likely to cause non-target species take and other safety issues.

Snare; Leg snares can be used with success where terrain prohibits the use of cage traps. Snares are recommended by some animal control experts for use on trails where hogs are traveling. The size of the snare cable should be heavy enough to hold a large hog. This method is an alternative that will be used only by refuge staff where removal of a specific animal or small group of animals is essential. Sometimes large boar hogs become trap-wise and can only be caught with a snare or shot.

F. Shooting

Allowing the general public the opportunity to hunt hogs without dogs during regulated hunting seasons on the refuge is the preferred method of reducing the hog population. Since opening the refuge to hunting in 1997, hunters have been permitted to take hogs without the use of dogs during any refuge hunt. Although 30-50 hogs are normally taken each year by hunters, this level of removal has proven to be very inadequate. Refuge regulations will continue to allow liberal take of hogs by hunters. In addition to removal by refuge hunters, the refuge staff will shoot feral hogs at any time whenever safely able to do so.

In addition to the actions identified above, the refuge will pursue issuing permits to individuals for hog removal using dogs if interested individuals can be found and the above actions do not result in adequate hog removal. Prior to implementing this activity, refuge staff will need

to coordinate with the Arkansas Game and Fish Commission. Permits will identify specific times and dates for this activity and will be outside of refuge hunting seasons. All swine (no matter what size) will be killed. No hogs are to be caught alive and transported.

As a 'last' resort, the refuge will seek funding to initiate contract trapping. At this time, the staff suspects the proposals above will collectively be adequate to address the problem. In the event, however, that the hog population is not adequately reduced to minimize negative impacts, contract trapping must become a high priority. The current and anticipated level of negative impacts occurring at this station from feral hogs is directly affecting habitat productivity for virtually all priority wildlife species and is simply unacceptable.

E. DOMESTIC LIVESTOCK

1. Description

Free ranging cattle were present throughout the area when the refuge was established. Virtually the entire northern refuge boundary is bordered by pastureland with high numbers of cattle present. During low water periods, cattle have also crossed the Cossatot and Little Rivers to gain access to the refuge. In addition, several sites existed when the refuge was established where dead animals from livestock and poultry feeder pen operations were being dumped on refuge property. Refuge personnel worked closely with local landowners and by mid-1998, most cattle were removed. Since that time, cattle sporadically are found on the refuge with most instances associated with holes in fences. A few instances have occurred since that time and will likely continue to occur where free ranging cattle were not removed quickly or the owner could not be located. In most cases, all cattle were removed and no long term or habitual offenders are noted.

If domestic livestock are found on the refuge in the future, the owner of the livestock will be located if possible. A verbal warning should be given to the livestock owner on the first offense and a citation should follow if the owner doesn't comply with removal in a reasonable amount of time. The amount of time may vary depending on circumstances, but the owner should be making an effort within 24 hours to get their livestock off the refuge. As a last resort, cattle may need to be impounded if not removed with normal CFR processes for impounded property followed. If such circumstances were to develop, the staff should coordinate closely with the U.S. District Attorney and U.S. District Judge prior to initiating any action. In instances where the owner cannot be found or identified, it may be necessary to destroy the individual animal since some breeds of cattle become quite wild in free ranging conditions and impossible to remove.

F. DOMESTIC/FERAL DOGS

1. Description

In appearance, most feral dogs are difficult, if not impossible, to distinguish from domestic dogs. Like domestic dogs, feral dogs manifest themselves in a variety of sizes, shapes, colors, and even breeds. Most feral dogs today are descendants of domestic dogs gone wild, and they often appear similar to dog breeds that are locally common. The primary feature that distinguishes feral from domestic dogs is the degree of reliance or dependence on humans and their behavior toward people. Studies showed the difference between feral and domestic dogs caught in a cage-type trap. Domestic dogs usually wagged their tails or exhibited a calm disposition when a human approached them and feral dogs showed highly aggressive behavior, growling, barking and attempting to bite. Some other dogs were intermediate in their behavior and could not be classified solely on their reaction to humans. Feral dogs are usually secretive and wary of people. Thus, they are active during dawn, dusk, and at night much like other wild canines.

Feral dogs are the most widespread of the wild canines and they may occur wherever people are present and permit dogs to roam free. Home ranges of feral dogs vary considerably in size and are probably influenced by the availability of food. Feral dogs are often found in forested areas in the vicinity of human habitation. Like coyotes, feral dogs have catholic diets and are best described as opportunistic feeders. They can be efficient predators, preying on small and large animals, including domestic livestock, but may also rely on carrion, particularly road-killed animals, green vegetation, berries and fruits.

Feral dogs are highly adaptable, social carnivores and are known to run in packs; however, in many cases, they may be solitary. Domestic dogs/feral dogs may have a litter of pups throughout any time of the year, with litter size dependent on available food and the breed of dog (usually 6-8). Hybridization between feral dogs and other wild canines can occur, but non-synchronous estrus periods and pack behavior (that is, excluding nonresident canines from membership in the pack) may preclude much interbreeding.

Free ranging domestic dogs are common in many rural areas where owners routinely allow dogs to reside without any type of confinement. Free ranging domestic dogs differ from truly feral animals only in that most of their food and shelter is provided by the owner and the dog has a close affinity to the residence in question. Free ranging dogs, particular breeds such as chase and catch dogs used for hunting, can routinely cover many square miles and return to home daily or within a couple of days. As an observation, free ranging domestic dogs away from their location of residence tend to occur in groups or packs and can cause virtually the same negative impacts to resident wildlife as truly feral animals.

Southwest Arkansas is a rural area of small family farms interspersed with large corporate timber company holdings that were open for decades to any public use. Traditionally, virtually every home has free ranging dogs present and use of large running breeds of chase dogs for hunting very common. Up until 2003, all corporate forest lands were open to any user and routinely used by any local and area resident for hunting and outdoor recreational activities. Use of pursuit dogs for deer and fox hunting was a common practice. Individuals owning large numbers of dogs (5-25) occurred throughout the area. Beginning in 2003, corporate landowners initiated leasing programs and these lands were closed to the general public. Virtually all company roads were gated and all access closed to the general public.

At the outset of refuge regulation implementation in 1997, the presence of free ranging domestic and feral dogs was identified as a problem. As an example, it would be very unusual to stop at any location at any time of the day or night during any time of the year and not hear chase dogs running on refuge property. Refuge personnel spent a great amount of time interacting with local residents in an effort to deal with this issue and conducted public meetings to inform everyone about refuge regulations, including animal trespass provisions. Staff spent a lot of time catching dogs, issuing warnings and issuing citations along with destruction of animals where necessary. Initial efforts were mostly successful in that many adjacent landowners did in fact confine their hunting dogs and coupled with animal control, circumstances markedly improved for several years. However, since the timber companies began leasing their lands, the problem has once again grown to unacceptable levels of impact to refuge wildlife and priority users. Staff suspects the problem may be just as great now as back in the late 1990's. Apparently, many dog users no longer have any large forested tracks of land available to run their dogs due to leasing which has resulted in a rapid increase in dog trespass issues. Many local landowners and leasers of company land do not want free ranging dogs present on their property and have implemented their own control program. Collectively, these issues have resulted in groups of dogs routinely being deliberately released immediately adjacent to or on the refuge. Refuge users and adjacent landowners commonly complain to refuge staff of impacts from free ranging dogs and demand action be taken.

Refuge staff has consulted with the U.S. District Magistrate on control issues and adjudication of animal trespass cases. The Magistrate has agreed to aggressively deal with these cases if ownership can be proven.

2. Damage Prevention and Control Methods

A. Exclusion

Total exclusion from unauthorized feral/domestic dogs on Pond Creek NWR is not possible and would only be accomplished by construction of an animal proof fence, which would far exceed the budget of the refuge and also would be logistically impossible. Refuge personnel have implemented an extensive education program for neighboring dog owners once again, encouraging them to restrict free ranging dogs, especially those that are prone to chase game onto the refuge. This has been done on an individual basis and has seemed to help very little over the past year or so.

B. Frightening

There are no known methods to frighten a domestic/feral dog from the woods.

C. Repellents

Methyl nonyl ketone, mostly in granular form or in liquid sprays, is widely used to prevent urination or defecation by dogs in yards. Several other chemicals are also registered for repelling dogs. However, these chemicals may be used to keep dogs from establishing scent stations or relieving themselves at selected sites, but they have little value in protecting wildlife from harassment and/or attack from dogs.

D. Toxicants

There are no toxicants widely used for controlling feral dogs.

E. Fumigants

No fumigants are registered for the control of feral dogs.

F. Trapping

Trapping is a method of catching feral/free ranging dogs. This method will only be used by refuge personnel and will utilize walk-in portable box traps and snares. It should be noted that this approach is very time consuming and is not expected to solve the overall problem. If ownership can be established, dogs trapped will be returned to owners and citations issued, where appropriate. Otherwise, animals trapped will be destroyed.

G. Shooting

Shooting feral/unauthorized free ranging dogs is the most efficient control technique available. Refuge personnel are responsible for protecting the wildlife and eliminating non-compatible impacts to refuge users by keeping all dogs off the refuge unless they are authorized to be there by refuge specific regulations. Except for retriever type breeds used for waterfowl and dogs used for raccoon and squirrel hunting (typically trained treeing breeds) during specific refuge hunting seasons, all dogs on refuge property must be on a leash and under the immediate control of the owner. All unauthorized dogs trespassing and/or chasing game on the refuge will be intercepted by refuge personnel and caught, if possible, and returned to the owner. A citation will be issued to the owner of the dog and mandatory court appearance requested for repeat offenders. All domestic hunting dogs (except waterfowl retrievers) are required to have a collar with its owner's name, phone number and address on it while hunting. If the dog cannot be caught or if ownership cannot be established, it will be treated as a feral dog and dispatched on site by refuge personnel. According to 50 CFR 28.43, any dog observed killing, injuring, harassing or molesting humans or wildlife will be disposed of in the interest of public safety and protection of the wildlife on a national wildlife refuge.

G. DOMESTIC/FERAL CATS

1. Description

The cat has been the most resistant to change of all the animals that humans have domesticated. Feral cats are house cats living in the wild. They are small in stature, weighing from 3-8 pounds, standing 8-12 inches high at the shoulder, and 14-24 inches long. The tail adds another 8-12 inches to their length. Colors range from black to white and all colors between depending on their breed. The hair texture also ranges from course to soft and long to short. Feral and domestic cats prefer areas in and around human habitation. Feral cats are opportunistic predators and scavengers that feed on any small rodent, birds, reptiles, amphibian, carrion and vegetation. They are very efficient hunters and are deadly to songbirds. Feral cats are so good at catching their prey they can lower the carrying capacity of an area for native predators such as foxes, raccoons, bobcat and other animals that compete for the same food.

Cats produce kittens any time throughout the year. An adult female cat will produce 2-10 kittens per litter and up to 3 litters could be produced annually if adequate food and habitat is available. Domestic house cats may live up to 27 years, but feral cats generally only live 3-5 years.

Feral cats serve as a reservoir for human and wildlife diseases, including cat scratch fever, distemper, histoplasmosis, leptospirosis, mumps, plague, rabies, ringworm, salmonellosis, toxoplasmosis, tularemia, and various endo- and ectoparasites.

2. **Damage Prevention and Control Methods**

A. **Exclusion**

There is no way to exclude cats from the refuge.

B. **Cultural Methods**

Cat numbers can be reduced by eliminating their habitat. Old buildings, junk vehicles and other structures that may act as a housing place for cats should be removed (and have been removed from refuge property).

C. **Repellents**

Any repellents that are on the market would not apply to protecting wildlife from unwanted trespassing cats.

D. **Frightening**

There are no effective frightening devices to keep cats off the refuge.

E. **Toxicants**

No toxicants are registered for control of feral cats.

F. **Fumigants**

No fumigants are registered for control of feral cats.

G. **Trapping**

Trapping is a good method of catching feral cats. This method will only be used by refuge personnel. Any house cat caught will be returned to the owner (if ownership can be established) and a citation issued, depending upon circumstances. Any house cat caught during this process where ownership cannot be established will be destroyed.

H. Shooting

Shooting feral cats is the most efficient control technique available. Domestic house cats brought onto the refuge by visitors must be confined or kept on a lease while visiting the refuge. Any house cat that is free roaming and cannot easily be caught should be treated as if it were feral and dispatched on site by refuge staff. Refuge personnel are responsible for protecting the wildlife by keeping all house cats off the refuge. According to 50 CFR 28.43, any cat observed killing, injuring, harassing or molesting humans or wildlife will be disposed of in the interest of public safety and protection of the wildlife by refuge personnel.

H. OTHER NON-NATIVE/EXOTIC ANIMALS

Any other animal species that is not indigenous to this area and not a migratory bird or an endangered species should be caught if possible and returned to its owner. If the owner is found, a citation should be issued. If the owner is not found, the animal should be treated as being feral and dispatched by refuge personnel. Some of these species may include any species of mammal, reptile, amphibian, or bird that was once a pet, but released on the refuge or ended up on the refuge. If the animal cannot be caught it should be treated as being feral and dispatched on site by refuge personnel.