FERAL HOG MANAGEMENT

Environmental Assessment

For

SOUTHWEST LOUISIANA NATIONAL WILDLIFE REFUGE COMPLEX

Cameron Prairie National Wildlife Refuge

NOVEMBER 2012

Environmental Assessment

2012 Feral Hog Management

for

Cameron Prairie National Wildlife Refuge
Cameron Parish, Louisiana

U. S. FWS
Southwest Louisiana National Wildlife Refuge Complex
1428 Hwy 27
Bell City, LA 70630

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Chapter 1 Purpose and Need for Action

The purpose of the proposed action is to protect 24,927 acres of fresh, intermediate and brackish marshes and moist soil fields from feral hog (*Sus scrofa)* induced erosion, mottled duck and other native species habitat destruction and avian nesting mortality. Currently and in past years, feral hogs have roamed at large on private property adjacent to CPNWR and have gone unchecked and unmanaged. The rapidly expanding distribution of feral hogs in the United States has caused great concern for many land and resource managers (Figure 1). The ecologically-rich marshes of CPNWR have not been immune to the invasion of these animals. Cursory observations suggest accelerated increases over the last few years. Feral hogs are omnivores devouring flora and fauna alike. Their access to the refuge has been enhanced through the years by oil and gas exploration and agriculture development occurring on the refuge. These roads and other manmade corridors are readily utilized by feral hogs affording easy access to CPNWR.

Marsh habitat, throughout CPNWR, has been compromised because of extensive rooting (foraging for food) by feral hogs. Since 2010, feral hog sightings have been primarily reported on the western side of CPNWR. The west portion of CPNWR is largely manged for moist soil plant production and is an integral part of our public use activities.

Cameron Prairie National Wildlife Refuge (CPNWR) was established in 1988 to provide habitat for migratory waterfowl and other avian species. It encompasses 9,621 acres and the 14,927 acre East Cove Unit (part of the multi-agency Cameron Creole Watershed Project), of fresh, intermediate and brackish marshes, and former agriculture fields currently utilized for moist soil plant production. It is a component of the Southwest Louisiana NWR Complex (Figure 2). CPNWR was established "*... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds*" (16 U.S.C. 715d (Migratory Bird Conservation Act)). During acquisition planning, justification for the Refuge included the following: 1) provide additional sanctuary to wintering waterfowl that would offer additional management opportunities, particularly for geese; 2) assure long-term preservation of important wintering habitat for waterfowl as the Louisiana coastline continues to move further inland; 3) provide additional sanctuary for wintering waterfowl in the leading harvest parish in North America; 4) provide additional relief or another alternative resting location to the high concentrations of waterfowl found at Lacassine National Wildlife Refuge; and 5) provide a variety of quality recreational opportunities such as hunting, fishing, wildlife observation, photography, and other compatible wildlife-dependent activities.

The U S Fish and Wildlife Service (FWS) is proposing to aggressively manage feral hogs on the CPNWR through the use of four management tools:

1) Aerial gunning (from a helicopter) operations would be conducted by USDA Wildlife Services (WS) as requested by FWS personnel ;

2) Public hunting regulated by Special Use Permit;

3) Ground shooting near feeders by FWS personnel and/or USDA (WS) ;

4) Trapping conducted by FWS personnel and/or USDA (WS). Followed by on-site euthanasia .

Authority to control wildlife populations for management is governed by Title 50 CFR, Part 31, Section 14:

(a) Animal species which are surplus or detrimental to the management program of a wildlife area may

(b) Animal species which damage or destroy federal property within a wildlife refuge area may be taken or destroyed by federal personnel.

Title 50 CFR, Part 30, Section 11 (a) states that 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.

> Also, Executive Order 13112 (Federal Register/ Vol. 64 No. 25 / Monday, Feb. 8, 1999/ Presidential Documents 6183) states in Sec. 2. Federal Agency Duties. that we should; (i) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (ii) monitor invasive species populations accurately and reliably; (iii) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (iv) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species

This document stresses the urgency for action and specific tools to reduce the population of feral hogs which are classified as an "outlaw quadruped "by the Louisiana Department of Wildlife and Fisheries and reclaim habitat for native species. The current feral hog population on the refuge at this time is estimated at between 50-150 animals.

The National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd et seq.) provides authority for the Service to manage the Refuge and its wildlife populations. It declares that compatible wildlife-dependent public uses are legitimate and appropriate uses of the Refuge System that are to receive priority consideration in planning and management. There are six wildlife-dependent public uses: hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation. It directs managers to increase recreational opportunities including hunting on National Wildlife Refuges when compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Management of feral hogs is consistent with the recommendations found in the CPNWR Comprehensive Conservation Plan (CCP) and Environmental Assessment completed during 2005 (USFWS 2005). At the writing of the CCP, Hog management was not

specifically identified, however, within invasive animal species section, control of invasive species will be managed if need arises. This plan and environmental assessment will become an appendix to the Southwest Louisiana National Wildlife Refuge Complex Habitat Management Plan.

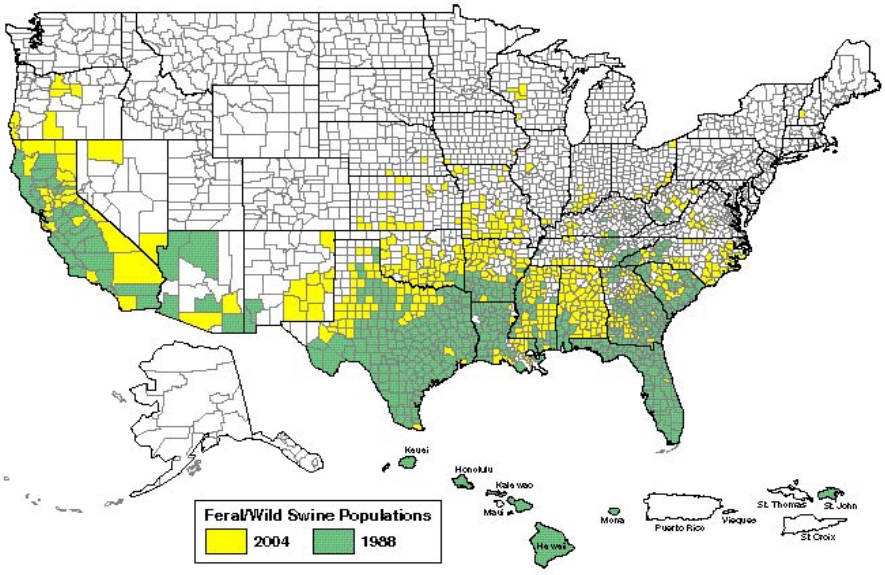


Figure 1. Distribution of feral hogs in the United States; courtesy of the Southeastern Cooperative Wildlife Disease Study, Athens, Georgia

Chapter 2 Alternatives Including the Proposed Action

This chapter discusses the alternatives considered for feral hog management on the 9,621 acre CPNWR. These alternatives are:

Alternative 1. No action

Alternative 2. (Proposed action), Implementation of the CPNWR Feral Hog Management Plan that provides for aggressive feral hog management using multiple tools including public hunting.

Alternative 3. Relocation of feral hogs.

Feral hog management is often challenging because of the prolific nature of the species. Efficient and effective population "management" is essential to the overall success of the program. Control effort administration will be under the jurisdiction of FWSs (FWS) personnel, and USDA/WS pursuant to *Executive Order 13112* which directs federal agencies whose actions may affect the status of invasive species to reduce invasion of exotic species and associated damages to the extent practicable and permitted by law.

2.1 Alternative 1: Current Management

Under this alternative, management of feral hogs would not comply with the approved CPNWR's Comprehensive Conservation Management Plan (CPCCP). Feral hogs would continue to propagate and roam throughout the Refuge. The current feral hog population would increase thereby escalating the rate of destruction of refuge habitat and wildlife. The Alternative 1. No Action is required under the National Environmental Policy Act of 1969 (NEPA) and establishes a baseline for comparing the present management direction and environmental consequences of the proposed action alternative.

2.2 Alternative 2: (Proposed Action): Implement the CPNWR Feral Hog Management Plan

Efforts to remove feral hogs from the Refuge would focus on:

> 1) Aerial gunning (from a helicopter) operations would be conducted by WS as requested by FWS personnel. Shooting would be one hundred percent selective for targeted species. Aerial operations would be conducted according to the Department of Interior (DOI) *Aerial Capture, Eradication and Tagging of Animals* ACETA Handbook (Appendix 1). A pre-treatment survey will be conducted in an effort to determine hog densities in targeted areas prior to aerial gunning. After aerial gunning the USFWS will then initiate an aerial population assessment survey. If the 95% population eradication objective is not met, USFWS will move forward with the secondary tools identified below. If the objective is met USFWS may still move forward with secondary measures in an effort to continue to keep hog populations at the desired level in an effort to reduce the more costly aerial gunning technique in the future.

2) A Public hunting program would be implemented through a special use permitting program similar to the alligator hunting program.

3) Ground shooting near feeders would be conducted by FWS personnel and/ or WS at USFWS discretion. As feral hogs become more difficult to trap, FWS personnel would transition to day- and night- strategies that incorporate the actions listed. Firearm policies and procedures would be under the jurisdiction of SWLA NWR Complex's: Non Law Enforcement Firearms Policy for the Southwest Louisiana National Wildlife Refuge Complex (Appendix 3).

4) Trapping would be conducted by FWS personnel and/or USDA (WS). On-site euthanasia would be applicable to all feral hogs encountered. Live traps would be checked on a daily basis and feral hogs captured would be dispatched immediately, all non-targeted wildlife captured will be released on site.

2.3 Alternative 3: Feral Hog Relocation

This action would call for the trapping and relocation of feral hogs. This action would be conducted by FWS personnel and/or contracted trappers under the direction of FWS. Traps would be checked on a daily basis when set. Hogs would be immediately transported to the relocation site. This action is not recommended due to the increasing hog populations of western Louisiana which are causing detriment to the local flora and fauna, as well as negatively impacting native freshwater mussels and insects by contributing *E. coli* to water systems (Kaller et al. 2007). In addition, Louisiana State Law prohibits the trapping, transport and release of feral hogs. Because of the additional adverse impacts this Alternative causes on other habitat, substantial cost associated with relocation, and LA State law prohibiting relocation and release, this Alternative was dropped from further consideration and will not be further evaluated in this document.

Chapter 3 Affected Environments

3.1 Physical Environment

CPNWR was administratively combined with nearby Sabine NWR in 2000. Lacassine NWR and Shell Keys NWR joined the Complex in 2004 and 2006, respectively. The four Refuges now comprise the Southwest Louisiana National Wildlife Refuge Complex with Cameron Prairie serving as Complex Headquarters. The Complex also has a unique administrative oversight role with the Louisiana Department of Wildlife and Fisheries (LDWF) Rockefeller Refuge and is a cooperator on the 60,000 acre Cameron-Creole Watershed Project .

CPNWR was established in 1988, and is one of more than 545 Refuges within America's National Wildlife Refuge System, the world's largest network of lands set aside specifically for wildlife. The Refuge is located 25 miles southeast of Lake Charles, on State Highway 27 in Cameron Parish, Louisiana (Figure 2). CPNWR is located in the transition zone between higher agriculture land (historic tallgrass prairie) and coastal marshes. The area contains a diversity of habitat including freshwater impoundments, moist soil management units, and limited upland sites. The Refuge is managed to provide habitat for migratory waterfowl and other migratory birds. Oil companies, however, still own subsurface rights to the Refuge and must be given reasonable access.

3.2 Habitat

Cameron Prairie Refuge provides habitat for many species of wildlife, including ducks, geese, alligators, nutria, raptors, wading birds, shorebirds, and various fish. The Refuge is one of the wintering refuges for waterfowl in the Mississippi Flyway. Colonial nesting birds such as cormorant, egrets (snowy, greater, cattle), roseate spoonbill, ibis (white faces & white), and great blue heron rookeries are present on the Refuge. In the fall and spring, many shorebird species can be found here. Numerous species of neotropical migrant songbirds pass through the Refuge on their migration. (USFWS 2005).

Figure 2. Cameron Prairie NWR Location

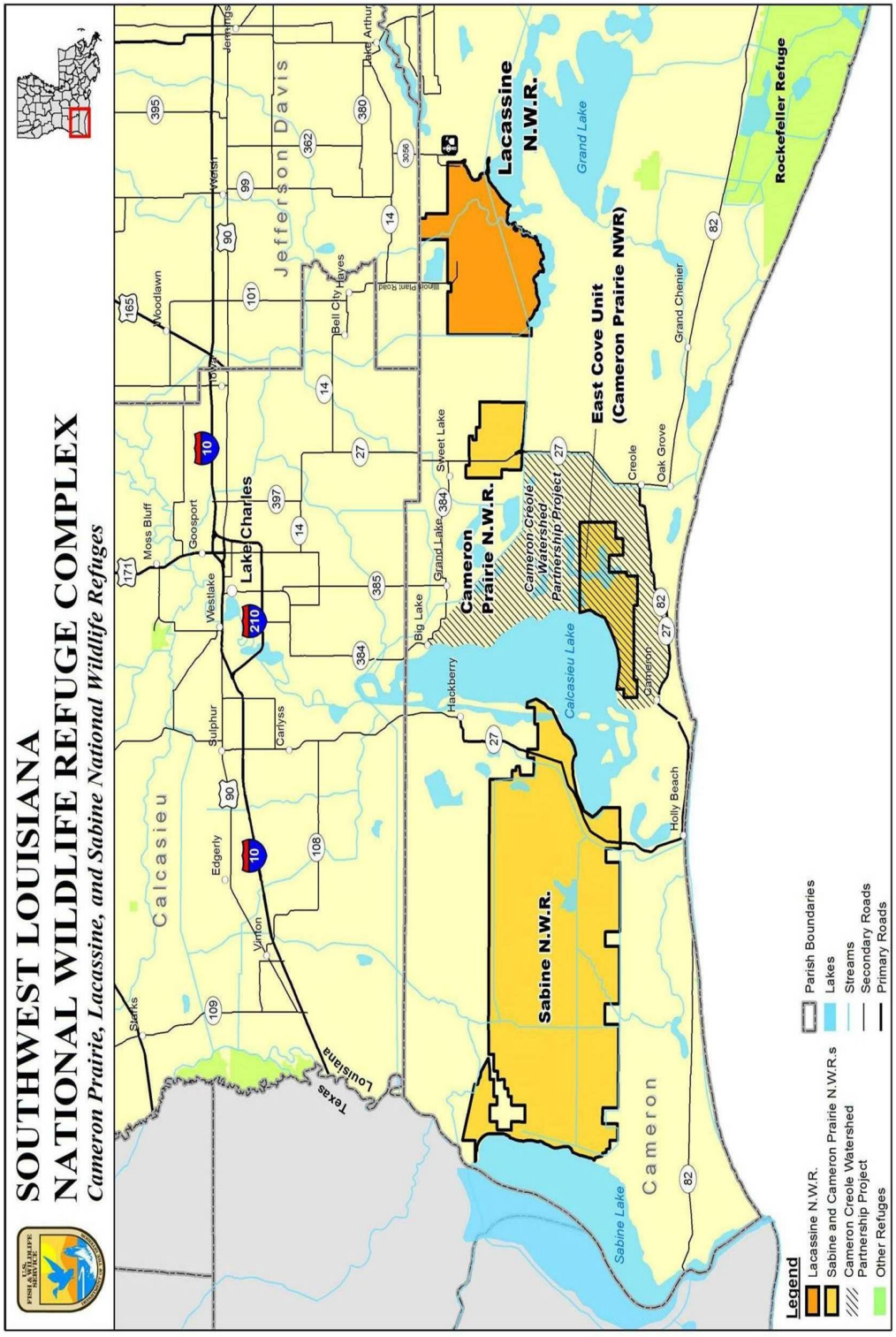
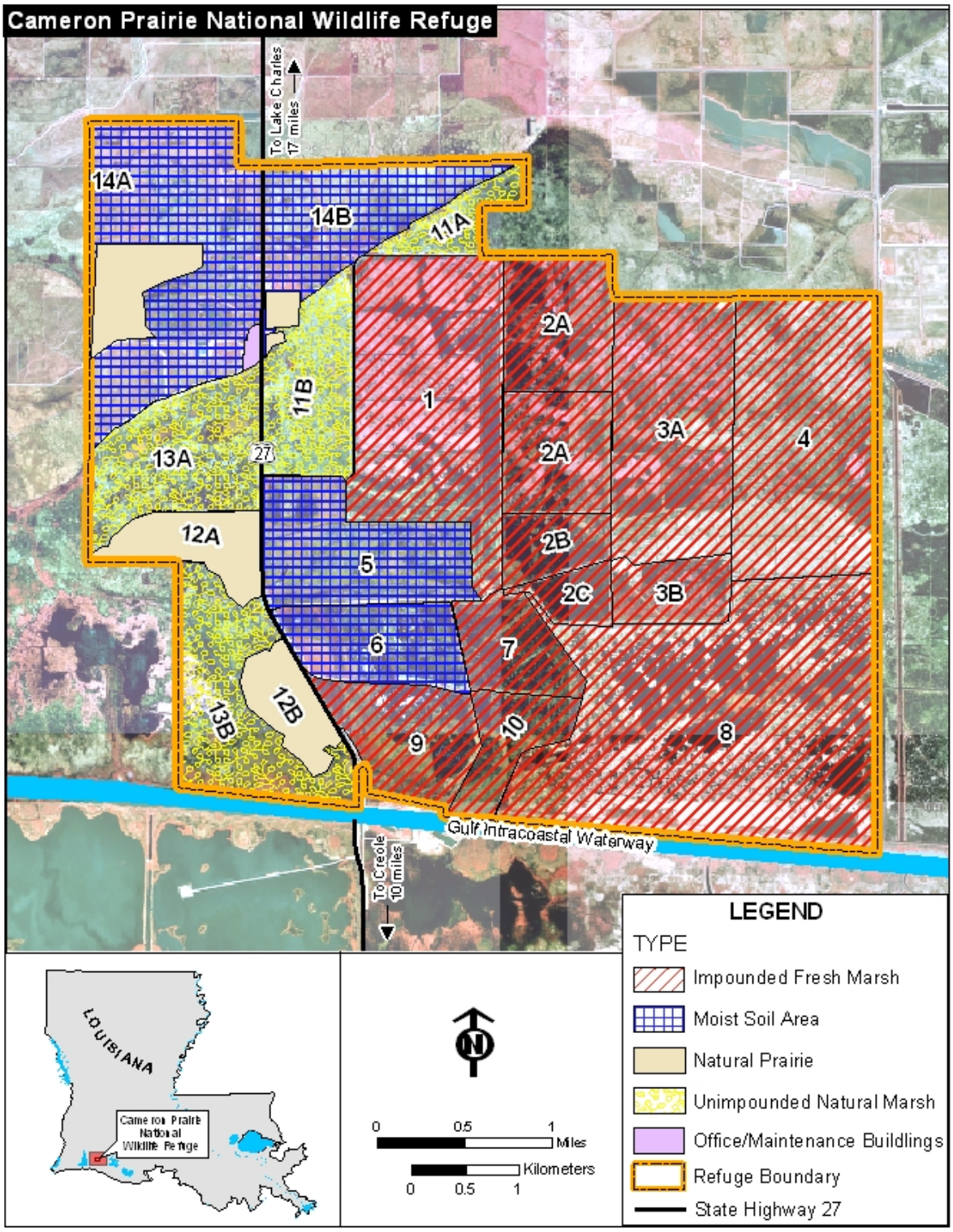


Figure 3. Cameron Prairie NWR Management Units & Habitat Type


Cameron Prairie National Wildlife Refuge
To Lake Charles
17 miles
14A
14B
11A
2A
1
11B
3A
4
13A
27
2A
12A
2B
5
2C
3B
6
7
13B
12B
9
10
8
Gulf Intracoastal Waterway
To Creole
10 miles
LOUISIANA
Cameron Prairie
National
Wildlife Refuge
N
0
0.5
1
Miles
Kilometers
0
0.5
1
LEGEND
TYPE
Impounded Fresh Marsh
Moist Soil Area
Natural Prairie
Unimpounded Natural Marsh
Office/Maintenance Buildlings
Refuge Boundary
State Highway 27

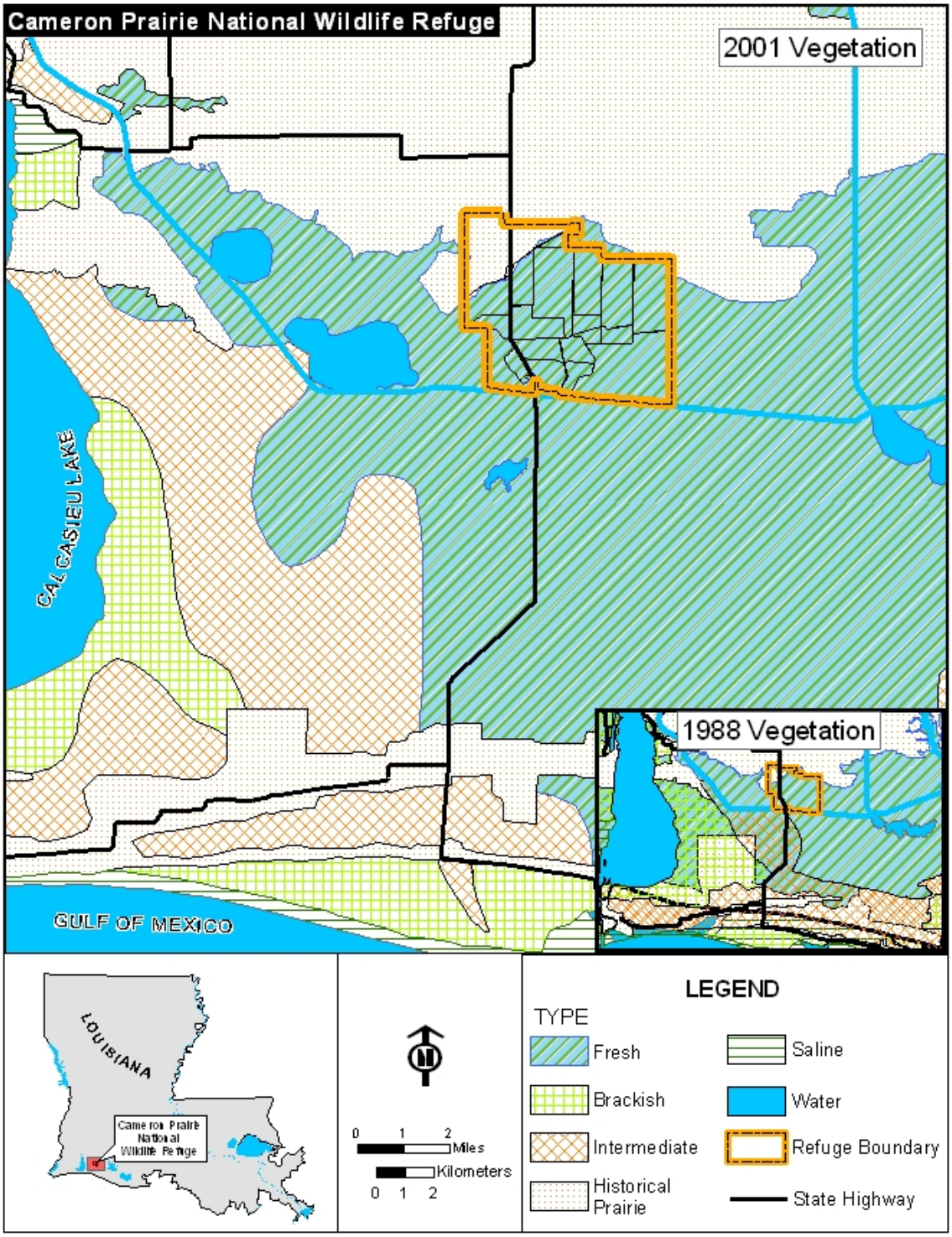
The impounded freshwater marsh units are dominated by bulltongue (*Sagittaria spp.*), water shield (*Brasenia schreberi*), white water-lily (*Nymphaea odorata*), spikerush (*Eleocharis spp.*), cattail (*Typha spp*.) bulush (*Scirpus spp.*) and maidencane (*Panicum hemitomon*). Open water areas throughout the Refuge host a variety of submerged

aquatics that assist with marsh stabilization, add to detritus build-up, and provide food for waterfowl. Widgeon grass (*Ruppia maritime*), coontail *(Ceratophyllum demersum*), southern naiad (*Najas quadalupensis*), common bladderwort (*Utricularia vulgaris*), fanwort (*Cabomba caroliniana*), Eurasian milfoil (*Myriophyllum spicatum*) and Ottelia (*Ottelia alismoides*) line the shallow areas. Vegetative species that occur on drier upland sites such as ridges, levees and pimple mounds include Chinese tallow (*Sapium sebiferum*), Baccharis (*Baccharis halimifolia*), coffee bean (*Sesbania exaltata*), black willow (*Salix nigra*), waxmyrtle (*Myrica cerifera*), hackberry (*Celtis laevigata*), blackberry (*Rubus spp* .), blue vervain (*Verbena hastate*), vasey grass (*Paspalum urvillei*) and goldenrod (*Solidago spp*.) (USFWS 2005).

Impounded Marsh Habitat

Objectives are to actively managed impoundment Units 1, 2A, 2B, 2C, 3A, 3B, 4, 5, and 8 (5,553acres), to improve food sources, protection and loafing areas, 45-55% coverage of emergent vegetation; control water hyacinth (*Eichhornia crassipes*), common salvinia (*Salvinia minima*) and maidencane (*Panicum hemitomon*); maintain 40-50% open water with 50-60% aquatics such as water shield (*Brasenia schreberi*), white water lily (*Nymphaea odorata*), American lotus (*Nelumbo lutea*); and maintain woody vegetation at 20-25% including wax myrtle (*Myrica cerifera*), hackberry (*Celtis laevigata*), willow (*Salix spp*.), Macartney rose (*Rosa bracteata*), and persimmon (*Diospyros virginiana*) on levee systems. Freshwater impoundments provide foraging habitat, loafing habitat, escape cover and sanctuary for waterfowl and other resources of concern. Maintaining roughly 50% cover of open water is critical for providing habitat for waterfowl. While cattails and maidencane provide some benefit as escape cover and as structure for invertebrate species on which waterfowl feed, if allowed to grow unchecked they will dominate impounded areas to the exclusion of other desirable plant species and open water. The exotic invasives common salvinia and water hyacinth provide very little benefit to waterfowl species and will quickly cover open water areas and outcompete native submerged vegetation if not controlled. Providing a diverse mix of native forage species and tall emergent vegetation for escape cover increases the usefulness of impounded freshwater marsh habitat by increasing the number and kind of resources that it provides for the Resources of Concern. Impounded marsh 50 habitat is protected from hunting to provide sanctuary for waterfowl on CPNWR. Impounded freshwater habitat increases habitat diversity and availability for colonial waterbirds which breed and winter on CPNWR. Other species with complementary habitat needs also utilize the impounded marsh, including alligators, fisheries, shorebirds, marsh birds, and others. Impounded marsh provides freshwater foraging areas during dry periods when unimpounded areas may be dry or saline.

Figure 4. Vegetation of CPNWR


Cameron Prairie National Wildlife Refuge
2001 Vegetation
CALCASIEU LAKE
1988 Vegetation
GULF OF MEXICO
LOUISIANA
Cameron Prairie National Wildlife Refuge
0 1 2
Miles
Kilometers
0 1 2
LEGEND
TYPE
Fresh
Saline
Brackish
Water
Intermediate
Refuge Boundary
Historical Prairie
State Highway

Moist Soil Habitat

Objectives for moist soil habitats are to establish adaptive management capabilities on Units 6, 7, 9, 10, and 14A and B (2,335 acres), to provide 70-80% 6-8"of water from mid Aug. to early Mar. and 15-20% coverage in flatsedges (Cyperus spp.), 45-55% coverage of a diverse mixture of walter's millet (Echinochloa walteri), spike rushes, fall panicum, smartweeds and no more than 25-30% coffee bean (Sesbania exaltata). Habitat requirements for wintering waterfowl, mottled ducks, northern pintails, and geese center on productive habitat. CPNWR has the capacity to provide 2,335 acres of highly productive moist soil management areas which produce a diverse mixture of native seed. Maintaining a balance of species requires limiting sesbania to no more than 30% to avoid shading and suppression of other food plants. Up to 20% cover of flatsedges provide seed and tubers, while having approximately half of the total cover in walter's millet, spike rushes, fall panicum, and smartweeds ensures a continuous supply of seed through the wintering period and increases dietary diversity and nutritional quality. Moist soil management areas also function as foraging habitat for colonial waterbirds, and serves as feeding habitat for many other species of birds.

Unimpounded Marsh Habitat

Objectives are to increase plant species diversity and decrease the vegetation density in unimpounded marsh Units 11A & B and 13A & B (1,394 acres) to improve wildlife habitat by: maintaining cover of maidencane and cattail below 15%, maintaining cover of Eurasian watermilfoil (Myriophyllum spicatum) and parrot feather (Myriophyllum aquaticum) at 6-10% of total open-water area, maintain 45-50% open water, 5-10%cover of waxmyrtle, 35% cover of flatsedge, spike rushes, cordgrass, 15-25% widgeon grass and southern naiad (Najas guadalupensis). More diverse vegetation provides a greater variety of food plants, making available not only a more varied diet for wildlife, but also increased temporal continuity of food supply. Diverse vegetative communities tend to be more resilient to disturbance, and require fewer management inputs. Although maidencane and cattail are native plants which provide some benefit to wildlife, keeping their cover below 10% maintains the cover and foraging benefits these plants provide while making room for other food plants. As in the case for impounded marsh, increasing the proportion of area covered by open water in unimpounded marsh will improve duck brooding habitat. Unimpounded marsh habitat is protected from hunting to provide sanctuary for waterfowl on CPNWR. Unimpounded areas of marsh complement the impounded units, contributing to overall habitat diversity across the refuge. This added diversity benefits colonial waterbirds (Hafner 1997) as well as most of the species with complementary habitat needs.

Native Prairie Grass Habitat

The prairie region of southwestern Louisiana was once very extensive (about 2.5 million acres) but today is limited to small, remnant parcels (Lester 2005). An abundance of wildlife and plant species can occur on coastal prairie, making the restoration of remnant sites very important for wildlife and their habitat.

Objectives are to preserve, enhance, and restore native prairie grasses in Units 12A and B (322 acres). Use prescribed fire to reduce waxmyrtle and Chinese tallowtree (*Sapium sebifera*) to less than 10% cover, and to encourage native herbaceous species including flatsedge, brownseed paspalum (*Paspalum plicatulum*), whitetop sedge (*Rhynchospora colorata*) eastern gamma grass (*Tripsacum dactyloides*), nuttall false indigo (*Baptisia nuttalliana*), and milkweeds (*Asclepias spp*.) Coastal prairie vegetation serves as nesting areas for mottled ducks and as feeding areas for wintering geese, especially after a growing-season burn has removed the rough and released fresh regrowth. Many other species with complementary needs use coastal prairie habitat, and maintaining this habitat contributes to overall biodiversity on the refuge.

1.3 Wildlife Resources

Identification of Refuge Resources of Concern

Priorities associated with wildlife and habitat management for NWRS are determined through directives, policies, and legal mandates. Resources of concern include species, species groups, and/or communities that support refuge purposes as well as FWS trust resources responsibilities (including threatened and endangered species and migratory birds). Resources of Concern are also native species and natural, functional communities such as those found under historic conditions that are to be maintained and, where appropriate, restored on a refuge (601 FW3.10B[1]).

Resources of concern for CPNWR were selected after taking into account the conservation needs identified within international, national, regional, or ecosystems goals/plans; state fish and wildlife conservation plans; recovery plans for threatened and endangered species; and previously approved refuge resource management plans as identified in the Comprehensive Conservation Planning Process policy (602 FW 3.4C[1][E]) as well as Section 1.3 of the HMP.

The species/communities selected as resources of concern from these plans support the followingNWRS mandates:

- Support refuge purposes and the NWRS mission;
- Conserve biological integrity, diversity, and environmental health
- Give special consideration to rare, declining or unique natural communities, species, and ecological processes within the refuge boundary
- Fulfill FWS trust resource responsibilities

Resources of concern identified for CPNWR include:

• Waterfowl, including northern pintails and other wintering ducks, mottled ducks, and geese
• Colonial waterbirds
• Other species with complementary needs

Waterfowl:

Coastal Louisiana is one of the most important waterfowl wintering areas in North America. Cameron Prairie's freshwater marshes, moist soil management units, and impoundments support a diversity of plants favorable for waterfowl as well as provide loafing and roosting sites to many species of ducks and geese. CPNWR is located in the Mississippi and Central flyways, which is a critical ecoregion for migrating ducks and geese in North America (Reinecke et al. 1989). The refuge attracts tens of thousands of blue-winged teal, cinnamon teal, green-winged teal, gadwall (*Anas strepera*), northern shovelers, ring-necked ducks (*Aythya collaris*), northern pintail, and several species of geese during the winter with mallards being the most numerous species. Management actions envisioned by this plan would support and improve the freshwater marshes, moist soil management units, and impoundments on CPNWR. Migratory waterfowl use the refuge as a feeding, loafing, and roosting site. Protecting and managing the hydrology of the refuge will preserve important wintering habitat.

Because of historic and ongoing habitat losses due to agricultural development, oil and gas exploration and extraction, and climate change, suitable habitat for wintering waterfowl has decreased over the past two centuries, leading to a decrease in waterfowl populations in North America (Batt et al. 1992). When large, unbroken expanses of wetlands and coastal prairies were available for use by waterfowl, the entire system was more resilient in the face of natural disturbances such as fire, drought, and tropical storms. In the current, anthropogenically modified landscape, habitat loss, habitat fragmentation, the introduction of exotic plant and animal species, and disruption of natural hydrological and pyric processes mean that remaining habitat, in order to function in the larger context of the continent-wide ecosystem, must be actively managed. Small fragments of habitat are less resilient to disturbances, and without management of vegetation, hydrology, fire, and animal populations, will change over time so that they no longer serve as high quality habitat for waterfowl or other desirable species.

Northern Pintails once were one of the most abundant ducks in North America but have suffered a disturbing population decline since the 1970's because of losses of breeding and wintering habitat (USFWS 2004). They are among the first ducks to migrate south in the fall. Pintails using the Central Flyway winter in the Texas Panhandle and on the Gulf Coast of Texas and western Louisiana (Moon et al. 2006). The majority of pintails using the Mississippi Flyway winter in Louisiana, with smaller numbers wintering in Arkansas, Tennessee, Mississippi and Alabama. CPNWR is a key wintering area for Northern pintails which concentrate on shallow fresh or brackish estuaries, brackish and saline marshes, and scattered freshwater impoundments (Johnsgard 1978). They will also use flooded agricultural land, especially corn, rice, wheat,soybeans and pastures. Wintering habitat has declined in this region as a result of decreased rice production and other land use changes. Because pintails exhibit high winter site fidelity, more pintails are likely to rely on CPNWR and adjacent coastal habitats during winter as freshwater habitats along

the Gulf coast disappear (Ballard et al. 2004).

The Mottled Duck is a year-round resident in coastal marshes along the western Gulf Coast (western subspecies, Texas and Louisiana; *Anas fulvigula maculosa)* and in the wetlands of Florida *(*eastern subspecies, *Anas fulvigula fulvigula)* (Rorabaugh and Zwank 1983). A report byThe Gulf Coast Joint Venture (a partnership between state and local wildlife agencies and nonprofit organizations) showed a dramatic and consistent downward trend in the western mottled duck population between 1966 and 2002. However, only in nearby Texas has the population declined; in Louisiana populations appear stable. Declining recruitment is the most likely source of the population decline (Wilson 2007).Wetland habitat drainage, declining rice farming, lead exposure, and increasing predator populations have also contributed to population declines (Wilson 2007). Flooded rice fields appear to be important loafing and feeding habitat for mottled ducks in agricultural lands, especially during drought periods when other wetland types are not available or where natural wetlands have been eliminated (Durham and Afton 2006). Mottled ducks depend on tall, dense, undisturbed stands of grass for nesting (Rorabaugh and Zwank 1983). CPNWR has the ability to provide important habitat for breeding mottled ducks and can contribute to the sustainability of the species.

Several species of geese migrate southward during the fall in large flocks and spend the winter on the Louisiana-Texas Gulf coast, including on CPNWR. Geese have long life spans and, like many other large water birds, they imprint along migratory corridors, using stopovers repetitively year after year. Maintaining habitat for these important waterfowl is part of the refuge purpose . Goose forage consists of invertebrates, roots, tubers, and leaves of various food plants which are locally abundant. Geese ingest sand and pebbles to supply their gizzards with a mechanical aid for the purpose of breaking down hard foods, such as seeds.

Colonial Waterbirds:

Cameron Prairie NWR provides habitat for colonial waterbirds throughout the year. Thirteen species of colonial waterbirds are documented to breed on Cameron Prairie. One other species (the reddish egret) is documented as occurring on the refuge but is not known to breed there (USFWS 2011, Table 3). Eight of the species are ranked "Moderate" or "High" risk conservation status by Kushlan et al. (2002), including the following birds which breed on the refuge: snowy egret, little blue heron, tricolored heron, white ibis, and roseate spoonbill.

Providing breeding habitat for these birds is a priority for the refuge. Management of impounded and unimpounded marsh and moist soil units and artificial upland areas benefits colonial waterbirds throughout the year by providing high quality feeding and roosting habitat.

A number of rookery areas are used on CPNWR. These are areas of shrubs and trees growing on artificial upland habitats such as levees and road banks. The refuge manages rookeries by controlling access to reduce human disturbance during the breeding season.

Woody plant control in these areas would be restricted to selective removal of exotic invasive plants including Chinese tallow. The refuge also provides abundant habitat for wading birds throughout the year on impounded and unimpounded marsh areas and moist soil management units.

Invasive Plant Species

Several invasive plant species are present on the Refuge. The Chinese tallowtree (*Sapium sebiferum*), the most prevalent, is found on canal and impoundment spoil banks and may be found on ridges. It is an introduced ornamental that has escaped to become the dominant woody species in Louisiana coastal marshes. Larger tallowtrees can be controlled by herbicide application or cleared, and small plants can be removed by burning woody growth before it reaches maturity.

Salt cedar (*Tamarix gallica*) is found sparsely along canal banks and ridges throughout the Refuge. It was introduced from Europe and can be an aggressive invader on dewatered, disturbed wetlands and especially on hydraulically deposited soils. Drought conditions probably contribute to its establishment and propagation. Methods of control include long-term deep flooding or application of herbicides licensed for aquatic use.

Chinaberry trees (*Melia azedarach*) are present on canal and spoil banks on the Refuge. It was introduced as an ornamental, but has escaped and now can be found on higher elevated areas of the Refuge. No methods of control or elimination were found in the literature, but may be similar to tallowtree.

Water hyacinth (*Eichhornia sp*.) was found in old borrow pits used to construct ring levees for oil and gas development in Management Unit 2. This is a South American and African plant introduced as an ornamental that produces quickly and has no natural predator in the United States. Repeated applications of the herbicide 2,4-D is the most practical method of reducing infestations.

Eurasian milfoil (*Myriophyllum spicatum*) is rapidly colonizing areas that have converted from emergent marsh to open water, and was found to be one of the most common species near terraces placed in an open water area in Unit 7. Though Eurasian milfoil is not native and is of less value to wildlife than other aquatic species, its presence is desired over the absence of vegetation in recently disturbed open water areas. The species is native to Eurasia and Africa and is believed to have arrived in North America during the late 19th century, possibly from shipping ballast. Methods of control include application of 2-4-D or biocontrol by introducing American Weevil.

Non-native Invasive Animal Species

An ever increasing and common invasive animal on the Refuge is the feral hog. Feral hogs are common on the Refuge and can be detrimental to nesting bird success. Hogs degrade habitat and contribute to land loss by damaging healthy plants that hold the

fragile marsh soils together. No harvest of feral hogs is conducted on the Refuge at this time. Feral hogs (Family Suidae) are considered by many biologists and land managers as a serious threat to native flora and fauna. They compete with native wildlife for food and shelter and can even pose a threat to humans, pets and domestic livestock through the spread of disease (MDC, web source). Feral hogs spend much of their time rooting and wallowing in wet areas such as river bottoms and marsh areas. Rooting and digging behaviors can contribute to erosion and destruction of native plant species, resulting in changes of successional patterns and soil properties (Miller, Synatzke. 1993). Feral hogs are voracious omnivores, eating almost anything they encounter. Grasses, roots and succulent green vegetation are preferred foods but they will eat fruits, nuts, and animal matter. They commonly eat the eggs of ground nesting-birds, rabbits and turtles, and are reported to kill and eat fawns. A recent study conducted by Louisiana Department of Wildlife and Fisheries reported that numerous alligator farmers (51.4%) reported Feral Swine damage to Alligator nests in 2011 (Elsey, Mouton, Jr., and Kinler. 2012). Nearly all farmers who had nests destroyed by Feral Swine (94.7%) reported hog damage is increasing on their properties (Elsey, Mouton, Jr., and Kinler. 2012). Personal observations have indicated that feral swine are impacting resident mammals such as muskrat. Damage to muskrat mounds, rooting and/or crushing, has been identified on Sabine NWR during 2012. It was not determined if feral swine were rooting the nests to feed on young or simply rooting and/or using muskrat mounds as elevated resting areas. Additional concerns regarding feral swine are that the species is very adaptable in wild ecosystems and are potential disease and parasite reservoirs (Miller, Synatzke. 1993).

Currently and in past years, feral hogs have roamed at large on private property adjacent to CPNWR and have gone unchecked and unmanaged. The rapidly expanding distribution of feral hogs in the United States has caused great concern for many land and resource managers. The ecologically-rich wetlands of CPNWR have not been immune to the invasion of these animals. Cursory observations suggest accelerated increases over the last few years. Feral hogs are omnivores devouring flora and fauna alike.

According to the Louisiana State University Agricultural Center (LSU AgCenter), feral hog populations are growing and expanding in the state and throughout the southeastern states. Hogs are becoming one of the most serious concerns for wildlife managers. They root up food plots, eat the corn at feeders, tear up hardwood stands looking for acorns, and scare other wildlife away. Hogs also prey on young game animals, compete with native wildlife, carry diseases and pollute streams. Feral hogs damage forest regeneration and other agricultural crops like sugarcane, corn and rice.

Feral hogs are a result of domestic hogs that have been released or a hybrid of domestic hogs and introduced Russian boars. Feral hogs are adaptable to a wide range of habitats -- from piney woods to bottomland hardwoods and even marshlands. Their average size is 100 to 150 pounds, but they can reach over 400 pounds. Feral hogs are the most prolific large wild mammal in North America with the population able to double in four months. Sows breed throughout the year or seasonally beginning at eight to 10 months of age. They can produce two litters every 12 to 18 months with an average of four to eight piglets per litter. Older sows may have litters of 10 to 13.

Feral hogs carry many diseases that can transmit transmit to humans. Brucellosis is the most dangerous but also the most preventable disease. The disease causes Undulant Fever in humans, which can result in fever, orchitis or oophoritis. Treatment can last for months, and the problems can re-occur at any time. The disease is contracted when butchering or handling the meat of feral hogs. The simple solution is to wear rubber or latex gloves when processing a hog or handling uncooked meat. Properly cooked meat is safe to eat (LSU AgCenter). Additionally, people butchering feral hogs should wear eye protection and avoid eating, drinking, or using tobacco products which could potentially result in oral contamination with bacteria-laden blood or bodily fluids (LDWF 2012)

Many biologists and wildlife managers recommended trapping or shooting as the best control methods. Feral hogs are considered unregulated quadrupeds in Louisiana. They can be shot by anyone with a legal hunting license during legal daylight shooting hours year-round.

Nutria (*Myocaster coypus*) is another invasive species of concern. However, numbers have decreased dramatically in the last few years. The nutria can cause harm to fragile marshes when they occur in high densities. When warranted, harvest is used to control the population.

Another invasive animal species of concern potentially found on the Refuge is the zebra mussel, which has caused great problems wherever it has become established in North America. Refuge personnel annually monitor canals throughout the Refuge for this highly invasive mussel, but none have been found to date.

3.4 Threatened, Endangered and Species of Concern

Cameron Prairie currently has no threatened and endangered species (USFWS 2002a).

3.5 Fishery Resources

CPNWR is dominated by freshwater fish species with over 30 freshwater species identified (USFWS 2005). During drought situations and following hurricane storm surge events and associated elevated salinities displaced estuarine fisheries species have been observed on CPNWR.

3.6 Cultural Resources

In addition to the natural habitat and wildlife that Cameron Prairie National Wildlife Refuge encompasses, it also holds resources of archaeological and cultural value. The Refuge is located in a region with a rich human history and pre-history. While cultural resources or properties have yet to be discovered at Cameron Prairie, it should be emphasized that they may well be present.

Prior to the arrival of Euro-Americans (pre-contact), it was inhabited by the Atakapa Indians. The Atakapa occupied the coastal and bayou areas of southwestern Louisiana and southeastern Texas until the early 1800s (Couser 2002). Archaeological evidence suggests that settlements have been present in this area since before American Indians learned to make pottery, approximately two thousand years ago. While “Atakapa” means "eaters of men" in the language of the neighboring Choctaw, it is unknown whether the Atakapas' supposed cannibalism was for subsistence or ritual. Pre-contact Atakapans were hunters, gatherers, and fishers. Their society consisted of loose bands that moved on a regular basis from place to place within a given territory, gathering, hunting, and fishing. The alligator was very important to them, because it provided meat, oil, hides, and even insect repellent (oil). The Atakapan language has fascinated linguists and is among the better-recorded Native American languages. At one time it was believed to be associated with other languages of the Lower Mississippi River, but later this theory was abandoned and it is now classified as an isolated language.

Most of what is known about the appearance and culture of the Atakapa comes from eighteenth and nineteenth century European descriptions and drawings. The Atakapan people were said to have been short, dark, and stout. Their clothing included breechclouts and buffalo hides. They did not practice polygamy or incest. Their customs included the use of wet bark for baby carriers and Spanish moss for diapers. According to another custom, a father would rename himself at the birth of his first son or if the son became famous. In the creation myth of the Atakapa, humans were said to have been cast up from the sea in an oyster shell. The Atakapas also believed that men who died from snakebite and those who had been eaten by other men were denied life after death, a belief that may have lent support to the notion that they practiced ritual cannibalism.

The various bands of the Atakapas were reported to have traded not only with other Indians but with early French and Spanish explorers and traders as well. After the appearance of these Europeans, the Atakapa dwindled rapidly. An estimated 3,500 still survived in 1698; by 1805, only 175 remained in Louisiana. Just nine known descendants were recorded in 1909. Their downfall was brought about primarily by the invasion of and devastation of European diseases rather than through any direct confrontation with European settlers.

The next major phase of the area’s human habitation occurred after the Treaty of Paris in 1763 concluded the French and Indian Wars (Feldman 1998). The British had already expelled French-speaking settlers—the Acadians—from Nova Scotia (in what is now one of the Maritime Provinces of Canada), in 1755. Their exile occurred as a result of the widespread turmoil and upheaval sweeping through French and British colonies in North America as England gained the upper hand in its struggle with France for the control of North America. The Acadians first arrived in “New Acadia,” now Louisiana, then a colony of Spain, in 1764, and this migration continued for the next two decades (Hebert 2003). Even after all their wanderings following their expulsion from Acadia, the adjustment from Maritime Canada, with its sub-arctic climate and rocky, hilly terrain, to the Mississippi Delta, with its nearly subtropical climate and bayous, must have been difficult for the Acadians. Yet over time, the Acadians, later referred to as

Cajuns, flourished and developed their own subsistence culture based on hunting, fishing, trapping, and some agriculture, that produced a unique cuisine and music, among other things.

Southern Louisiana is also known for its Creole culture and cuisine, although these are more noted in urban areas like New Orleans. While the Cajuns were specifically French in origin, the Creoles trace their heritage to Spanish, African, Italian, as well as French influences, indeed, to any other peoples who chose to live in New Orleans (Royal Café no date). The roots of Creole culture date to the early 1700s, with the French settlement of La Nouvelle Orleans under its founder Jean Baptiste Le Moyne, Sieur de Bienville, governor of the Louisiana Territory. In 1763 the Louisiana Territory was traded to Spain, and Spanish influence increased. German and Italian immigrants and African slaves also contributed heavily to Creole culture, cuisine and music.

As stated above, no archaeological or historical sites have been documented at Cameron Prairie, but this does not mean they do not exist. The generally wet or even inundated condition of soils in the area, within marshes, bayous, and former rice fields, is not conducive to conducting archaeological surveys.

1.7 Socio Economic

CPNWR is located in 1,313 square-miles Cameron Parish, Louisiana, one of the largest parishes (i.e., county equivalent) in the state. Cameron Parish is situated in the extreme southwestern corner of Louisiana, abutting the Gulf of Mexico to the south and Texas to the west. In 2003, the population of the parish was estimated at 9,708, a slight decline (3%) from the 2000 Census (U.S. Census Bureau 2004). The median household income of the parish in 1999 was $34,232, compared to $32,566 for Louisiana as a whole. The same relative prosperity is reflected in a poverty rate below the state average. Approximately 12% of Cameron Parish residents lived below the poverty line in 1999, compared to almost 20% for all of Louisiana. Educational attainment is below the state average, however, with only 8% of the population aged 25 or higher having a Bachelor's degree or higher, as opposed to the statewide average of 19%.

In 2003, transportation and warehousing was the largest of 20 major economic and employment sectors in the parish (STATS Indiana 2004). The U.S. Census Bureau classified occupations in Cameron Parish are shown in Table 3.

In terms of employment by industrial sector, the primary industries lumped as "agriculture, forestry, fishing and hunting, and mining" predominate in Cameron Parish, as shown in Table 4.

In terms of its racial and ethnic breakdown, as reported in the 2000 Census, Cameron Parish is 92.5% white, non-Hispanic; 3.9% black or African American; 0.4% American Indian; 0.4% Asian; and 2.2% Hispanic or of Latino origin (U.S. Census Bureau 2004). (These percentages do not add up precisely to 100% because of the difference between designated races—white, black, Native American, and Asian—and ethnicities, which are

Latino and non-Latino.) In addition, 1.6% in the Census reported some other race or two or more races. Overall, the population of Cameron Parish has a greater percentage of non-Hispanic whites (92.5%) than the state as a whole (62.5%). That is, it is less diverse and has fewer minorities.

TABLE 1. CAMERON PARISH - OCCUPATIONS OF EMPLOYED CIVILIAN POPULATION 16 YEARS AND OLDER (2000).

OCCUPATION	NUMBER	PERCENT
MANAGEMENT, PROFESSIONAL, AND RELATED OCCUPATIONS	772	18.5
SERVICE OCCUPATIONS	718	17.2
SALES AND OFFICE OCCUPATIONS	954	22.8
FARMING, FISHING AND FORESTRY OCCUPATIONS	199	4.8
CONSTRUCTION, EXTRACTION AND MAINTENANCE OCCUPATIONS	594	14.2
PRODUCTION, TRANSPORTATION, AND MATERIAL MOVING	947	22.6
SOURCE: U.S. CENSUS BUREAU, CENSUS 2000, SUMMARY FILE 3, PROFILE OF SELECTED ECONOMIC CHARACTERISTICS		

TABLE 2. CAMERON PARISH - EMPLOYMENT OF CIVILIAN POPULATION 16 YEARS AND OLDER BY INDUSTRY (2000).

INDUSTRY	NUMBER	PERCENT
AGRICULTURE, FORESTRY, FISHING AND HUNTING, AND MINING	696	16.6
CONSTRUCTION	470	11.2
MANUFACTURING	295	7.1
WHOLESALE TRADE	143	3.4
RETAIL TRADE	426	10.2
TRANSPORTATION AND WAREHOUSING, AND UTILITIES	396	9.5
INFORMATION	52	1.2
FINANCE, INSURANCE, REAL ESTATE, AND RENTAL AND LEASING	155	3.7
PROFESSIONAL, SCIENTIFIC, MANAGEMENT, ADMINISTRATIVE, AND WASTE MANAGEMENT SERVICES	206	4.9
EDUCATIONAL, HEALTH AND SOCIAL SERVICES	677	16.2

ARTS, ENTERTAINMENT, RECREATION, ACCOMMODATION AND FOOD SERVICES	**269**	**6.4**
OTHER SERVICES (EXCEPT PUBLIC ADMINISTRATION)	**213**	**5.1**
PUBLIC ADMINISTRATION	**186**	**4.4**
***SOURCE*: U.S. CENSUS BUREAU, CENSUS 2000, SUMMARY FILE 3, PROFILE OF SELECTED ECONOMIC CHARACTERISTICS**		

Chapter 4 Environmental Consequences

This chapter describes the foreseeable environmental consequences of implementing the feral hog management alternatives in Chapter 2. When detailed information is available, a scientific and analytic comparison between alternatives and their anticipated consequences is presented, which is described as "impacts" or "effects." When detailed information is not available, those comparisons are based on the professional judgment and experience of Refuge staff and Service and State biologists

4.1 Effects Common to all Alternatives

4.1.1 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities' access to public information and participation in matters relating to human health or the environment. This assessment has not identified any adverse or beneficial effects for either alternative unique to minority or low-income populations in the affected area. Neither alternative will disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low-income populations.

1.1.2 Public Health and Safety

Each alternative would have similar effects or minimal to negligible effects on human health and safety.

1.1.3 Refuge Physical Environment

Impacts of each alternative on the Refuge physical environment would have similar minimal to negligible effects. Some disturbance to surface soils, topography, and vegetation would occur in areas selected for hunting; however, effects would be minimal.

Hunting would benefit vegetation and wildlife as it is would aid in reducing feral hog populations within the Refuge. The Refuge would also control access to minimize habitat degradation.

Impacts to the natural hydrology would have negligible effects. The Refuge expects impacts to air and water quality to be minimal and only due to Refuge visitors' automobile and off-road vehicle emissions and run-off from road and trail sides. The effect of these Refuge-related activities on overall air and water quality in the region are anticipated to be relatively negligible. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws. Impacts associated with solitude are expected to be minimal given time and space zone management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups.

1.1.4. Cultural Resources

Under each alternative, hunting, regardless of method or species targeted, is a consumptive activity that does not pose any threat to historic properties on and/or near the Refuge.

1.1.5. Facilities

Maintenance or improvement of existing facilities (i.e. parking areas, roads, trails, and boat ramps) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. The Service defines facilities as: "Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc."

1.1 Summary of Effects

4.2.1 Direct and Indirect Impacts to Habitat

Alternative 1. No Action

Under this alternative, no effort would be made to control feral hogs on the refuge.

> *Direct Effect*: Feral hog damage to CPNWR would continue to increase affecting the flora and fauna dependant on wetland habitat.
>
> *Indirect Effect*: Landscape damage caused by feral hogs would cause long term impact to wildlife and wildlife related activities on CPNWR and potentially spread to adjacent private lands.

Alternative 2. Proposed Action : Implement the Feral Hog Management Plan

Under this alternative, the Refuge purpose of conserving wetlands for wildlife would be achieved and the goals of the CPNWR Comprehensive Conservation Plan would be fully met.

Direct Effect: The biological integrity of the Refuge would be protected. The management of feral hogs would positively impact wildlife habitat by promoting plant health, and be beneficial to both migratory and nesting wildlife populations.

Indirect Effect: The addition taking of feral hogs might cause minor vegetation damage and increase noise disturbance. However both impacts are short term and very localized. Controlling hog on federal lands may reduce the number of hogs destroying vegetation and wildlife on adjacent private land

4.2.2 Direct and Indirect Impacts to Hunted Wildlife (Waterfowl)

Alternative 1. No Action

Direct Effect: Uncontrolled, Feral hog populations will increase causing additional refuge disturbance. Disturbances will include but are not limited to: mottled duck nest destruction, wetland vegetation destruction, competition for food with all other migratory and nesting species.

Indirect Effect: Destruction of marsh habitat would contribute to a decline in migratory wetland species' use of the Refuge. Vegetative seed sources would be reduced as feral hogs "root" wetland plants beneficial to wintering waterfowl. They directly compete for food that native species need for winter survival.

Alternative 2. Proposed Action: Implement the Feral Hog Management Plan

Direct Effect: Migratory bird hunting would continue to occur on 34,000 acres of the Refuge. Hunting is allowed four days (Wed, Thurs, Sat and Sun) a week. A decrease in the population of feral hogs along with a decrease in habitat damage and nest depredation would occur under this alternative.

Indirect Effect: Feral hog management could cause some disturbance to other game species depending on proximity to the actual hunt. However, time and space zoning established by Refuge regulations would minimize incidental disturbance.

4.2.3 Direct and Indirect Impacts to Non-hunted Wildlife

Alternative 1. No Action

Direct Effect: Degradation of populations of non-hunted species would continue as nest disturbance and niche encroachment by feral hogs would continue to increase at a prolific rate.

Indirect Effect: The sensitive wetland ecosystem on the Refuge would be degraded over an extended period of time by increases in feral hog populations on the Refuge which could expand to private land.

Alternative 2. Proposed Action: Implement the Feral Hog Management Plan

Direct Effect: Disturbance to non-hunted wildlife could increase slightly during the implementation of the hog management plan or trapping and relocation proposal. However, impact will be localized and short term due to careful hog management techniques. Disturbance to daily wintering activities of birds might occur, but will be transitory as FWS personnel, and/or hunters traverse habitat. Disturbance to birds would probably be commensurate with that caused by non-consumptive users and normal refuge maintenance activities. Increased disturbance to non-hunted wildlife will be minimal.

Indirect Effect: Public wildlife observation may be reduced on occasion. However, no feral hog management will occur in areas easily accessible for wildlife observation (non-consumptive)by the public at times of high non-consumptive public use. Most feral hog management activities will occur in the winter in areas open only to hunters.

4.2.4 Direct and Indirect Impacts to Endangered and Threatened Species

Alternative 1. No Action

There are no endangered species to be impacted

Alternative 2. Proposed Action: Implement the Feral Hog Management Plan

There are no endangered species to be impacted

4.2.5 Direct and Indirect Impacts to Refuge Facilities (roads, trails, parking lots, levees)

Alternative 1. No Action

Additional damage to roads due to hunter use during wet weather periods would not occur; however, other users would still be using roads, thereby necessitating periodic maintenance. Additionally, costs associated with an expanded management program in the form of road and levee maintenance, instructional sign needs, and law enforcement would not be applicable.

Alternative 2. Proposed Action : Implement the Feral Hog Management Plan

The current Refuge management program has shown minimal damage to roads/ trails due to hunter use during wet weather periods. There would be some costs associated with a management program in the form of helicopter rental, USDA (WS) contract costs, road maintenance, instructional sign needs, and law enforcement. These costs should be minimal relative to total Refuge operations and maintenance costs and would not diminish resources dedicated to other Refuge management programs.

4.2.6 Direct and Indirect Impacts to Wildlife Dependant Recreation

Alternative 1. No Action

Degradation to CPNWRs flora and fauna would continue to increase as feral hog populations increase. The public would not have the opportunity to harvest feral hogs, participate in wildlife-oriented recreation that is compatible with the purposes for which the Refuge was established and have an increased awareness of CPNWR and the National Wildlife Refuge System.

Alternative 2. Proposed Action: Implement the Feral Hog Management Plan

As public use levels expand across time, unanticipated conflicts between user groups may occur. Experience has proven that time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups. Conflicts between hunters and non-consumptive users might occur, but would be mitigated by time (non-hunting season) and space zoning.

As the feral hog populations decreases, less damage and degradation would occur. The public would have an increased awareness of CPNWR, the National Wildlife Refuge System and public demand for more hunting would be met. The public would also have the opportunity to harvest a renewable resource in a traditional manner, which is culturally important to the local community.

4.3 Cumulative Impacts Analysis

4.3.1.1 Migratory Birds

Over time, regular application of the tools identified in the CPNWR Feral Hog Management Plan, in conjunction with other habitat management techniques such as prescribed burning, water level management and water salinity management should increase waterfowl food production and furnish habitats and sanctuary needs for migrating, wintering, and breeding ducks (particularly the mottled duck) and geese of the Chenier Plain system of southwest Louisiana. The wetland habitat's overall value to waterfowl, other waterbirds, and aquatic species like fish and the alligator would also be improved and extended under the proposed action.

4.3.1.2 Resident Wildlife (Exotic and Native)

4.3.1.2.1 Feral Hogs

Feral hogs can have detectable influences on wildlife and plant communities. Extensive disturbance of vegetation and soil occurs as a result of their foraging (rooting) habits. The disturbed area may cause a shift in plant succession on the immediate site. Feral hogs also compete, to some degree, with several species of wildlife for certain foods (Engeman et al.).Feral hogs are often the single greatest vertebrate modifiers of natural plant communities (Bratton 1977, Wood and Barrett 1979, Stone and Keith 1987, Engeman et al. in press). Habitat damage by hogs is most pronounced in wet areas (e.g., Choquenot et al. 1996, Engeman et al. in press). Their shallow waters are dominated by herbs and shrubs (Florida Natural Inventory 1990), making them desirable for foraging by hogs.

Invasive feral hog populations can also lead to outbreaks of diseases such as swine fever (hog cholera), brucellosis, and pseudo rabies.

4.3.1.3 Non-hunted Wildlife

Non-hunted wildlife would include migratory birds such as songbirds, wading birds, raptors, and woodpeckers; small mammals such as voles, moles, mice, shrews, and bats; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory bats, butterflies and moths, these species have very limited home ranges and hunting could not affect their populations regionally; thus, only local effects will be discussed.

The cumulative effects of disturbance to non-hunted migratory birds under the proposed action are expected to be negligible for the following reasons. The removal of hogs will be carefully planned to not coincide with the nesting season. Long-term future impacts that could occur if reproduction was reduced by the taking of hogs are not relevant for this reason. Disturbance to the daily wintering activities, such as feeding and resting, of birds might occur. Disturbance to birds by hunters would probably be commensurate with that caused by non-consumptive users.

The cumulative effects of disturbance to small animals under the proposed action are expected to be negligible for the following reasons. Small mammals are generally inactive during winter when hogs will most likely be taken. These species are also nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity during the hunting season when temperatures are low. Personnel involved with the removal of hogs either private or professional would rarely encounter reptiles and amphibians during most of the removal period. Encounters with reptiles and amphibians in the early fall are few and should not have cumulative negative effects on reptile and amphibian populations. Invertebrates are also inactive during cold weather and would have few interactions with personnel during the removal period. Refuge regulations

further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the targeted species is not permitted.

Some species of bats, butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. These species are in torpor or have completely passed through South Louisiana by peak control period. Some taking of feral hogs may occur when these species are migrating; however, human interaction would be commensurate with that of non-consumptive users.

Positive effects of the proposed action would include quality habitat, decreased predation by hogs on ground nesting species or pre-fledgling birds that may prematurely fall from their nests, increased fecundity due to decreased competition for native foods and the enhanced potential for increased population levels.

4.3.1.5 Endangered Species

Species of special management concern, including threatened or endangered, have not been identified at Cameron Prairie.

4.3.2.1 Wildlife-Dependant Recreation

As public use levels expand across time, unanticipated conflicts between user groups may occur. The Refuge's visitor use programs would be adjusted as needed to eliminate or minimize each problem and provide quality wildlife-dependent recreational opportunities. Experience has proven that time and space zoning (e.g., establishment of separate use areas, use periods, and restrictions on the number of users) is an effective tool in eliminating conflicts between user groups.

The level of recreation use and ground-based disturbance from visitors would be largely concentrated at trails and the Refuge's office and maintenance areas. This, combined with the addition of increased hunting opportunity, could have a negative effect on nesting bird populations. However, the hunting will be limited to non-nesting periods for birds that utilize the Refuge.

The Refuge would control access under this alternative to minimize wildlife disturbance and habitat degradation, while allowing current and proposed compatible wildlife-dependent recreation. Some areas, such as waterfowl sanctuaries, would be closed seasonally to hunting to minimize disturbance to wintering waterfowl.

4.3.2.2 Refuge Facilities

The Service defines facilities as: "Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc." Under the proposed action those facilities most utilized by people engaged in hog removal are: roads, parking lots and trails. Maintenance or improvement of existing facilities (i.e.

parking areas, roads, and trails) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities described are periodically conducted to accommodate daily refuge management operations and general public uses such as wildlife observation and photography. These activities will be conducted at times (seasonal and/or daily) to cause the least amount of disturbance to wildlife. Disturbed sites will be restored to as natural a condition as possible. During times when roads are impassible due to flood events or other natural causes those roads, parking lots, trails and boat ramps impacted by the event will be closed to vehicular use.

1.1.1.3 Cultural Resources

The removal of feral hogs from the CPNWR, regardless of method or species targeted, is an activity that does not pose any threat to historic properties on and/or near the Refuge. Feral hog removal meets only one of the two criteria used to identify an "undertaking" that triggers a federal agency's need to comply with Section 106 of the National Historic Preservation Act.
These criteria, which are delineated in 36 CFR Part 800, state:

> 1- An undertaking is any project, activity, or program that can alter the character or use of an archaeological or historic site located within the "area of potential effect;" and
>
> 2- The project, activity, or program must also be either funded, sponsored, performed, licenses, or have received assistance from the agency.

Consultation with the pertinent State Historic Preservation Office and federally recognized Tribes are, therefore, not required.

4.3.2.4 Anticipated Impacts if Proposed Feral Hog Management Plan is used on Refuge Environment and Community

The Refuge expects no sizeable adverse impacts of the proposed action on the Refuge environment which consists of soils, vegetation, air quality, water quality and solitude. Some disturbance to surface soils and vegetation would occur in areas selected for feral hog management; however, impacts would be minimal. Feral Hog Management would benefit vegetation and various wildlife species by regressing habitat damage and predation caused by feral hogs. The Refuge would also control access to minimize habitat degradation.

The Refuge expects no impacts to air and water quality. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws.

Impacts associated with solitude are expected to be minimal given time and space zone management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups.

The Refuge would work closely with State, Federal, and private partners to minimize impacts to adjacent lands and its associated natural resources; however, no indirect or direct impacts are anticipated. The newly opened hunts would result in a net gain of public hunting opportunities positively impacting the general public, nearby residents, and refuge visitors. The Refuge expects increased visitation and tourism to bring additional revenues to local communities but not a significant increase in overall revenue in any area.

4.3.2.5 Other Past, Present, Proposed, and Reasonably Foreseeable Feral Hog Management and Anticipated Impacts

Cumulative effects on the environment result from incremental effects of a proposed action when these are added to other past, present, and reasonably foreseeable future actions. While cumulative effects may result from individual minor actions, they may, viewed as a whole, become substantial over time. The proposed management plan has been designed so as to be sustainable through time given relatively stable conditions. Changes in refuge conditions, such as sizeable increases in refuge acreage or public use, are likely to change the anticipated impacts of the current plan and would trigger a new planning and assessment process.

The implementation of any of the proposed actions described in this assessment would have both direct and indirect effects (e.g., new site inclusion would result in increased public use, thus increasing vehicular traffic, disturbance, etc); however, the cumulative effects of these actions are not expected to be significant.

4.3.2.6 Anticipated Impacts if Individual Hunts are Allowed to Accumulate

When hunting is used as a management tool to control feral hogs on the Refuge the program would be managed within the framework of State and Federal regulations. By maintaining regulations that are as, or more, restrictive than the State, individual refuges ensure that they are maintaining seasons which are supportive of management on a more regional basis. This is a time honored process and has been used to successfully manage alligator hunting within the Southwest Louisiana National Wildlife Refuge Complex. Additionally, Refuges coordinate with LDWF annually to maintain regulations and programs that are consistent with the State management program.

Appendix 1
Literature References

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APPENDIX 2.

Aerial Capture, Eradication and Tagging of Animals (ACETA) Handbook

APPENDIX 3.

Non Law Enforcement Firearms Policy for the Southwest Louisiana National Wildlife Refuge Complex