ENVIRONMENTAL ASSESSMENT

For

White-tailed Deer, Feral Hog, and Waterfowl Hunt Plan

ARANSAS NATIONAL WILDLIFE REFUGE
Austwell, Texas

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1.0 PURPOSE AND NEED FOR ACTION

1.1 Introduction

The purpose of this environmental assessment (EA) is to disclose the consequences of three alternatives to opening selected units of the Aransas National Wildlife Refuge (Aransas NWR) to hunting. This includes a No Action alternative that would continue the current condition of limited hunting, and the Service's preferred alternative which proposes providing maximum public hunting opportunities. This proposal applies to selected existing fee title Refuge lands.

1.2 Location

Aransas NWR is located on the Texas coastal bend, an area known ecologically as the Gulf Coast Prairies and Marshes Ecoregion. Boasting 19 major rivers and 22 bays, this ecoregion is a virtual factory for producing fish and shellfish, vital links in the food chain for marine organisms, and vital to the economic health of human communities (TNC Pub. 2008). Additionally, this region consists of a narrow band about 60 miles wide along the Texas coast. It is characterized by long and continual confrontations with the sea, wind, and rain, shaping this region and creating a tapestry of shallow bays, estuaries, salt marshes, dunes and tidal flats (TPWD 2004).

Refuge headquarters is located five miles south of Austwell, Texas and approximately 70 miles northeast of Corpus Christi, TX. The Refuge consists of 115,931 acres and is comprised of five units (Figure 1) situated in Aransas, Calhoun, and Refugio Counties of Texas.

1.3 Background

The Aransas Migratory Waterfowl Refuge was established on December 31, 1937, becoming the 121st refuge to be established in NWRS and second in Texas. The Refuge was established to benefit migratory waterfowl along the Central Flyway. The Refuge was renamed Aransas National Wildlife Refuge ANWR in 1940. Shortly after World War II, when impending extinction of the whooping crane became apparent, biologists realized the significance of ANWR tidal flats as whooping crane wintering grounds. Since then, many proclamations, administrative transfers, and land purchases/donations have occurred through the years, as outlined in Section 1.1 (CCP, 2010). Through these various land acquisitions, the whooping crane's fate and recognition of the Refuge have fused in the public mindset. Today, the Refuge consists of 115,931 acres and comprised of five units (Figure 1) situated in Aransas, Calhoun, and Refugio Counties of Texas. This plan addresses hunting opportunities on three ANWR Units: Blackjack, Matagorda Island (MI), and Tatton Units. Myrtle-Foester Whitmire and Lamar Units are closed to hunting.

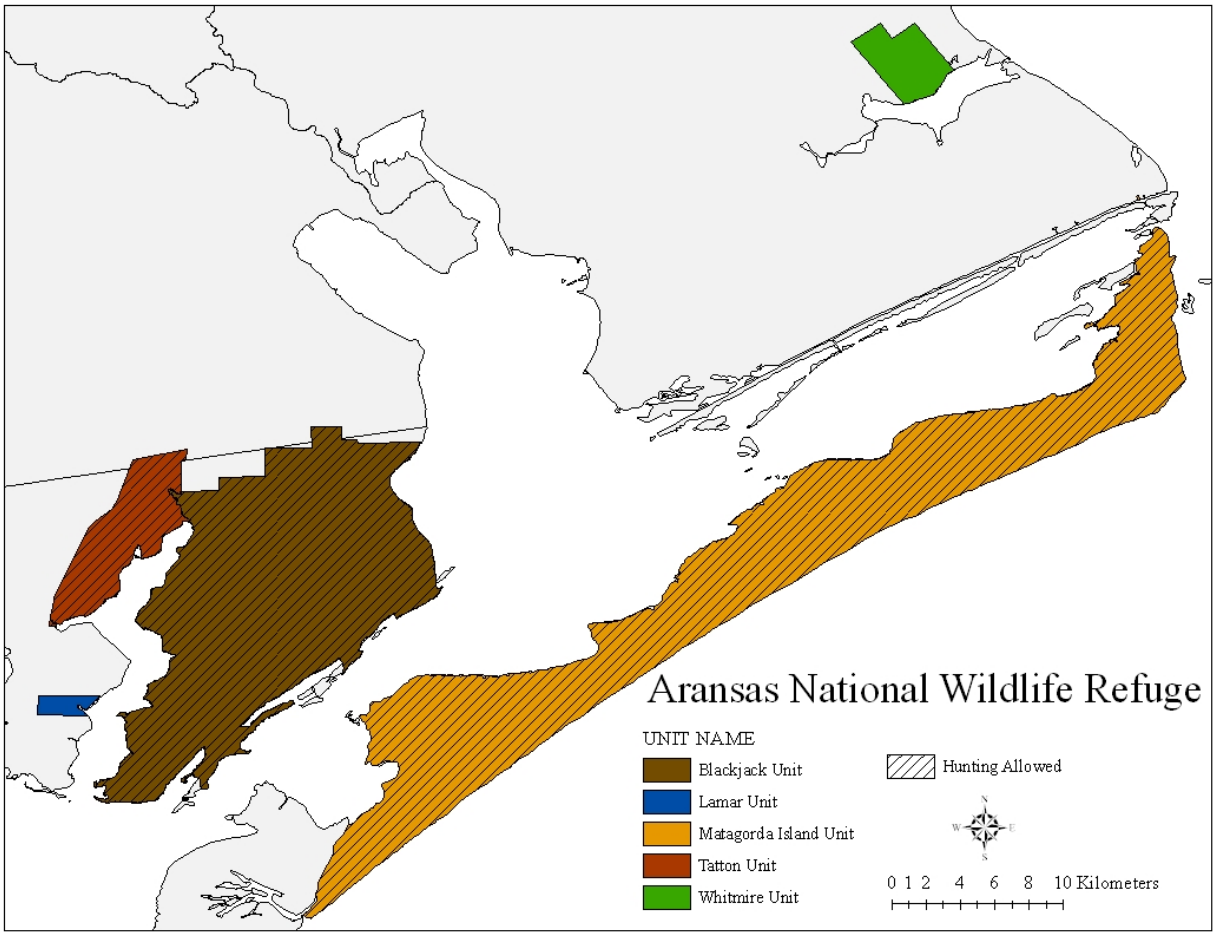

Figure 1. Map of Refuge Units Comprising the Aransas National Wildlife Refuge

It is the goal of the Refuge to protect wildlife habitat and biological diversity along the Texas Gulf Coast. It is unique in its representation of four broadly distinct coastal habitats: barrier island, peninsular, coastal upland prairie, and shoreline. With increasingly diminishing habitats, Aransas NWR plays a critical role in coastal habitat preservation and management. Aransas NWR continues to serve as the perpetual winter home for a high diversity of migratory birds, a variety native wildlife, and threatened and endangered species, chief among these is the endangered whooping crane.

The only self-sustaining, natural wild populations of whooping cranes nest in Canada and winter along the Texas Gulf Coast on and near Aransas NWR. It is referred to as the Aransas/Wood Buffalo Population. In their restricted winter range, they are vulnerable to annihilation by catastrophic events. The principal threat to the wild population continues to be a contaminant spill from barges on the Gulf Intracoastal Waterway that bisects the winter range. A spill could destroy and/or degrade their habitat, eradicate their food resources or kill the birds directly as a result of ingestion of toxins.

Blackjack Unit – originally comprising 47,261 acres and was established on December 31, 1937 by Executive Order 7784, *"...as a refuge and breeding ground for migratory birds and other*

wildlife..." This acquisition was implemented under the authority of the Migratory Bird Conservation Act of 1929 (45 Stat. 1222) which also established the Refuge *"...for use as an inviolate sanctuary...for any other management purposes...for migratory birds..."* (16 U.S.C. § 715d). This unit, comprised of the Blackjack Peninsula, has a designated Proclamation Boundary or buffer zone, adding an additional 12,934 acres of jurisdiction over open waters surrounding the peninsula for the protection of waterfowl (Presidential Proclamation No. 2314 (1938), and No. 2478 (1941). The Proclamation Boundary (50 CFR, Part 32.8) was established to *"...effectuate the purposes of the Migratory Bird Treaty Act of July 3, 1918 ...designated as closed area in or on which hunting, taking, capturing or killing... is hereby prohibited."*

Public hunts on the Blackjack Unit began in 1966, with the introduction of the archery hunting for white-tailed deer and feral hog. This provides the visitor with additional recreational opportunity where hunting opportunities on public lands are limited. In 1968, the refuge added a rifle season and has since been holding annual seasons on the Blackjack.

Matagorda Island Unit – the first acquisition was established on December 8, 1982 by administrative transfer of 19,000 acres of Federal lands, from the U.S. Air Force to the Service for *"…wildlife conservation purposes."* This acquisition was implemented under the authority of "An Act Authorizing the Transfer of Certain Real Property for Wildlife or Other Purposes," (1948) which also established that the Refuge serves *"...particular value in carrying out the national migratory bird management program..."* (16 U.S.C. § 667b).

A second acquisition was established in November 1988 by purchase of the 11,502 acre Wynn Ranch from The Nature Conservancy of Texas, *"…to preserve the wetlands and associated habitats of this barrier island for all species of wildlife"* – 1989 Land and Water Conservation Fund acquisition document. This acquisition was implemented under the authorities of the: 1) Fish and Wildlife Act of 1956, which also established that the Refuge is *"...for the development, advancement, management, conservation, and protection of fish and wildlife resources..."* (16 U.S.C. § 742f(a)(4)) and *"...for the benefit of the U.S. Fish and Wildlife Service, in performing its activities and services..."* (16 U.S.C. § 742f(b)(1)); and 2) Endangered Species Act of 1973, which also established that the Refuge serves: *"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants"* (16 U.S.C. § 1534).

A third acquisition was established on December 8, 2000, by administrative transfer of 15.29 acres and the MI Lighthouse from the U.S. Coast Guard to the Service for *"…wildlife conservation purposes to protect the whooping crane and other endangered species"* – acquisition document dated April 16, 1999. This acquisition was implemented under the authorities of: 1) An Act Authorizing the Transfer of Certain Real Property for Wildlife or Other Purposes, 1948, which established that the Refuge serves *"...particular value in carrying out the national migratory bird management program..."* (16 U.S.C. § 667b); and 2) the Endangered Species Act of 1973, which established that the Refuge serves *"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants"* (16 U.S.C. § 1534).

Hunting activities on MI are complex, due to the various management agreements in place. Documented hunting on MI dates back to the early 1940's, when the U.S. Air Force occupied the northern 28 miles or 19,000 acres of the island as the Matagorda Bombing and Gunnery Range. Records indicate the military conducted recreational hunting for deer, waterfowl, mourning dove, and northern bobwhite. In 1971, the military agreed to let the U. S. Fish and Wildlife Service (USFWS) manage this property for the benefit of whooping cranes. After the installation closed

in 1978, the land transferred to USFWS in 1982 for "wildlife conservation purposes" and permanent inclusion in the NWRS. USFWS inherited deer and waterfowl hunting activities previously established by the military. Big game hunting (feral hogs and white-tailed deer) was formally opened and these hunts will continue. The waterfowl hunting continued without the formal opening process. In 1979, 26,166 acres of salt marsh, tidal flats, and gulf beach previously leased by the military returned to the Texas General Land Office (GLO), which manages public coastal lands. Later that year, the Texas State Legislature designated the MI State Park and Wildlife Management Area, comprising most of the same acreage returned to GLO. In an effort to resolve many of the disputes over the management of MI, the USFWS and State of Texas signed a Memorandum of Agreement (MOA) in 1982 (Public Law 98-66) providing for the integrated management of all Federal and State lands on MI through conservation easements A similar Conservation Easement Agreement (CEA) of 1982 was also signed. Under these agreements, USFWS became the primary authority for wildlife and habitat management on the entire tract, approximately 43,891 acres, by inclusion of these lands into the Refuge System. Texas Parks and Wildlife Department (TPWD) became the primary authority for supervising public access and use of the area as a park and wildlife management area. As such, TPWD has conducted public use activities on MI, including deer, hog, and waterfowl hunting, since 1984. Both the MOA and CEA were updated as the MOA of 1994 and CEA of 1994, to include the newly acquired southernmost portion of MI and eliminate cattle grazing on the island. Additionally, the name for this all-inclusive entity is MI National Wildlife Refuge and State Natural Area. These new agreements supersede the 1982 agreements and remain in effect until December 2082. For a complete and detailed accounting of events leading to and surrounding these agreements, see the Aransas National Wildlife Refuge Comprehensive Conservation Plan (ANWR CCP, 2010).

Tatton Unit – was established in two parts: 1) November 9, 1967 (7,538 acres) and 2) May 15, 1968 (29.9 acres) by donation from Mr. and Mrs. Meredith Tatton of 7,568 acres to the Service for *"... for protecting and enhancing the habitat required by wildlife species present in the area ..."* Deed of Gift Vol. 131: 467-474, September 18, 1967. Additionally, *"…for wildlife refuge purposes...and managed for many wildlife species but... excellent habitat for Attwater's prairie chicken ..."* – Secretary of the Interior Stewart L. Udall (DOI, Bureau of Sport Fisheries and Wildlife news release dated November 17, 1967). This acquisition was implemented under the authority of the Migratory Bird Conservation Act of 1929 (45 Stat. 1222), as amended, which also established that the Refuge is *"...for use as an inviolate sanctuary ...for any other management purpose...for migratory birds..."* (16 U.S.C. § 715d).

Past hunting activities on the Tatton unit include a white-tailed deer and feral hog youth hunt conducted by TPWD annually from 2004-2009. We will formally open big game hunting on the Tatton unit.

1.4 Purpose and Need for the Proposed Action

Providing hunting opportunities is consistent with the Refuge Comprehensive Conservation Plan (CCP, 2010) and U.S. Fish and Wildlife Service policies on wildlife dependent recreation and hunting as mandated by the National Wildlife Refuge System Improvement Act of 1997.

The guiding principles of the Refuge System's hunting programs as outlined in the *U.S. Fish & Wildlife Manual* (605 FW 2) are to:

- Manage wildlife populations consistent with Refuge System-specific management plans approved after 1997 and, to the extent practicable, State fish and wildlife conservation plans;

- Promote visitor understanding of and increase visitor appreciation for America's natural resources;

- Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality found in 605 FW 1.6;

- Encourage participation in this deeply-rooted tradition in America's natural heritage and conservation history; and

- Minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities.

Hunting in part fulfills the Refuge CCP which contains the following objectives regarding hunting.

- Biological diversity by preserving the natural diversity and variety of biotic communities occurring on Refuge lands;
- High quality recreational experiences on refuge lands, as well as increase opportunities for youth hunters and hunters with disabilities;
- Wildlife-dependent public recreation, as mandated by and according to USFWS policy.

With this Environmental Assessment, Aransas NWR proposes opening waterfowl hunting on the northern end of MI Unit, white-tailed deer and feral hog hunting on the Tatton units.

1.5 Decision to be Made

The Service's Regional Director will review the recommendations assessed in this EA and select one of the three Alternatives presented. The Regional Director will also determine whether this EA is adequate to support a Finding of No Significant Impact (FONSI) or whether an Environmental Impact Statement will need to be prepared.

To initiate or expand hunting programs, the Service must publish in the *Federal Register* any proposed and final refuge-specific regulations pertaining to that use prior to implementing them. The regulations are only one element of a complete opening package, which is comprised of the following documents: hunting plan; compatibility determination; documentation pursuant to compliance with the National Environmental Policy Act of 1969, as amended (NEPA) and appropriate NEPA decision document; Endangered Species Act section 7 evaluation; copies of letters requesting State involvement and the results of the request; draft news release; outreach plan; and the draft refuge-specific regulations.

This EA serves as the NEPA document which analyzes the impacts on environmental, cultural, and historical resources of continuing to provide hunting opportunities on the Aransas NWR. The Hunting Plan is presented in this document as the preferred alternative. Proposed uses within

this plan have been determined to be appropriate and compatible with the mission of the Refuge System and purposes for which the Refuge was established.

1.6 Regulatory Compliance

National wildlife refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The mission of the Refuge System is:

"... to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57).

The goals of the Refuge System are to:

- *Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered;*
- *develop and maintain a network of habitats for migratory birds, anadromous and interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges;*
- *conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts;*
- *provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation);* and
- *foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.*

The NWRS Improvement Act of 1997 provides guidelines and directives for the administration and management of all areas in the NWRS. It states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy Refuge System lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use "… will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuges." In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety." The act also recognized that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation, photography, environmental education and interpretation, when determined to be compatible with the mission of the System and purposes of the refuges, are legitimate and appropriate public uses of the NWRS and they shall receive priority consideration in planning and management.

This EA was prepared by the Service and represents compliance with applicable Federal statutes, regulations, Executive Orders, and other compliance documents, including the following:

- American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)
- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470)
- Clean Air Act of 1972, as amended (42 U.S.C. 7401 *et seq.*)
- Clean Water Act of 1972, as amended (33 U.S.C. 1251 *et seq.*)
- Endangered Species Act of 1973, (ESA) as amended (16 U.S.C. 1531 *et seq.*)
- Executive Order 12898, Federal Action Alternatives to Address Environmental Justice in Minority Populations and Low Income Populations, 1994.
- Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. 661 *et seq.*)
- Floodplain Management (Executive Order 11988)
- National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 *et seq.*)
- Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500 *et seq.*)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq.*)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 *et seq.*)
- Protection and Enhancement of the Cultural Environment (Executive Order 11593)
- Protection of Wetlands (Executive Order 11990)
- National Pollutant Discharge Elimination System, as amended (33 U.S.C. 1251 *et seq.*)
- Executive Order 13112, Invasive Species (issued in February 1999)
- Administrative Procedures Act (5 U.S.C. 551-559, 701-706, and 801-808) as amended
- Antiquities Act of 1906 (16 U.S.C. 431-433
- Bald Eagle Protection Act (16 U.S.C. 668-668d) as amended
- Federal Land Recreation Enhancement Act (REA), 16 U.S.C.6803(c), Consolidated Appropriations Act (PL 108-447)
- Fish and Wildlife Act of 1956 (16 U.S.C. 742a-754j-2)
- Fish and Wildlife Conservation Act (16 U.S.C. 2901-2911) as amended
- Fish and Wildlife Improvement Act of 1978 (16 U.S.C. 7421)
- Migratory Bird Treaty Act (16 U.S.C. 703-712 as amended
- National Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended
- Recreation Hunting Safety and Preservation Act of 1994 (16 U.S.C. 5201-5201) Refuge Recreation Act (16 U.S.C. 460K-460K-4) as amended
- Sikes Act (16 U.S.C. 670a-680o) as amended
- Soil and Water Conservation Act of 1977 (16 U.S.C. 2001-2009) as amended

Further, this EA reflects compliance with applicable State of Texas and local regulations, statutes, policies, and standards for conserving the environment and environmental resources such as water and air quality, endangered plants and animals, and cultural resources.

1.7 Public Involvement and Issues Identified

Public scoping of the proposed action was initiated on 11 January 2011 meeting with TPWD personnel. Additional meetings were held with numerous federal, state, non-profit entities and partners during the development of the hunt plan and Environmental Assessment. A news release was distributed to the local media and our Friends group email list. Through casual discussions and written comments, the following concerns were identified:

- There is a lack of public lands available for hunting.
- Outfitters and the public have come to expect hunting opportunities on the refuge, especially waterfowl hunting on MI and in the MI conservation easement.
- There is a concern about potential habitat depredation from deer and feral hog overpopulation.
- Some people were concerned with allowing waterfowl hunting on MI in the presence of whooping cranes and potential disturbance factors.
- The majority of comments received during the scoping period were in support of additional hunting opportunities.

2.0 ALTERNATIVES; INCLUDING PROPOSED ACTION ALTERNATIVE

This chapter discusses the alternatives considered for continuing big game and formally opening waterfowl hunting opportunities on the Refuge.

2.1 Alternative A – No Action (Current Management):

Currently, a total of 52,000 acres is open to big game hunting, while MI (19,500 acres) is currently open to waterfowl hunting. Under this alternative, hunting of big game (white-tailed deer and feral hog) would continue on the currently approved Refuge units of Blackjack and Matagorda Island as shown in 50 CFR 32.63. Currently, waterfowl hunting (for coots, ducks, and mergansers) occurs on MI on the 17 upland ponds and within the conservation easement; however, the upland ponds have not been formally open in the CFRs. The upland pond waterfowl hunting, currently sponsored by TPWD via longterm interagency agreements, would continue under current TPWD guidelines. Waterfowl hunting would also continue to occur within the conservation easement. Under the terms of the conservation easement with GLO, the Refuge has no authority to regulate hunting on the conservation easement; therefore waterfowl hunting occurs throughout the entire season in this area. See Figures 2-6 for locations of the units currently opened to hunting.

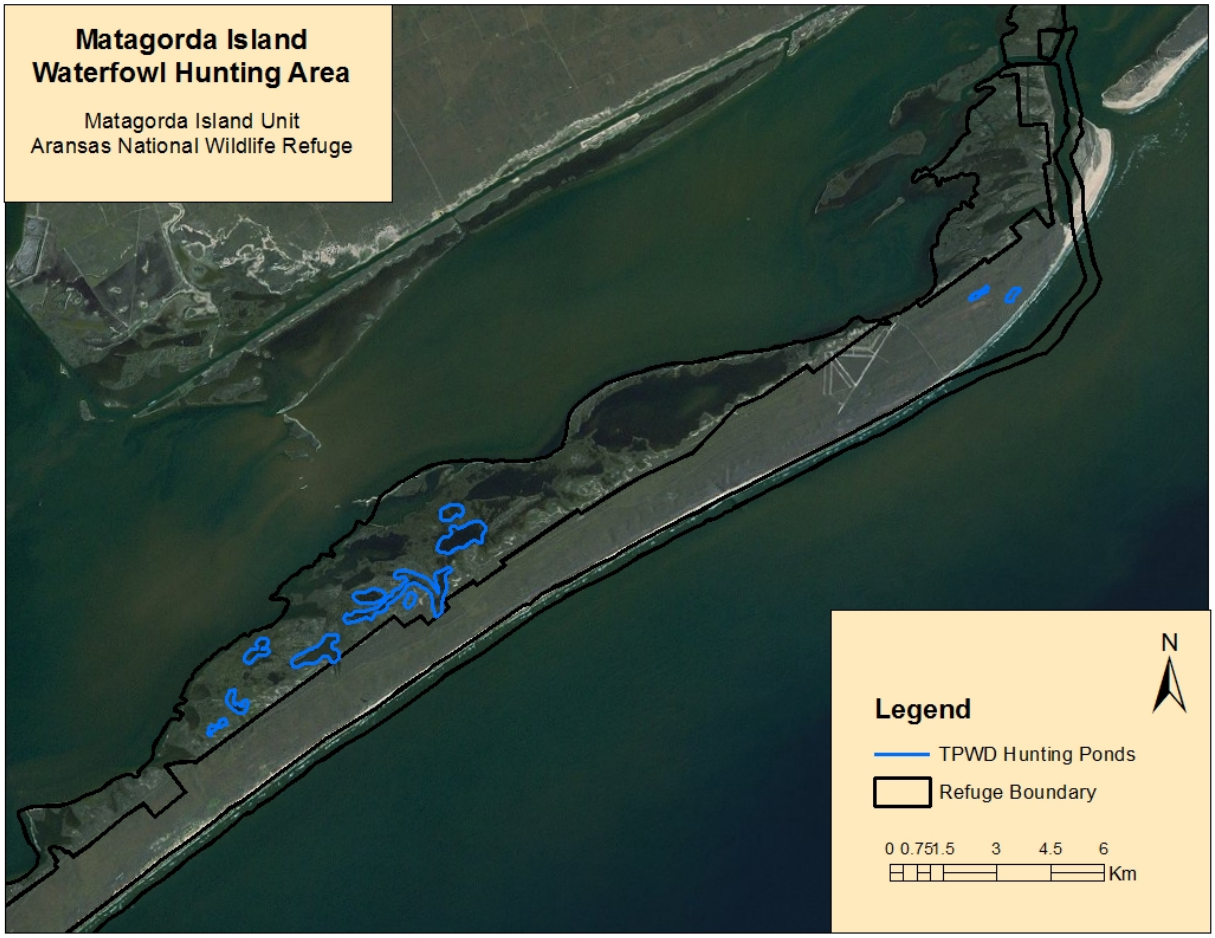

Figure 2. Map of Waterfowl Hunting Area on Matagorda Island Unit.

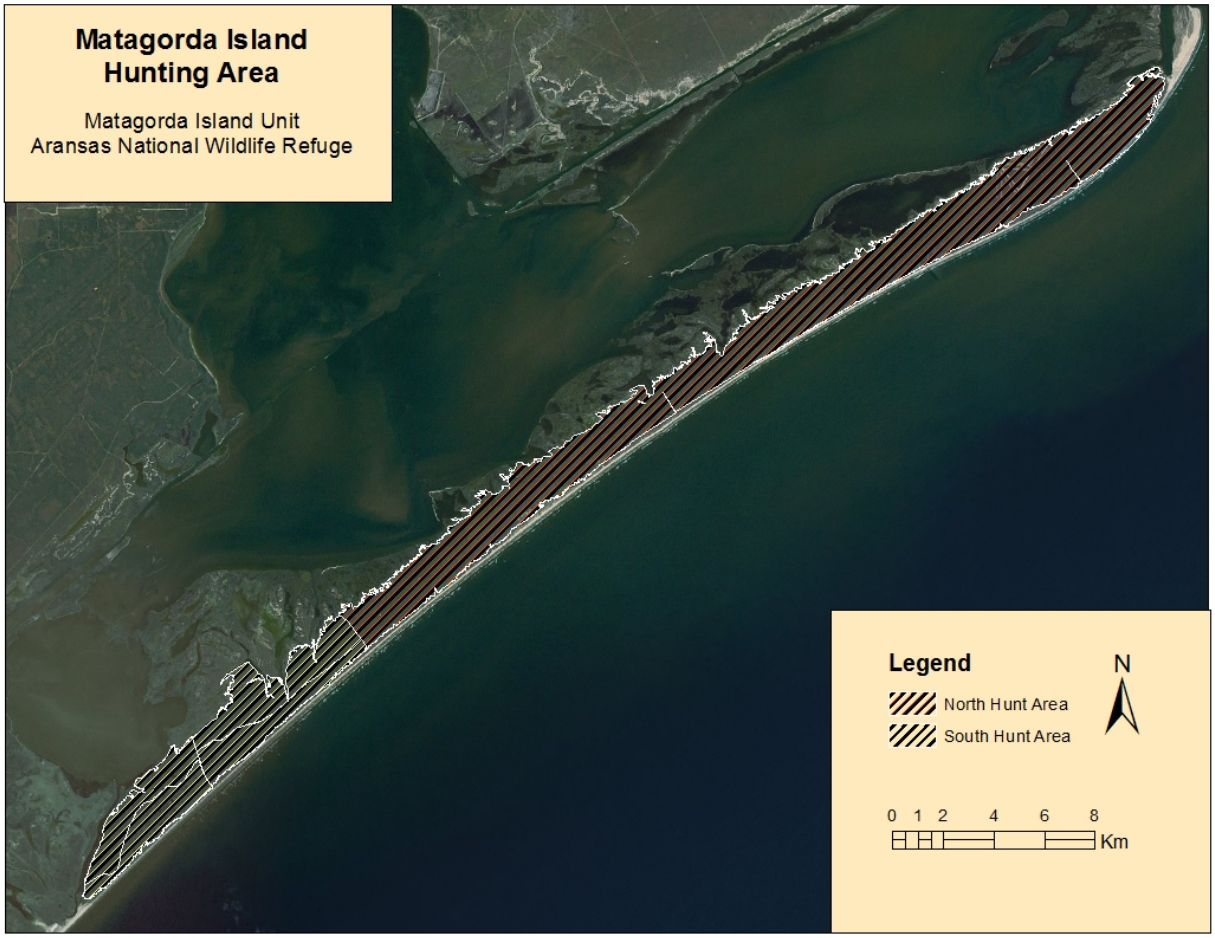

Figure 3. Map of Hunting Units on Matagorda Island Unit.

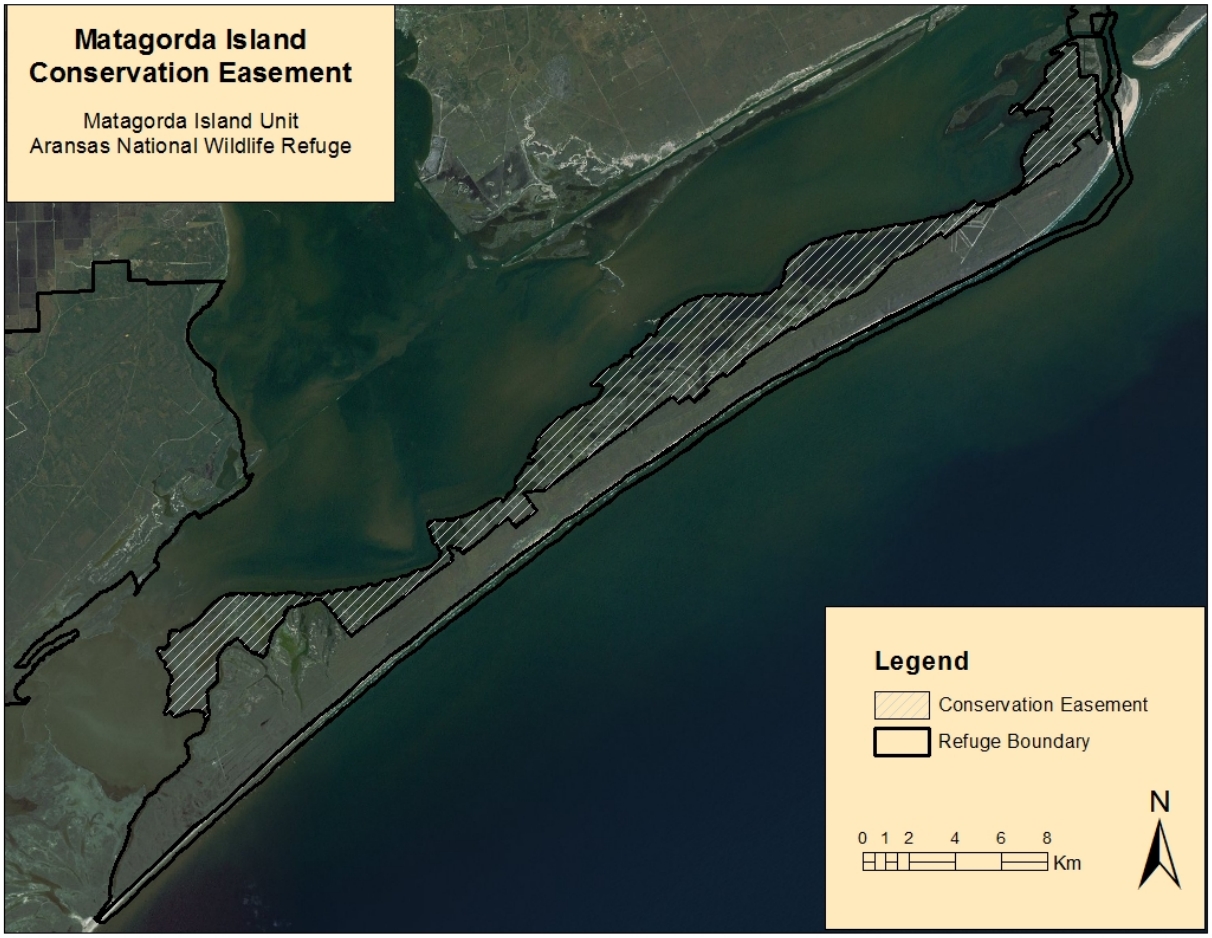

Figure 4. Map of Conservation Easement Area on Matagorda Island Unit

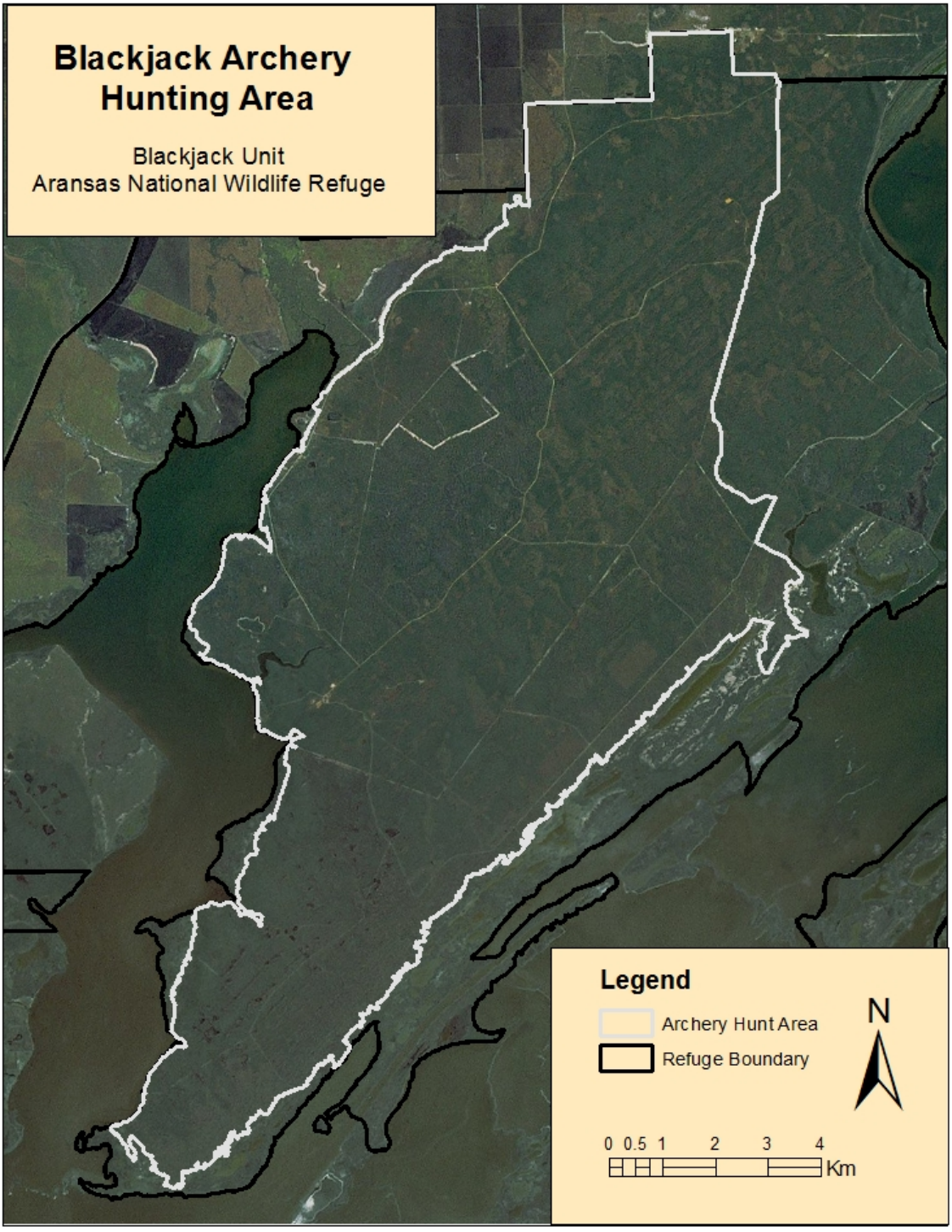

Figure 5. Map of Archery Hunting Area on Blackjack Unit

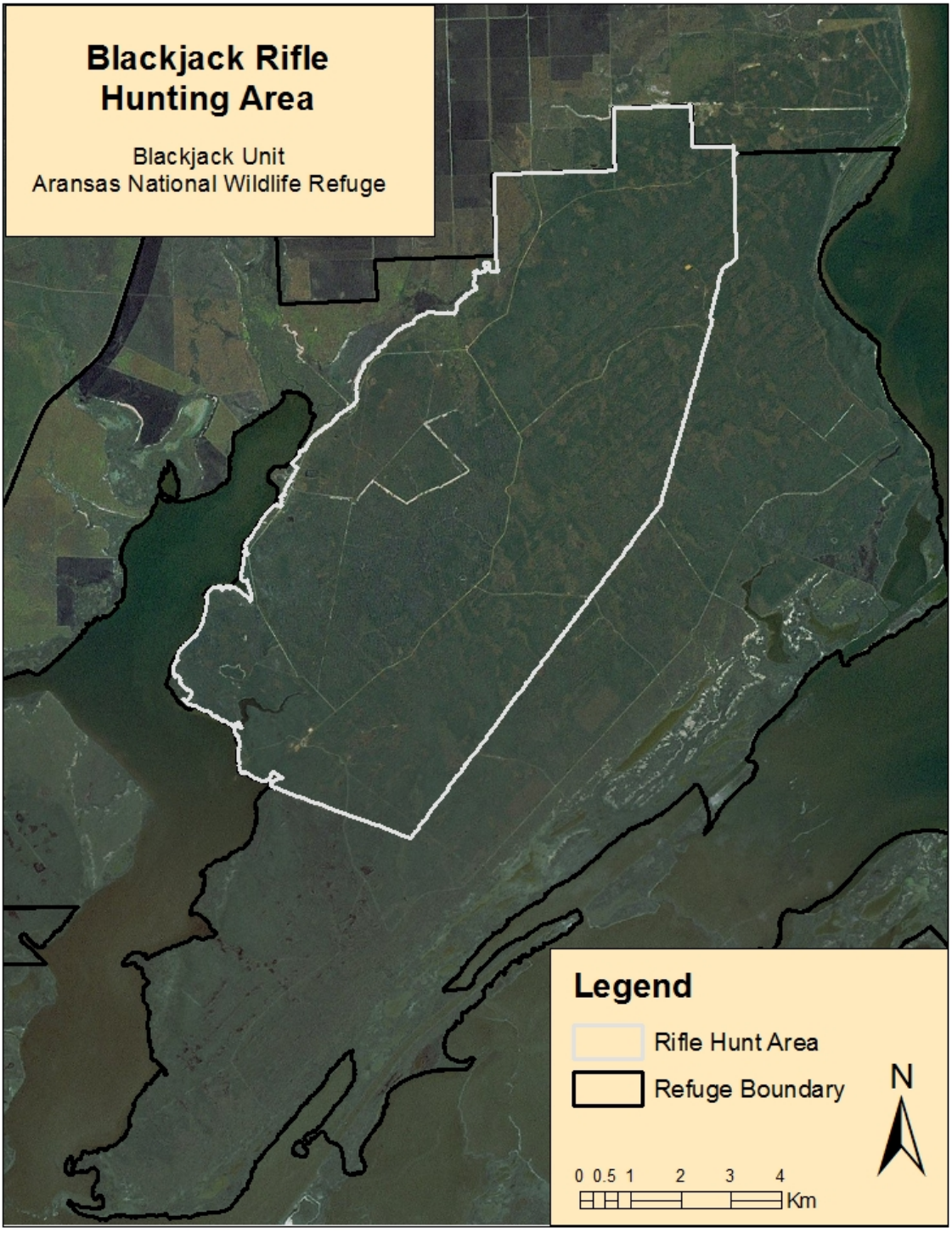

Figure 6. Map of Rifle Hunting Area on Blackjack Unit

2.2 Alternative B – Proposed Action:

Under this alternative hunting would continue as described under Alternative A; however, waterfowl hunting would be formally open through the CFRs on MI. In addition, big game hunting (white-tailed deer and feral hog) would be opened on Tatton Unit.

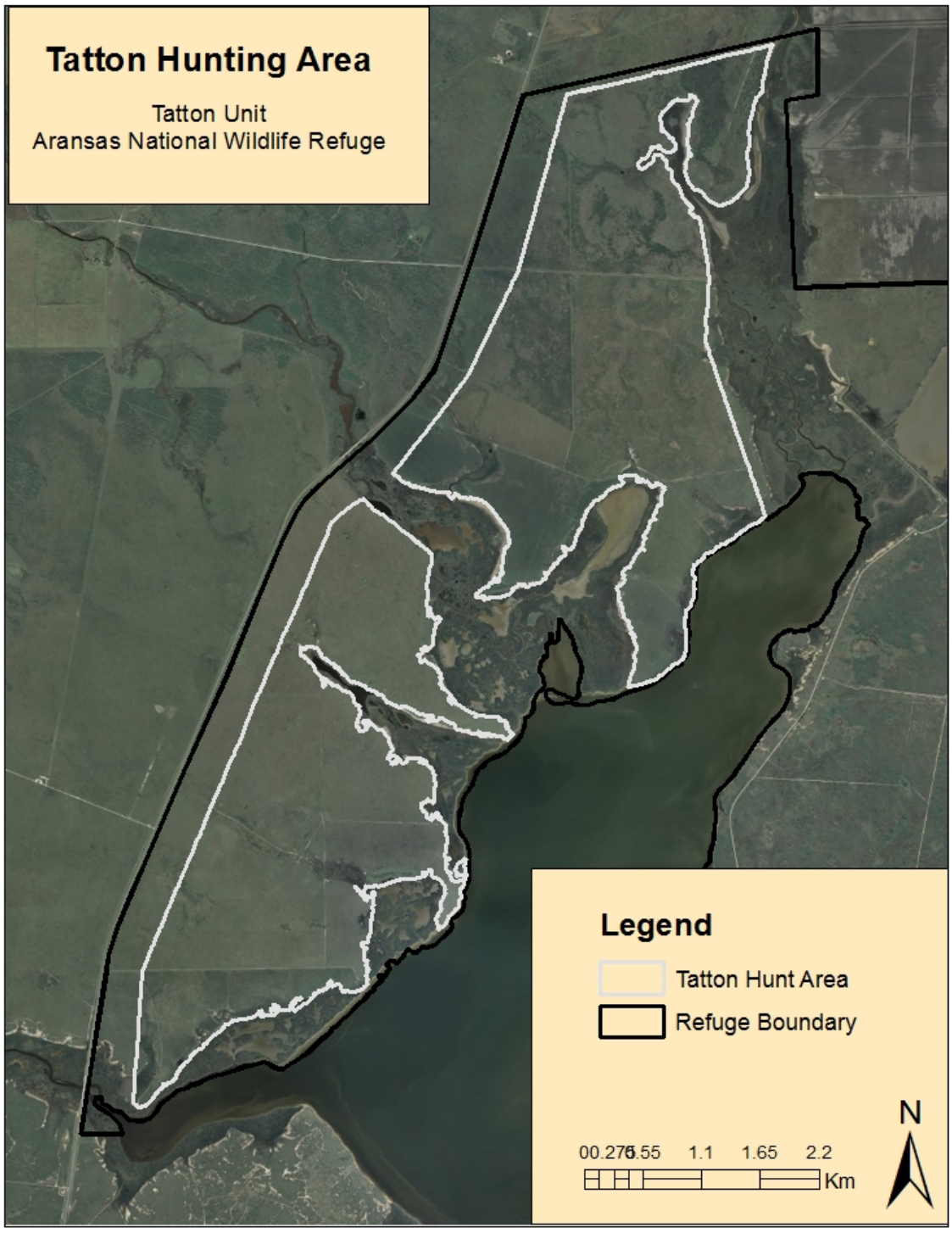

Figure 7. Map of Hunting Area on Tatton Unit

2.3 Alternative C – Reduced Waterfowl Hunting:

Under Alternative C, hunting opportunities for big game hunting on the Aransas NWR would be the same as Alternative B, however, MI upland ponds would be closed to all waterfowl hunting activities to address concerns regarding potential disturbance to the endangered whooping crane. Waterfowl hunting would continue on the conservation easement due to the terms of the conservation easement with GLO.

3.0 DESCRIPTION OF THE ENVIRONMENT

The Blackjack Unit lies on a portion of the Ingleside Barrier known as the Blackjack Peninsula. The Ingleside Barrier is a windrow of sand heaped directly on the shoreline much like currently growing barrier islands. Just inland of this windrow of sand lies a swath of rich accumulated sediments called the Ingleside Terrace. This terrace is the basis for the dark fertile land that borders the coast.

The Tatton Unit, a contiguous 7,568 acre stretch of coastal grassland lying between State Highway 35 and the west shore of St. Charles Bay, is connected to the Blackjack Peninsula at the northeastern terminus of St. Charles Bay. It serves as a remnant of low upland (dark soil) coastal prairie and its associated wildlife.

Matagorda Island is the visible top of an elongated mound of sand, some 30-40 feet thick on top of compacted marine and fluvial sediments. Sandy soils were derived from both the eroded interior of the State and Gulf deposits. Off MI's Gulf shore, the substrate is firm sand and crushed shell, whereas bayside water deepens gradually and the bottom ranges from muddy sand to deep ooze. The island is 38 miles long and varies in width from ¾-mile to about 4-1/2 miles. The Gulf shoreline is smooth and linear whereas, the back side makes up about 80 miles of irregularly shaped bay shoreline. Encompassing 56,668 acres, broad beach, and a prominent sand dune line about 15 feet high, MI is typical of a Gulf barrier island.

Refuge weather is both dominated and moderated by the warm air masses that rise up over the Gulf of Mexico. The climate is characterized as maritime, humid, and subtropical. Annual average precipitation for the Refuge is about 38 inches. Hurricanes and tropical storms can rapidly increase the amount of water in the area, but more typically dry summers and drought desiccate the area. Water can be intermittently standing during wet spells, and nonexistent during what would be considered normal rainfall years. The rainfall pattern typically has two peaks, one in the spring and another in the late summer and early fall. The greatest reasons for the variation in the effects of rainfall upon the landscape have to do with timing, soils, winds, and temperature. The timing of rainfall can be irregular such that accumulations do not occur, and the effects of soil, wind, and temperature are compounded. For example, the porous sandy soils allow for rapid percolation of rainwater into the root zone. Persistent drying winds coupled with high air temperatures lead to high surface and soil water evaporation and plant transpiration.

3.1 Soils

Two major habitat types are evident on the Refuge: coastal prairies and marshes. The Coastal Prairie component is primarily comprised of vast dark-soiled upland prairies near the coast. This

habitat type, found just inland of the Coastal Marsh, includes low sandy peninsulas and barrier islands. Along the immediate coastline, within the Coastal Marshes component, is a narrow strip of sandy soil differing in character from Coastal Prairie. Estuaries and bays comprise the remaining balance of the Coastal Marshes habitat component. Along the immediate coast, these parts are virtually interwoven and integrated, making them as one. With the exception of the Tatton Unit, which is a remnant of this Coastal Prairie, the Refuge lies primarily within the Coastal Marshes habitat type.

Primary range sites (ecological sites) in the Coastal Prairie include blackland, sandy prairie, and lowland flats (Gould 1975). In terms of the Refuge and adjacent lands today, the blackland comprises those lands in agricultural production; sandy prairie is comprised of the sandy soils along the coast (Blackjack and MI Units), and Tatton Unit characterizes the lowland flats. Lowland flats, also called low upland prairie, are transitional areas between the blackland soils and the sandy prairie or marshes. Different kinds of soils differ in their capacity to produce plants. Guckian and Garcia (1979) describe the sandy soils near the coast as producing tall grasses, sedges, and salt-tolerant plants (i.e., live oak); the coastal lowlands as generally growing cordgrass; and the more elevated blackland soils further inland as producing a prairie of tall and mid grasses, mainly big and little bluestem, switchgrass, and indiangrass. Soil types that produce the same kind and amounts of plants make up a range site. Range sites consist of lands having a combination of soil, climate, and natural life that is significantly different from that of adjacent areas. Soil texture, structure, porosity, color, temperature, and density are particularly important in defining a range site's soil physical characteristics. Soil characteristics will determine absorption of water, water storage in the soil, the ease of tilling the soil, the amount of aeration (vital to root growth), soil compaction (vital to root penetration), and will influence soil fertility (Donahue et al. 1983).

3.2 Hydrology

Located at the southern end of the Great Plains and along the Gulf of Mexico, the Refuge straddles a significant transition zone in the east to west moisture gradient and the north to south shift from temperate to tropical climates. The Refuge lies on the outer perimeter (water's edge) of the Coastal Plain Physiographic Province designated as the Gulf Prairies and Marshes vegetation zone, a strip of land paralleling the coast and spreading inland. The shoreline and barrier islands are under the direct maritime influence of the Gulf of Mexico.

The major bodies of water surrounding the Blackjack Unit are the San Antonio, Aransas, and St. Charles bays. Aransas Bay borders the southern tip of the Refuge. The Guadalupe River, which flows into San Antonio Bay, comprises the northeast boundary of Blackjack Peninsula. To the west of the Refuge (Blackjack Peninsula) lies St. Charles Bay, that borders the Tatton Unit. Ayers, Mesquite, and San Carlos bays separate the Blackjack Peninsula from MI. Salinities can vary in relation to the amounts of freshwater inflows. High inflows can make the bays mostly fresh and replenish nutrients, whereas drought can create hypersaline conditions. Water temperatures in the bays are also variable. Shallow waters can become hot enough to drive out dissolved oxygen in the summer and more rarely freeze during cold spells.

The presence of barrier islands (Matagorda and St. Joseph) about five miles offshore creates a marine system somewhat independent of the coastal marine environment just inland. The passes of Cedar Bayou, Pass Cavallo, and Aransas Pass provide the necessary exchange points with the

Gulf of Mexico. However, Cedar Bayou is currently completely silted in; therefore no water exchange is occurring between the bay and the Gulf of Mexico through this pass. The principal freshwater inflow into the bays is from the Guadalupe and San Antonio Rivers to the north and the Aransas and Mission Rivers to the west. Tides along the coast routinely range from one to two feet, but strong winds are often more significant in moving water in and out of the shallow bays and sloughs. This water movement is important in maintaining the tidal flats and in moving water through the passes. This is also very important in the food cycle of many migratory birds.

Matagorda Island's long axis and main physiographic features are aligned parallel to the sea and every surface feature is profiled by the prevailing offshore winds. The open bays have no emergent vegetation, but support submerged marine grasses in some areas. Pass Cavallo is the natural relatively deep pass that separates the northeast end of MI from the tip of Matagorda Peninsula. On the other end of the Island lies Cedar Bayou, a shallow natural pass that separates MI from St. Joseph Island.

The Blackjack Unit represents a modern landform and is the result of wave and current action on the mix of marine and fluvial deposition, compaction, and stabilization over time forming the outline of the local bays. Over time, river deltas and estuaries stabilized and various fragments of the Ingleside Barrier became peninsulas protruding into the edges of the bays.

Blackjack Peninsula, a surviving fragment of the Ingleside Barrier, is situated about eight miles from the Gulf of Mexico. It is surrounded by several shallow bays, all of which lie behind the protective influence of MI. Because of its protective location, MI aided in the formation of the Guadalupe and San Antonio estuary, one of the eight major estuaries along the Texas coast. These barrier islands create shallow backside lagoons and protect them from the open waters of the Gulf, forming the Gulf-side edge of the Gulf Prairies and Marshes Ecoregion.

3.3 Air Quality

Air quality for Aransas, Refugio, and Calhoun Counties have not been quantified by the Texas Commission on Environmental Quality (TCEQ). The Refuge is a part of TCEQ Region 14, also known as Corpus Christi Region. No monitors have been or currently being used within the three Refuge counties and all monitors used for Region 14 are located approximately 50 miles away.

Air-borne pollution is always a concern as the Refuge is located within 60 miles of one of the most industrialized areas in the US. Numerous refineries, chemical plants, power plants, ports, and vehicular traffic contribute to particulate matter that affects the region in various ways depending on wind direction.

3.4 Vegetation

Blackjack Unit

The Ridge and Swale Community is the most widespread biotic community on the Blackjack Unit. The corrugated ridge and swale topography is a result of sand deposition due to wind and wave action. Sandy ridges provide elevation required for woody perennials to survive flooding.

Frequently-flooded sandy swales grow an assortment of annuals and water-tolerant herbaceous perennials.

Three primary components (running live oak thicket, live oak motte/woodland, and grassland) make up this area. Initially, only live oak motte/woodland and grassland components occurred. However, human activities on the landscape were instrumental in creating running live oak thickets, comprised primarily of dense stands of live oak shoots. Naturally, oak thickets can be caused by natural forces and localized events such as intense fire, heavy herbicide use, and hurricanes. This multi-stemmed growth phenomenon, a survival mechanism of woody plants, can be induced and/or greatly exacerbated by large-scale land clearing, continuous overgrazing, and repeated mechanical treatments over time.

The oak motte/woodland component is dominated by live oak, laurel oak, red bay, and lime prickly ash. Understory consists of yaupon, greenbriar, and beautyberry, with mustang grape growing among the trees. This habitat offers wintertime cover and summertime shade for wildlife. Live oak thicket is comprised of mostly dense stands of live oak shoots. Grasslands are dominated by an array of mid- and tall-perennial bunchgrasses, rarely seen outside the Refuge. About 85 grass species have been recorded within the oak motte/woodland component. In areas where water accumulates, sawgrass, rattlepod, bulrushes, and sedges can be found.

Matagorda Island

Barrier Flat Community
The grassy ridge and swale association that occupies the interior (uplands) of MI is termed the Barrier Flat Community. Geologically, it is formed by the same processes that formed the Ridge and Swale Community found on the Blackjack Peninsula. However, it is unique and highly adapted to maritime influence. Primary floral components include bushy bluestem, seacoast bluestem, gulfdune paspalum, marshhay cordgrass, American snoutbean, hoary milkpea, southern dewberry, wild bean, silverleaf sunflower, bull thistle, beach ground cherry, partridge pea, yankeeweed, wooly goatweed, ragweed, broomweed, Texas and plains prickly pear, Gulf muhly, crinkle-awn, mesquite, and false willow.

Tatton Unit

Upland Grassland Community
This coastal prairie community occurs on relatively well-drained dark soils and is found on the northern half of the Unit. Transitional areas, as lowland flats, have developed between the blackland soils and sandy prairie, and in some cases between blackland soils and salt marshes. Proximity and influence of coastal bays and gradual sloping topography helped create these transition zones. Currently, the grassland is composed of seacoast bluestem and silver bluestems, windmill grass, knotroot bristle grass, white tridens, Texas wintergrass, and an assortment of panic grasses. Attwater's prairie chicken once existed in this habitat and the area has been identified as a possible future release site, should an attempt be made to reestablish the species on the Refuge.

Mesquite/Prickly Pear Community
This community is not common on the Refuge and occurs as an isolated fragment on the Tatton Unit. It is comprised mostly of mesquite, granjeño, blackbrush, agarito, retama, Texas prickly pear, and devil's head cacti on the higher clay loam uplands.

Refuge-wide

Freshwater Community
Freshwater is available throughout the refuge from a variety of sources, including: windmills, artesian well runoff, rain-filled depressions, and aquifer intercept points that can serve as semi-permanent freshwater sources. During wet years, every swale on the Refuge will be full for weeks.

Specific vegetative mixes will depend on water permanence. More permanent water will develop submerged plants (e.g. hornwort and southern naiad) and floating plants (e.g. duckweed and pondweed). Shoreline emergent plants include: cattail, California and American bulrush, burhead, arrowleaf, and common reed. Bankside trees are typically black willow. Rattlepod, coffee bean, saltmarsh aster, spiny aster, and groundsel may also be present. The edges of temporary pools are generally marked by thick stands of bushy bluestem, switchgrass, button bush, as well as a variety of rushes and sedges. On the barrier flats, floral components include: green algae, wigeongrass, stonewort, seashore paspalum, American bulrush, burhead, cattails, black rush, coffee bean senna, bermuda grass, water hyssop, umbrella pennywort, creeping seedbox, smartweed, and saltcedar.

Tidal Flat/Pool Community (Salt Marsh Community)
This habitat type is often called "salt marsh," though not true salt marsh. Along the Texas coast, often shoreline is not regularly flushed by significant tides, but is washed by freshwater drainage. In this scenario, salt marsh dwindles rapidly. The only hint of true salt marsh in our area consists of a long narrow band dominated by smooth cordgrass, a few feet to yards wide, and is not extensive enough to support distinct animal communities. Typically, salt marsh refers to tidal flat community, marking the transition from upland to the bay. Within this area lies unique plant and animal communities specially adapted to the winds and tides.

Primary floral components of the Tidal Flat/Pool Community include: smooth cordgrass, maritime saltwort, wigeongrass, shoal grass, saltgrass, seashore dropseed, bushy sea oxeye, sea lavender, camphor daisy, shore grass, Gulf cordgrass, sumpweed, groundsel, mesquite, and Texas prickly pear. Shallow tidal pools that remain, surrounded by vast areas of mud flats, provide tremendous feeding, loafing, and roosting areas for many shorebirds, herons, egrets, cranes, and waterfowl.

Common fauna include: shorebirds, waders, herons and egrets, gulls, terns, black skimmer, clapper rail, seaside sparrow, raccoon, feral hog and white-tailed deer. Rare and uncommon flora/fauna include: black mangrove, wood stork, diamondback terrapin turtle,, blue crab, and the Federally-endangered whooping crane.

3.5 Wildlife

The unique terrestrial and aquatic communities of the Refuge are due in large part to differences in wind direction, water circulation, and vegetation as compared to other coastal areas. The refuge's position relative to northern breeding grounds, Gulf of Mexico, tropics, and Central Flyway makes Aransas NWR critical for migratory birds. In particular, the area is representative of plant and animal species from all cardinal directions (McAlister and McAlister, 1995).

The Refuge possesses a rich mixture of barrier island, peninsular, coastal upland prairie, and shoreline habitat supporting a diversity of wildlife species along the Texas Gulf Coast. These species, including game and nongame, are important contributors to the overall biodiversity of Aransas NWR. Conservation of migratory birds is often considered the overall connecting theme of the NWRS. Aransas NWR was established primarily for migratory bird conservation, protection and preservation of scarce and vulnerable native coastal prairie, and maintenance of natural biological diversity. The Refuge has documented 402 species of birds, 50 species of mammals, 76 species of reptiles and amphibians, and 81 species of fish. Management of many of these species remains a collaborative effort with TPWD.

Research on the Refuge is conducted for wildlife and their respective habitats, cultural resources, and water quality. Research is conducted by Refuge staff, academia, volunteers, and other federal and state agencies.

3.5.1 Mammals

A list of 50 mammals found on the entire Refuge can be accessed at: http://www.fws.gov/southwest/refuges/texas/aransas/.

Additionally, there are harvestable and sustainable populations of white-tailed deer and feral hogs found throughout Refuge units. The deer population in Texas has historically experienced boom and crash phases. The quality and quantity of deer habitat has declined in recent decades due to the influences and development activities of man. White-tailed deer are highly adaptable and can tolerate a variety of habitat changes. Deer need a nutritious year-round food supply to survive, and food availability limits the number of deer the habitat will support in a healthy condition. When a white-tailed deer population exceeds carrying capacity, they overbrowse and destroy available desirable food supplies. Carrying capacity varies from year to year and, without population control and management, deer numbers typically reach or exceed carrying capacity. Death, malnutrition, low body weights, poor fawn survival and losses from parasites and diseases can occur causing a decline in the population

Pigs (Suidae) are not indigenous to Texas and were introduced as livestock. Through accidental releases and intentional stockings, pigs established feral populations. (Mayer and Brisbin 1991). Feral hogs are pervasive throughout much of Texas, with the highest populations occurring throughout the east, south, and central portions (Taylor 2003). Estimates place the Texas feral hog population in excess of 1.5 million and they have been documented in most of the state's 254 counties (Taylor 2003). Feral hogs are considered free-ranging exotic animals in Texas and not legally considered wildlife, thus no season or bag limits have been set by TPWD.

The feral hog population explosion has become a serious problem for Texas. High reproductive potential, opportunistic feeding habits, adaptability, and mobility of feral hogs have negatively impacted native wildlife species. The negative impacts and destructive nature of feral hogs to agriculture have caused annual economic damages in excess of $52 million dollars, according to Texas AgriLife Extension estimates (Timmons, Cathey, Dictson, and McFarland 2011). Feral hogs are such a serious problem in the state, the Texas Legislature awarded funding to the Texas Department of Agriculture for research and development of solutions to better manage feral hog problems in Texas.

Feral hogs are highly adaptable, have high reproductive capabilities, and can be found in a wide range of habitat types. They compete with native wildlife for food, cover, water, and space. Feral hogs are opportunistic omnivores, competing with game and non-game wildlife species for available food resources. Rooting and digging activities negatively impact habitats (West et al 2009) and feral hogs can impact ground-nesting species through nest destruction and predation (Taylor 2003). Additionally, feral hogs, like all animals, wild or domestic, are susceptible to a wide range of infectious and parasitic diseases (Taylor 2003). As feral hog populations increase and expand, there is a greater chance that they may transmit diseases to other wildlife, domestic animals and humans.

3.5.2 Reptiles and Amphibians

The list of 76 amphibians and reptiles found on the entire Refuge can be accessed at: http://www.fws.gov/southwest/refuges/texas/aransas/

3.5.3 Fish

The list of 81 fish found on the entire Refuge can be accessed at: http://www.fws.gov/southwest/refuges/texas/aransas/

3.5.4 Avifauna

The list 402 birds found on the entire Refuge can be accessed at: http://www.fws.gov/southwest/refuges/texas/aransas/
Many neotropical migrants breed on the Refuge while other species use it during migration.

3.6 Threatened and Endangered Species and Species of Concern

The Refuge provides habitat for a variety of rare or declining species, including some federally listed (threatened or endangered) and candidate species:

Class	Common Name	Scientific Name	Federal Status	State Status	Comment
Avian	Whooping Crane	*Grus americana*	Endangered, w/ critical habitat	Endangered	Critical habitat
Avian	Northern Aplomado Falcon	*Falcon femoralis septentrionalis*	Endangered	Endangered	
Avian	Piping plover	*Charadrius melodus*	Threatened	Threatened	Critical habitat
Reptile	Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Endangered	Endangered	
Reptile	Hawksbill Sea Turtle	*Eretmochelys imbricata*	Endangered	Endangered	
Reptile	Leatherback Sea Turtle	*Dermochelys coriacea*	Endangered	Endangered	
Reptile	Green Sea Turtle	*Chelonia mydas*	Threatened	Threatened	
Reptile	Loggerhead Sea Turtle	*Caretta caretta*	Threatened	Threatened	

3.7 Historical and Archeological Resources

In 1994, a cultural resources survey was conducted on Blackjack and Live Oak Peninsulas, as well as the Tatton Unit. Although the Refuge had 14 known sites on Aransas, Tatton, and Lamar Units, plans were made to re-locate 13 previously recorded sites and document any additional sites encountered. Seven sites were located, while the remaining six locations revealed no evidence. One previously unrecorded site was documented. These sites were located primarily along exposed shorelines. Archeologists determined shoreline erosion likely contributed to the loss of these sites. The report further determined that sites on the Refuge could include Paleo-Indian, Archaic, and Late Prehistoric archeological sites.

While not thoroughly surveyed for prehistoric archeological sites, MI is well known for its rich history. The Island was first inhabited by Karankawa Indians. In 1528, Cabeza de Vaca led a Spanish expedition, becoming the first Europeans to explore the Island. On the northeastern tip of MI, the town of Saluria was built in 1847, followed later by the building of Fort Esperanza. Matagorda Island Lighthouse, built in 1852 and now owned by the Service, is listed on the National Register of Historic Places. Near the lighthouse, a lighthouse-keeper's quarters once existed. A cemetery containing the remains of former lighthouse keepers and their families exists nearby. Additionally, at least two other cemeteries exist where relatives of early ranching families are buried. Civil War fortifications (i.e., trenches) used in 1863 by both Union and Confederate armies are still visible today. There have been 38 documented ship wrecks near the Island, dating back to 1685. World War II bombing targets and old landing field that once comprised the MI Air Force Bombing Range still remains today.

The Refuge does not have a museum or museum collections (e.g., art, ethnography, history, documents, and artifacts). Cultural and historical sites are to be "*preserved in place*" on MI. Plans for additional cultural resource inventories on the remainder of the Refuge will be undertaken, if required. Otherwise, they will be "preserved in place." To date, some archeological materials have been collected from refuge lands and placed in collections, as mentioned in the 1994 cultural resources survey report. Working under an Archaeological Resources Protection Act permit issued by the Regional Director, archeological investigations and collecting are performed only in the public interest by qualified archeologists. Refuge staff members take steps to prevent unauthorized collecting by the public, employees, and government contractors. Violations are reported to the Regional Historic Preservation Officer.

3.8 Socioeconomic Resources

Aransas County is classified as a rural county with an approximate population of 23,158 people in 2010. (U.S. Census Bureau 2010). The U.S. Census Bureau (2010) estimated 15,355 housing units in 2010, with 74 percent home ownership. Median household income is 42,179.00 and median family size is 2.29 persons.

Refugio County is classified as a rural county with an approximate population of 7,383 people in 2010. (U.S. Census Bureau 2010). The U.S. Census Bureau (2010) estimated 3,726 housing units in 2010, with 78 percent home ownership. Median household income is 42,949.00 and median family size is 2.43 persons.

Calhoun County is classified as a rural county with an approximate population of 21,381 people

in 2010. (U.S. Census Bureau 2010). The U.S. Census Bureau (2010) estimated 11,410 housing units in 2010, with 70 percent home ownership. Median household income is 43,258.00 and median family size is 2.60 persons.

Aransas, Calhoun, and Refugio counties are rural, with their economies based mostly on farming, ranching, chemical industries, fishing, and tourism. Historically, the three counties were a sparsely settled area of huge cattle ranches, but early in the 20th century, the immense ranches began to break up, and in 1909, organized farming was introduced to this area of the Gulf Coast of Texas. Farming and agribusiness has remained the mainstay of the area. One of the largest single industries in the area is chemical manufacturing (Calhoun county), which accounts for about $148 million in the economy annually. Approximately 63,500 acres of cotton, 51,800 acres of sorghum, and 27,500 acres of corn were planted- the three major field crops in the counties of Aransas, Calhoun, and Refugio (National Argricultural Statistics Service, 2011 data). Other crops include pecans, forage, various grains, and vegetables. From 1997-2002, farming decreased by 7 percent in Aransas County, increased by 10 percent in Calhoun County, and increased by 3 percent in Refugio County. However, the total market value of production, which includes both livestock sales and crop sales, decreased by approximately 11 percent from 1997 to 2002. As of 2002, the total market value of production in the Plan study area (excluding Aransas County for lack of data) was $45.5 million.

The three-county region's proximity to the Texas coast makes the area a center for commerce, industry, and recreation. Ship and rail transport facilities support such industries as petroleum refineries, metals fabrication, plastics, and chemical plants. Oil and gas production is an active industry in the area. These industries were originally attracted to the area due to the available natural gas supplies, fresh water, distance from heavily populated areas, and the Gulf Intracoastal Waterway.

According to the U. S. Census Bureau, the majority of the Calhoun County economy is chemical manufacturing and construction, while the majority of Aransas and Refugio Counties' economies are retail business. Another major industry in the region is commercial and recreational fishing. Fishing in the coastal bend has evolved from subsistence in prehistoric times to the important commercial and recreational industry that it is today. As of 1996, the direct economic impact of the commercial fishing industry in the coastal bend was $165 million, producing about 3,849 jobs. Although commercial fishing may be declining, recreational fishing seems to be on the rise. During the same period and taking into account all indirectly associated support services such as hotels and restaurants, the total economic impact of recreational fishing was $410 million, producing about 24,032 jobs (Lee et al. 2003).

Another industry that has rapidly developed and is particularly important to the Refuge and the region's economy is ecotourism (Lee, 2012). Ecotourism includes such things as wildlife or bird watching, photography, nature study, hiking, boating, camping, biking, and visiting parks. Ecotourism also provides opportunities for communities to promote their cultural and ethnic diversity. For example, Rockport is home to more than 100 professional artists who are drawn to the area's natural scenery. Numerous art galleries showcase the history and natural beauty of the area, further enhancing the tourism experience and economic growth of the area. Ecotourism provides huge benefits to the local retail and services industries.

There are no formal studies directly related to this Refuge showing the economic benefits to the Refuge counties. The Visitor Services staff has worked with two local Chambers of Commerce to promote "ecotourism" type activities. Informal surveys show that thousands of Refuge visitors (fishermen, hunters, bird watchers, etc.) come from outside the county to enjoy wildlife-dependent recreation opportunities.

3.9 Land Use

Lands in Aransas, Refugio, and Calhoun Counties, specifically those in close proximity to the refuge, are primarily used for agriculture, however development along the Texas Coastal Bend is increasing at a fast pace.

3.10 Public Use/Recreation

The Refuge receives over 50,000 visitors annually and provides opportunities for the public to hunt big game and waterfowl, fish, and the ability of observe, photograph and learn about the Gulf Coast Ecosystem.

The Refuge actively participates in what is commonly called the Big 6 program as outlined by the NWRS Improvement Act of 1997. They include: hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation. The Refuge also hosts numerous special events such as National Wildlife Refuge week, Earth Day, Free Fishing Day, and National Public Lands Day. Visitors can bird, hike, fish, and kayak/canoe appropriate areas of the Refuge during daylight hours.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter analyzes and discusses the potential environmental effects or consequences that can reasonably be expected by the implementation of the proposed action. An analysis of the effects of management action has been conducted on the physical environment (climate, air quality, hydrology, geology, mineral resources, and soils); biological environment (habitat, resident wildlife, migratory species, and threatened and endangered species); and socioeconomic environment (cultural resources, socioeconomic, visitor service/recreational opportunities, public health and safety, facilities, and visual and aesthetic resources). The direct, indirect, and cumulative impacts of each alternative are considered. Direct effects are the impacts that would be caused by the proposed action at the same time and place as the triggering action. Indirect effects are impacts that occur later in time or distance from the triggering action. Cumulative effects are incremental impacts resulting from other past, present, and reasonably foreseeable future actions, including those taken by federal and non-federal agencies, as well as undertaken by private individuals. Cumulative impacts may result from singularly minor but collectively significant actions taking place over a period of time.

It has been determined that Alternative A (Current Management) and Alternative B (Proposed Action) will not have impacts on hydrology, water quality, geology, mineral resources and visual/aesthetic resources; therefore there will be no further discussion of these resources in the analysis. Potential impacts on other physical, biological, and socioeconomic resources are addressed in the sections below. Potential impacts are described in terms of type, duration, intensity and context (scale). General definitions are defined as follows:

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 residents access to public information and participation in matters relating to human health or the environment. This EA has not identified any adverse or beneficial effects for any alternative unique to minority or low-income populations in the affected area. Additionally, none of the alternatives will disproportionately place any adverse environmental, economic, social, or health impacts on minority or low-income populations.

4.1.2. Climate Change:

Climate change is already affecting fish, wildlife, plants and their habitats around the globe. The Service's Southwest Region has been working with the U.S. Geological Survey, the academic community, and other natural resource management agencies and interest groups to translate available and emerging science into concrete actions that reduce the impacts of a changing climate on the broadly diverse ecosystems in Arizona, New Mexico, Oklahoma and Texas
The Refuge believes that its hunt program will have negligible impacts on Climate Change; however, much is unknown about this subject. The Service has recently addressed the subject of Climate Change with the issuance of the publication "*Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change."* This five year plan calls for developing long-term processes and protocols for biological planning and conservation at broad, landscape scales. This five year action plan calls for baseline data to be established. Refuges to date have no information or data regarding their carbon footprint. This subject will be further addressed as future direction is developed and provided on how to step this Strategic Plan down to the field level.

4.1.3. Impacts on Cultural Resources

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. In fact, hunting 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 is, therefore, not required.
Long term, the reduction of the Refuge feral hog population would likely result in a decreased likelihood that cultural sites would be damaged by hogs. If any new cultural or historical sites are located on the Refuge, all recreational uses will be reviewed and restricted as necessary to protect those resources.

4.2. Physical Environment

4.2.1 Impacts on Air Quality

Alternative A— Current Management:
Under Alternative A, no additional impacts to air quality are expected from continuation of current hunting programs. Hunter traffic on roads and trails may cause a slight decrease in air quality due to vehicle emissions and the stirring of road dust. These impacts are expected to be negligible, short-term, and local because the small number of vehicles (at an average of 2 hunters per vehicle) therefore, there would not be a noticeable improvement in air quality if hunting opportunities were ceased.

Alternative B— Proposed Action:
Impacts would be similar to Alternative A, with additional hunting on the Tatton unit. Levels of hunter traffic may cause a negligible decrease in air quality due to vehicle emissions and the stirring of road dust from up to 7 vehicles for a period of 2 days per year. These impacts are expected to be short-term, and local and would have no noticeable effects on air quality.

Alternative C—Reduced Waterfowl Hunting:
Impacts would be similar to Alternative A and B. However, hunting would be eliminated in the upland ponds, which would reduce vehicle emissions and the stirring of road dust. These impacts are expected to be negligible, short-term, and local because the small number of vehicles (at an average of 2 hunters per vehicle and twelve hunting days) would not noticeably affect air quality.

4.2.2 Impacts on Water Quality and Quantity:

Alternative A— Current Management:
The current hunting program has no direct impacts on water quality or quantity. Although feral hog hunting is currently conducted on the refuge, it has not been effective at impacting the feral hog population. Under current management, the feral hog population is expected to continue to increase. Therefore, this alternative could result in long-term adverse impacts to water quality due to the increasing hog population causing disturbance in creeks, wetlands, and bays. Feral hog rooting and digging activities along wetlands and waterways may damage wetland vegetative communities and cause erosion along waterways and wetlands. Water quality may also be impacted by an increasing number of hogs entering the water to drink or lower body

temperature which would result in additional turbidity and excrement discharge. No impacts related to white-tailed deer and waterfowl hunting are anticipated.

Alternative B— Proposed Action:
Under this alternative, impacts would be similar to Alternative A. Only 7 additional hunters on the Tatton unit would not be expected to change the overall feral hog population. Any change that results in the increase would be negligible to water quality. No impacts to water quantity are anticipated with either white-tailed deer or waterfowl.

Alternative C—Reduced Waterfowl Hunting:
Under this alternative, impacts would be similar to Alternatives A and B. There would be no change to water quantity.

4.2.3 Impacts on Soils:

Alternative A— Current Management:
Under Alternative A, minor long-term adverse impacts to soils are expected from continuation of current management due to continued damage associated with feral hog activity. The rooting and digging activities negatively impact habitats (West et al. 2009). Damage includes erosion along waterways and wetlands and the loss of native plants.

Negligible beneficial impacts are expected to result from reducing feral hog numbers. Although feral hog hunting on the Refuge is not an effective population management tool, any reduction in hog numbers is considered beneficial because the negative effects of rooting and wallowing on vegetative communities, soil properties, and plant succession patterns would be reduced, thereby reducing potential erosion along waterways and wetlands.

Alternative A would result in some disturbance to surface soils (compaction by foot traffic). Impacts are expected to be short-term, negligible and local because hunter density will be low across the Refuge throughout the hunting season (approximately one hunter per 100 acres). Vehicles would be confined to public access roads and parking facilities on the Refuge. Refuge regulations will not permit the use of ATVs except on designated units for hunters with disabilities.

Waterfowl hunters are legally required to use non-toxic shot that has been found to be inert in the environment (50 CFR 20). Similarly, the projectiles used for archery hunting are constructed of carbon fiber, aluminum or steel components and are typically recovered after use but are inert if lost while afield. Rifle bullets used to hunt white-tailed deer or feral hogs typically contain lead. However, because these are single projectiles, fewer of them are used per hunter and they are distributed across a larger area their impact to soil quality is likely negligible.

Alternative B— Proposed Action:
Under this alternative impacts would be similar to Alternative A. The additional hunting on the Tatton unit, up to 7 vehicles, is not expected to noticeably impact soils since vehicles will be confined to the access roads on the unit.

Alternative C— Reduced Waterfowl Hunting:

Under this alternative impacts to soils would be less than to those discussed under Alternative A and Alternative B since there will no longer be hunting on the 17 upland ponds.

4.3 Biological Environment

4.3.1 Impacts on Habitat

Alternative A— Current Management:
Under Alternative B, negative impacts to habitat posed by feral hogs and white-tailed deer would be mitigated by removal of some animals. Reduced deer and hog number should result in beneficial impacts to habitat since there would be a corresponding reduction in browsing and rooting; however, these impacts are expected to be short-term, negligible and local considering that the low number of animals harvested would not effectively reduce the overall deer or feral hog populations. As previously, mentioned any reduction in feral hog numbers on the refuge is considered beneficial to habitat because the negative effects of rooting and wallowing.
Hunters are not permitted to manipulate vegetation. Prohibited activities include: cutting limbs, screwing or nailing into trees, clearing trails, paths or lanes. Foot travel associated with hunting activities could result in disturbance to vegetation (trampling); however, these impacts are expected to be short-term, minor and local because hunter density will be low across the Refuge throughout the hunting season (i.e., approximately one hunter per 100 acres). To reduce to risk of spreading seed of exotic or invasive plant species or damaging native habitat by other means, vehicles would be confined to public access roads and parking facilities on the Refuge. Refuge regulations would not permit the use of ATVs except on designated units for hunters with disabilities.

Alternative B— Proposed Action:
Under this alternative impacts would be the same as Alternative A. Adding white-tailed deer and feral hog hunting is expected to have negligible impacts on the habitat community since hunter density would be low (7 hunters per 7,000 acres).

Alternative C— Reduced Waterfowl Hunting:
Under this alternative, impacts to habitat would be similar to those discussed under Alternative A and Alternative B except that impacts would be removed within the upland ponds on MI.

4.3.2 Impacts on Resident Wildlife

Alternative A— Current Management:
Alternative A is not expected to adversely impact white-tailed deer or waterfowl populations, which are expected to remain stable and below carrying capacity. Although feral hogs are difficult to control, the additional control afforded by this alternative should result in beneficial though negligible effects (because hunting is documented as ineffective in population control) on other resident wildlife and their habitat. Non-game species will be temporarily disturbed by human presence in the field.

Alternative B— Proposed Action:
Under this alternative impacts would be the same as Alternative A.

Alternative C— Reduced Waterfowl Hunting:
Under this alternative, impacts to resident wildlife would be the same on all hunting units with the exception of reduced impacts within the upland ponds of MI.

4.3.3 Impacts to Migratory Species

Alternative A— Current Management:
Migratory species present on the Refuge include waterfowl, other water birds, neo-tropical migrant birds, and raptors. This alternative would result in some short-term disturbance (increased human presence and noise associated with hunting) to migratory birds that occur on the refuge. However, the level of disturbance perceived likely varies by species and individual. The low hunter densities result in low and patchily distributed disturbance across the refuge. The impacts of this disturbance are expected to be direct and negligible.

Alternative B— Proposed Action:
Under this alternative impacts would be the same as Alternative A.

Alternative C— Reduced Waterfowl Hunting:
Under this alternative, impacts to migratory species would be the same on all hunting units with the exception of reduced impacts within the upland ponds of MI.

4.3.4 Impacts on Threatened, Endangered and Special Status Species

Alternative A— Current Management:
The current management is not likely to impact Aplomado Falcon, White-tailed Hawk or the Sea Turtle populations of Kemps Ridley's, Loggerhead, Green, Hawksbill, and Leatherback because they have minimal temporally and spatial overlap. Breeding seasons for these species occur during spring and summer (i.e., March-July) and all hunting activities occur during fall and winter (i.e., October-January). Although Aplomado Falcons and White-tailed hawks are present on the refuge when the proposed hunting would occur, these activities are unlikely to impact them because during fall and winter these species are itinerant foragers with large territories, and therefore are able to avoid human disturbance. Similarly, the highest density of piping and snowy plovers known to occur on the refuge are found on the beach of Matagorda Island where hunting does not occur.

Prior to the typical first arrivals of Whooping Cranes (October) archery hunting for white-tailed deer and feral hogs is allowed to occur within the marsh units of the blackjack peninsula. These units are frequently occupied by whooping cranes but their presence occurs after the conclusion of hunt. During November and December, rifle hunting for white-tailed deer and feral hogs occurs on upland units of the refuge (See Figure 4) approximately 2 miles from areas whooping crane typically inhabit during this time. It is unlikely hunting for white-tailed or feral hogs at the current level (i.e., # of hunters) will have consequential impacts on endangered species on the refuge.

Of the activities within the current management the potential impacts of waterfowl hunting on Matagorda Island require the greatest degree of scrutiny. Multiple analyses have been conducted to determine the possibility of acute and chronic effects of hunting disturbances on whooping cranes. Mabie et al. (1989) experimentally tested the responses of whooping cranes to staged

hunting-type activities on Matagorda Island. They examined the effects of two simulated hunting scenarios: airboat and hunter, outboard driven boat and hunter. Simulated hunting scenarios were described as: "driving…a hunter into the marsh in the vicinity of a family group of cranes scheduled for study. For a 1-hour period, the hunter positioned a few decoys, fired a shotgun (non-toxic shot) 10-15 times, and moved around in the vicinity of the hunting blind." For a 2-hour period the behavior of cranes was quantified pre- and post-scenario by a concealed observer. During additional 2-hour periods, observers quantified the behavior of cranes in the absence of staged scenarios. Analyses of these data indicated that neither of the staged hunting-type scenarios resulted in a significant increase in "alert" behavior among the family groups studied. Analysis of individual activity patterns indicated that responses typically waned 15 minutes post-scenario. These data show waterfowl hunting activities on Matagorda Island did not result in significant changes in whooping crane behavior. The authors concluded that the level on human activities in the marshes of Matagorda Island during the mid-1980s was not likely to result in habituation of the birds, however suggested that continued annual monitoring be conducted to detect and alleviate any potential impacts of human disturbance on whooping cranes.

Potential impacts of Alternative A were also analyzed using locations of whooping cranes detected from aerial surveys conducted during open and closed hunting periods from 2006-2011. The location of detected cranes was digitized from hardcopy maps into a geodatabase. Locations of waterfowl hunting blinds on Matagorda Island were recorded via helicopter by Texas Parks and Wildlife staff using a GPS, and were imported into the geodatabase. The distance between crane locations and the nearest known duck blind location was measured and compared between periods opened and closed to public waterfowl hunting. Statistical analyses did not indicate a relationship between the distance from cranes and the nearest hunting blind and the period (i.e., open versus closed hunting season).

Alternative B— Proposed Action:
Under this alternative impacts would be the same as Alternative A. The addition of hunting on Tatton unit is not expected to further impact T& E species. White-tailed hawks and whooping cranes, which are the only known T& E species to occur on the unit, are not expected to be impacted by white-tailed deer and feral hog hunting as described under Alternative A.

Alternative C— Reduced Waterfowl Hunting:
Under Alternative C, impacts would be the same as Alternative A, except there would be a decrease in disturbance near the upland ponds on MI. Hunting would be removed in the upland ponds which consist of approximately 500 acres within the 56,683 acres of MI. As described in Alternative A the current level of disturbance occurring at these ponds is negligible to whooping cranes.

4.4 Socioeconomic Environment

4.4.1 Impacts on Socioeconomic Resources

Alternative A— Current Management:
Under Alternative A, the economic and social condition of the area would remain the same or slightly increase. Under Alternative A, the public is allowed a limited harvest of a renewable resource. Additionally, the Refuge is promoting a wildlife-oriented recreational opportunity that

is compatible with the purpose for which the Refuge was established. The public would have an increased awareness of Aransas NWR and the National Wildlife Refuge System and public demand for some 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. This alternative allows the public to enjoy hunting at low cost in a region where most private land is leased for hunting at $2,500-$3,000/year per person. This Refuge is one of two public properties open to hunting in the three county area. Also minor beneficial impacts may occur in the long-term by allowing an increase in recreational users to units that have been previously unavailable.

Alternative B— Proposed Action:
Under this alternative, impacts would be the same as Alternative A with the addition of opportunities on the Tatton unit. This would allow youth the opportunity to 1) experience a wildlife-dependant recreation; 2) gain an appreciation for and understanding of wildlife, the natural world and the environment; and 3) promote a land ethic and environmental awareness.

Alternative C— Reduced Waterfowl Hunting:
Under this alternative, impacts would be similar to Alternative A with a small reduction of hunting opportunities for the public on the upland ponds of MI. This reduction is not expected to impact socioeconomics of the area since the affected hunters are likely to move to a nearby off-refuge location.

4.4.2 Impacts to Visitor Services/Recreation Opportunities

Alternative A— Current Management:
Under Alternative A, there would be no change in the existing visitor services and recreation opportunities on the Refuge. The average breakdown of the approximately 50,000 to 52,000 annual visitor use days over the past six years is as follows: fishing ~15%, hunting ~5%, and other wildlife-dependent uses (photography, wildlife observation, and interpretation) ~80%. Currently, deer and feral hog hunters average about 2000 visits per year. Most wildlife observation and hiking visits occur on the Blackjack Unit. They are not affected by the hunting since the hunt areas are closed to the general public year-round.

Alternative B— Proposed Action:
Under this alternative, both beneficial and adverse impacts to visitor services/recreational opportunities would occur. There would be an additional hunting opportunity which would be a positive impact because the state has limited hunting opportunities for the public. The residents of Texas has a strong hunting tradition throughout the state. The visitor use area on the Tatton unit will be closed for a period of two days out of 365 days per year. Hunters would benefit from the opening of additional units to hunting. The refuge expect (and have seen) a greater increase in numbers for wildlife-dependent recreational users not related to hunting activities. Overall, impacts to visitor services/recreation opportunities are considered short-term, minor and local since other parts of the Refuge are available for use by non-hunters (other wildlife-dependent recreation users).

Alternative C— Reduced Waterfowl Hunting:
Under this alternative there would be a negligible impact on visitor services. Not allowing waterfowl hunting on the upland ponds will impact hunters for a period of twelve half days of

hunting, thus the impact is minimal. The hunting occurring on MI will have minimal effect on the other public use activities due to the limiting factor of transportation to the island and while on the island, thus visitation is minimal.

4.4.3 Impacts on Public Health and Safety

Alternative A— Current Management:
Under current management public health and safety risks are minimal because the refuge employs multiple safety rules and regulations (CFR Reference). All other public use conflicts are stopped while hunts are open. There is only a very slight chance of a hunting accident as Refuge hunter *densities* are strictly limited and all hunters must wear 400 sq. inches of hunter orange, including ball cap. There would be more hunters spread out over a larger area. There is a chance of a firearms accident to another hunter or themselves. The risk of accident on the Refuge would continue to be minimized by limiting the number of hunters through a permit process, limiting the areas open for hunting, and shortening seasons throughout the Refuge. All hunters born after September 2, 1971 must have completed a state-certified hunter education course. Exceptions for the safety course include a one-time deferral that must be shown on their hunting license. Hunter numbers and season lengths are very restrictive relative to State seasons under this alternative.

Alternative B— Proposed Action:
Under this alternative impacts to public health and safety would be similar to Alternative A.

Alternative C— Reduced Waterfowl Hunting:
Under this alternative impacts to public health and safety would be similar to Alternative A.

4.4.4 Impacts on Refuge Facilities

Alternative A— Current Management:
Damages to roads and parking facilities from hunter use would continue at the current level, which requires some road grading and mowing a couple of times per year. Other non-consumptive users would also continue to use Refuge facilities, thereby necessitating periodic maintenance throughout the year. Feral hogs could damage roads and trails by rooting and wallowing activities. The hunter check station would incur some usage each year and minimal upkeep is necessary. Other facilities and fences would not be affected.

Alternative B— Proposed Action:
Under this alternative impacts would be similar to Alternative A. With the addition of the Tatton unit, there would be no measurable impact from the road traffic of 7 vehicles for two days per year.

Alternative C— Reduced Waterfowl Hunting:
Under this alternative, impacts to Refuge facilities would be the same as Alternatives A and Alternative B. With the reduction in road traffic on the MI unit for 12 days there would be no measurable impact.

4.4.5 Humaneness and Animal Welfare Concerns:

Alternative A— Current Management:
Under this alternative, mortality of white-tailed deer, feral hogs, and waterfowl would occur. Hunter safety and license requirements would be in accordance with State regulations. All hunters born after September 2, 1971, are required to complete a hunter safety course before they will be issued a hunting license. During this course, established hunter ethics and responsibilities to help ensure hunters are using good judgment related to humaneness and animal welfare are addressed. Accurate, clean shots are expected. The target should be within the effective range of the firearm, ammunition, or bow and arrow and the skills of the hunter; and a humane kill is likely.

Alternative B— Proposed Action:
Under Alternative B, impacts would be the same as Alternative A.

Alternative C— Reduced Waterfowl Hunting:
Under Alternative C, impacts would be the same as Alternative A.

4.5 Cumulative Impacts Analysis

A cumulative impact is defined as an impact on the environment that results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future action regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Cumulative impacts are the overall, net effects on a resource that arise from multiple actions. Impacts can "accumulate" spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. Sometimes different actions counterbalance one another, partially canceling out each other's effects on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource.

4.5 .1 Anticipated Direct and Indirect Impacts of Proposed Action Alternative on Wildlife Species.

4.5.1.1 Resident Wildlife

White-tailed Deer

Regional Analysis:
In the early 1900's there were an estimated 500,000 white-tailed deer in the United States. Unregulated commercial hunting and subsistence hunting threatened to eliminate the white-tailed deer from much of its range. At that time, many state wildlife agencies were formed with the goal of conserving the nation's depleted wildlife resources. Hunting regulations were put into place, and the harvest of antlerless (female) deer was prohibited. The rebound of white-tailed deer populations that followed is considered a wildlife management success story. Today there

are over 20 million deer in the United States and numbers are rising (Swihart and DeNicola 1997). Anticipated annual deer harvest on the Refuge and other national wildlife refuges open to deer hunting is an extremely small percentage of the state's annual harvest and just a fraction of the national population. TPWD estimated 13,664 white-tailed deer were harvested in the 13 million-acre Gulf Coast Prairie and Marshes region of the State during the 2010-2011 hunting season (Purvis 2012). This represents 0.001 deer harvested per acre.

Local Analysis:
Data from the last 20 years of deer harvest on the Aransas NWR indicate the annual average number of deer harvested from the 115,000 refuge was 109 individuals. This represents 0.0009 deer per acre, indicated the harvest rate on the refuge is 10% lower than the rest of the region. The impact of harvest at this rate from the Aransas NWR is negligible within the context of the estimated four million white-tailed deer found in Texas (Graves 2004). The Refuge will continue to support a substantial deer herd that will be at, or above, the habitat's carrying capacity to the detriment of other wildlife species. The timing, duration and anticipated harvest levels of the Refuge's hunt program would not result in adverse cumulative impacts to Refuge resources, wildlife populations or the surrounding environment. Under the proposed action alternative the impacts are expected to be unchanged.

Feral Hogs

Regional and Local Analysis
The hunting of feral hogs is not considered detrimental to the biological integrity of the Refuge, is not likely to create conflict with other public uses, and is within the wildlife-dependent public uses to be given priority consideration. In fact, the removal of as many of these destructive, exotic, feral animals as possible would positively benefit the Refuge (and neighboring) habitat.

Executive Order 13112, Invasive species, issued in February, 1999 instructs Federal Agencies to: prevent the introduction of invasive species; detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; monitor invasive species populations accurately and reliably; provide for restoration of native species and habitat conditions in ecosystems that have been invaded; conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and promote public education on invasive species and the means to address them.

Feral hogs are an extremely invasive, non-native species and not considered a game species by the State of Texas. There is an estimated population in excess of 1.5 million feral hogs in Texas. This is due in part to intentional releases, improved habitat, increased wildlife management, disease eradication, limited natural predators, and high reproductive potential. There seem to be very few inhibiting factors to curtail this population growth (Taylor 2003). No bag limits or set seasons are established for feral hogs. Hunting of feral hogs provides the Refuge with another management tool in reducing this detrimental species, and at the same time, is widely enjoyed by hunters. Cumulative effects to an exotic species should not be of concern because the Refuge would like to extirpate this species on Refuge lands. Hunting of hogs is not considered detrimental to the biological integrity of the Refuge, is not likely to create conflict with other public uses and is within the wildlife dependent public uses to be given priority consideration. They are a priority species for Refuge management only in terms of their negative impacts on

Refuge biota and need for eradication. The public interest would best be served by allowing this activity on the Refuge. However, even with hunting, feral hogs are likely to always be present because they are prolific breeders. The Refuge hunt has averaged harvesting 27 hogs per year from 2004 through the 2010 season. The State of Texas allows for year-round hunting (day and night) of feral hogs.

Other (Non-hunted) Resident Wildlife

Regional and Local Analysis
The Refuge is proposing to hunt only white-tailed deer, feral hog and waterfowl. Other resident wildlife species are also present on the Refuge, including songbirds, wading birds, and raptors; 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. Most of these species are common and widespread. In general these species are broadly distributed throughout the region and have limited home ranges. Hunting is not expected to affect any wildlife populations regionally. Some wildlife disturbance (increased human presence and sounds of gunshots) will occur locally during the hunting season; however, these impacts are expected to be minor for the following reasons. The hunting season is typically of short duration (October through January) and will only have minimal direct impacts on other resident wildlife. Nesting birds will not be impacted due to the timing of the hunts.

Small mammals, including bats, become inactive during winter when hunting season occurs, and many of these species are nocturnal. Both of these characteristics reduce/eliminate hunter interactions with small mammals. Hibernation or torpor by cold-blooded amphibians and reptiles also limits their activity during the winter months when hunting occurs. Hunters would rarely encounter amphibians and reptiles during most of the hunting season. Encounters with amphibians and reptiles would be greater during early fall but should not have cumulative negative effects on amphibian and reptile populations. Invertebrates become less active during the fall and winter months and there would be few interactions with hunters during the hunting season.

4.5.1.2 Migratory Species

Migratory species present on the Refuge (over 200 species) include waterfowl, other waterbirds, neotropical migrant birds, and raptors.

Waterfowl (Ducks, Coots, and Mergansers)

Regional and Local Analysis:
Waterfowl populations throughout the United States are managed through an administrative process known as flyways, of which there are four (Pacific, Central, Mississippi and Atlantic). The review of the policies, processes and procedures for waterfowl hunting are covered in a number of documents.

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ‘‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88– 14),’’ filed with

the Environmental Protection Agency on June 9, 1988. The Service published a Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and the Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment and Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53776); the Service announced its intent to develop a new Supplemental Environmental Impact Statement for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216).

Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the Migratory Bird Hunting Frameworks. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds.

The Migratory Bird Hunting Frameworks provide season dates, bag limits, and other options for the States to select that should result in the level of harvest determined to be appropriate based upon Service-prepared annual biological assessments detailing the status of migratory game bird populations. In North America, the process for establishing waterfowl hunting regulations is conducted annually. In the United States, the process involves a number of scheduled meetings (Flyway Study Committees, Flyway Councils, Service Regulations Committee, etc,) in which information regarding the status of waterfowl populations and their habitats is presented to individuals within the agencies responsible for setting hunting regulations. In addition, public hearings are held and the proposed regulations are published in the Federal Register to allow public comment.

For waterfowl, these annual assessments include the Breeding Population and Habitat Survey, which is conducted throughout portions of the United States and Canada, and is used to establish a Waterfowl Population Status Report annually. In addition, the number of waterfowl hunters and resulting harvest are closely monitored through both the Harvest Information

Program (HIP) and Parts Survey (Wing Bee). Since 1995, such information has been used to support the adaptive harvest management (AHM) process for setting duck-hunting regulations. Under AHM, a number of decision-making protocols render the choice (package) of pre-determined regulations (appropriate levels of harvest) which comprise the framework offered to the States that year. Texas's Parks and Wildlife Department then selects season dates, bag limits, shooting hours and other options from the Central Flyway package. Their selections can be more restrictive, but cannot be more liberal than AHM allows. Thus, the level of hunting opportunity afforded each State increases or decreases each year in accordance with the annual status of waterfowl populations.

Each National Wildlife Refuge considers the cumulative impacts to hunted migratory species through the Migratory Bird Frameworks published annually in the Service's regulations on Migratory Bird Hunting. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a refuge opens a new hunting activity, season dates, and bag limits, and other aspects of a hunt may be more restrictive than the State allows.

The Texas coast has long been a popular place for waterfowl hunting. In 2004 Texas had approximately 85,000 waterfowl hunters (National Flyway Council 2006). Many TPWD waterfowl management areas near the Aransas NWR (i.e., Guadalupe delta WMA, Mad Island WMA) are well known hunting destinations. Many other areas of the coast are publically accessible via state waters and are also used by waterfowl hunters. In many cases, there is no check-in or mandatory reporting procedure, so harvest estimates for the area are not available.

4.5.1.3 Endangered Species

It is the policy of the Service to protect and preserve all native species of fish, wildlife, and plants, including their habitats, which are designated as threatened or endangered with extinction.

Regional Analysis
A Section 7 consultation (September 2012) was initiated with the Corpus Christi Ecological Services Field Office in association with the proposed action of continuing hunting on the Refuge. It was determined by the Refuge that Alternative B would not adversely affect endangered or threatened species on the Refuge however the consultation is still pending.

Local Analysis
Current management is not likely to have adverse impacts to whooping cranes since in the last 23 years only 1 whooping crane has been known to have been shot by a waterfowl hunter on the Texas Coastal bend. This occurred on San Jose Island in 1988-1989 when the bird was apparently mistaken for a snow goose. The predictable presence of whooping cranes on the Texas coast may increase the awareness of local waterfowl hunters and hunting guides, thus reducing the rates of accidental take.

A local analysis was conducted to assess the potential long-term impacts to whooping cranes and is summarized in 4.3.4.

4.5.2 Anticipated Direct and Indirect Impacts of Proposed Action on Refuge Programs, Facilities, and Cultural Resources.

4.5.2.1 Other Wildlife-Dependent Recreation

The Refuge has other public use wildlife-dependent opportunities that can be affected by the hunt program. During the hunt mini-seasons, signs and notices go out advising the general public of temporary closures on hunt units. This can interfere with wildlife observation, trail walking, boating, and fishing. Generally, many of these non-hunting activities do not occur frequently by the public during the colder months. These conflicts are temporary and short-term.

By implementing the Proposed Action Alternative B, the Refuge would meet the demands of the public, as well as, meeting the goals for which the Refuge was established. Implementing this hunt program would also bring a new public hunt opportunity to an area dominated by private lands. This is especially important as nation-wide statistics show a decrease in hunter retention and recruitment (especially youth hunters), in part due to a lack of quality public hunting areas.

As public use levels expand across time, the potential for unanticipated conflicts among and with user groups may be present. In the event such unanticipated conflicts may occur as a result of

implementing this hunt program, the Refuge's visitor use programs would be adjusted as needed to eliminate or minimize each problem, so that it could continue to provide quality wildlife-dependent recreational opportunities. Hunting season dates and regulations would be set and regulated to allow all user groups to experience a quality visit while on the Refuge. The Refuge would have the flexibility to modify the hunt program in order to meet the needs of most wildlife-dependent recreational user groups.

4.5.2.2 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 hunters would be: interior service roads, hunter check station, and trails. These facilities are currently used to accommodate Refuge management operations. The addition of these limited hunts will slightly increase vehicular traffic; however, impacts on these facilities would be minor in the short term and over time. Any negative impacts realized to these facilities would be reduced by appropriate regulation(s).

The proposed opening of additional units will provide an important role in carrying out the mission of the Service and the Refuge System. These same areas will be used by the other Refuge visitors during non-hunting periods.

4.5.2.3 Cultural Resources

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. In fact, hunting 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 is, therefore, not required.

4.5.3 Anticipated Impacts of Proposed Hunt on Refuge Environment and Community

4.5.3.1 Refuge Environment

Negative impacts to the Refuge environment associated with the proposed hunting activities will be minor. It is expected that some minor disturbance to soils and vegetation will occur as a result of people engaging in the proposed hunting activities. Air quality will experience minor impacts due to increased fossil fuel emissions as people travel to and from hunting areas. The Refuge is not known for its ability to provide solitude due to the proximity of highway traffic,

freight trains, farming equipment, and other such disturbance so the temporary increase in use during the proposed hunts would not affect this character of the Refuge.

Lands adjacent to the Refuge are predominantly agricultural and sparsely populated, and hunting is a common past time in the area, so the brief increase in activity on the Refuge would have little effect on the public, visitors, and nearby residents.

Any negative cumulative impacts realized in the future action to the Refuge environment would be further reduced by appropriate regulation(s). Collectively, these actions are anticipated to result in minor cumulative effects to the Refuge environment.

4.5.3.2 Refuge Community

The economic impact of the proposed hunt program would be a relatively minor increase in sales of hunting licenses and ammunition to the limited number of people participating in these hunts. Local hotels may experience a slight increase in business as drawn hunters might utilize them.

The new hunts would result in a net gain of public hunting opportunities in a region dominated by private land, which would have a beneficial impact on the general public and hunter retention/recruitment. The community would also benefit from a slight increase tourism and revenue.

4.5.4 Other Past, Present, Proposed and Reasonably Foreseeable Hunts (and Other Activities) and Anticipated Impacts

Past

Virtually all the lands acquired by the Service for inclusion into Aransas NWR were hunted as private or family hunt leases before being added to the refuge system. In speaking with long-time hunters or local residents, some private hunts and management of habitat were run well while others not as well. Past land use practices also included ranching and farming.

Present

The Refuge has and continues to work in cooperation with TPWD biologists and staff in an ongoing effort to monitor the deer population on the Refuge. Current Refuge hunts are very well controlled by number of hunters, season lengths, weapons allowed, and law enforcement presence. The Refuge is one of two public lands in the three county area open to public deer hunting opportunities. All other hunting is by private lease or on personal property and continues at various levels from being poorly run to well managed around and adjacent to the Refuge. Many TPWD waterfowl management areas near the Aransas NWR (i.e., Guadalupe delta WMA, Mad Island WMA) are well known hunting destinations. Many other areas of the coast are publically accessible via state waters and are also used by waterfowl hunters. Oil and gas exploration and activities has been an ongoing impact on the refuge since its establishment. The past land use practices of ranching and farming no longer continued once the land was added to the Refuge. These areas are being restored to live oak motte/woodland and grassland components by either active (eg. prescribed burning, roller chopping) or passive management practices.

Future

The proposed opening of additional units to big game and migratory bird hunting on the Refuge is expected to be an effective management tool ensuring healthy and sustainable game animal populations, while decreasing feral hog numbers. Refuge staff will continue to promote native flora and fauna diversity through active habitat management that achieve Refuge wildlife habitat priorities and objectives. However, these goals and objectives may not be obtained if additional areas are not hunted. Deer and hog populations would subsequently increase beyond the habitat's carrying capacity and ultimately decreasing the biological integrity of the Refuge.

As public use levels expand across time, the potential for unanticipated conflicts among and with user groups may be present on MI. In the event such unanticipated conflicts may occur as a result of expanding this hunt program, the Refuge's visitor use programs would be adjusted as needed to eliminate or minimize each problem, so that it could continue to provide quality wildlife-dependent recreational opportunities. Hunting season dates and regulations would be set and regulated to allow most user groups to experience a quality visit while on the Refuge. The Refuge would have the flexibility to modify the hunt program in order to meet the needs of all wildlife-dependent recreational user groups.

As the Refuge continues to become more widely known, visitation is expected to increase, especially in non-hunting wildlife-dependent recreational activities. It is assumed that more visitors to this area will create the potential for beneficial economic effects and a positive image for the county and surrounding area.

4.5.5 Anticipated Impacts if Individual Hunts are Allowed to Accumulate

The Service has concluded that there will be minor cumulative impacts on the Refuge's wildlife populations, either hunted or non-hunted species. The Service has also concluded that the proposed action will not cumulatively impact the Refuge environment or Refuge programs. This determination was based upon a careful analysis of potential environmental impacts of hunting on the Refuge together with other projects and/or actions. Hunting is an appropriate wildlife management tool that can be used to manage wildlife populations. Some wildlife disturbance will occur during the limited hunting seasons. Proper zoning, regulations, and Refuge seasons will be designated to minimize any negative impacts to wildlife populations using the Refuge.

Field checks by Refuge law enforcement officers will be planned, conducted, and coordinated with staff and other agencies to maintain compliance with regulations and assess species populations and numbers harvested.

4.5.6 Summary of Cumulative Effects

These actions would have both direct and indirect effects (*e.g.*, additional units open to hunting would result in increased public use, thus increasing vehicular traffic, disturbance, etc); however, these would be minor cumulative effects from the proposed action. When these new units are then opened to other wildlife-dependent recreation during non-hunting periods, the expected increase in visitation would have beneficial economic impacts on the local community.

National Wildlife Refuges, including Aransas National Wildlife Refuge, would conduct hunting programs within the framework of State and Federal regulations. By maintaining hunting

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 regional basis.

4.6 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" 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 directs 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.

None of the alternatives described in this EA will disproportionately place any adverse environmental, economic, social or health impacts on minority and low income populations. Implementation of the proposed action is anticipated to be beneficial for the environment over the long-term and people in the surrounding communities.

4.7 Unavoidable Adverse Effects

As proposed under alternative, implementation of hunting on the Refuge may result in some unavoidable adverse impacts. Some deer and waterfowl would be killed; however, these species are a renewable resource and there would be no discernible effect on the populations. While some feral hogs would also be killed, this is not considered an adverse effect, because they are a destructive, invasive, non-native species that has detrimental impacts on Refuge habitats and native wildlife. There would also be some short-term disturbance to other resident wildlife, but these impacts are expected to be minimal.

4.8 Irreversible and Irretrievable Commitment of Resources

None of the alternatives would result in a large commitment of nonrenewable resources.

Project implementation would require a small commitment of fossil fuels (diesel and gasoline), oils, and lubricants used by heavy equipment and vehicles for road maintenance. Trails will be mowed and increased law enforcement activities may become necessary.

4.9 Summary of Impacts by Alternative

Table 4.9-1 Summary of Environmental Consequences by Alternative:

Environmental Resource	Alternative A: Current Management	Alternative B: Proposed Action	Alternative C: Reduced Waterfowl Hunting
Impacts to Air Quality	Minor vehicle emissions and stirring of road dust expected	Same as alternative A with minor increase in some hunting activities	Same as alternative A but decrease in some hunting activities
Impacts to Water Quality and Quantity	Direct negative impacts from high feral hog population, No other direct impacts	Same as alternative A with minor increase in some hunting activities	Same as alternative A but decrease in some hunting activities
Impacts to Soils	Minor direct negative impacts due to vehicle and foot traffic	Same as alternative A with minor increase in some hunting activities	Same as alternative A but decrease in some hunting activities
Impacts on Habitat	Minor direct negative effect (long-term) by maintaining trails; Minor direct positive by lowering populations of deer and hog	Same as alternative A with minor increase in some hunting activities	Same as alternative A but decrease in some hunting activities
Impacts on Resident Wildlife	Minor direct negative effect (some disturbance and harvest); Minor direct positive effect (management of deer herd and exotic feral hog)	Same as alternative A	Same as alternative A but decrease in some hunting activities
Impacts to Migratory Species	Minor direct negative effect (some disturbance and harvest); Minor direct positive effect (management of deer herd and exotic feral hog)	Same as alternative A	Same as alternative A but decrease in some hunting activities
Impacts on Threatened and Endangered Species		Same as alternative A with minor increase in some hunting activities	Same as alternative A but decrease in some hunting activities
Impacts on Socioeconomic Resources	Minor direct/indirect positive effect (opening areas previously closed to the public)	Same as alternative A with minor increase in some hunting activities	Same as alternative A but decrease in some hunting activities
Impacts to Visitor Service/Recreation	No change	Minor positive/negative effect (opening areas to hunting/closing areas to the public for 2 days out of 365)	Minor negative/positive (closing areas to hunting/opening areas to the public for 12 days out of 365)
Impacts on Public Health and Safety	Minor risk (minimized by spreading hunters out over large area and limiting number of hunters)	Same as alternative A	Same as alternative A
Impacts of Refuge Facilities	Minor direct negative effect as more roads and facilities need maintaining	Same as alternative A with minor increase in some additional roads	Same as alternative A but decrease in some roads

5.0 CONSULTATION, COORDINATION and DOCUMENT PREPARATION

Aransas NWR staff is working closely with Texas Parks and Wildlife Department concerning the proposed hunting plan and formally opening the hunt units.

5.1 Staff Consulted in the Preparation of This Document

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6.0 APPENDICIES

Appendix A
DEFINITION OF TERMS

Carrying capacity is the maximum population of a particular organism that a given environment can support without detrimental effects.

Effects

Direct effects are the impacts that would be caused by the alternative at the same time and place as the action.

Indirect effects are impacts that occur later in time or distance from the triggering action.

Cumulative effects are incremental impacts resulting from other past, present, and reasonably foreseeable future actions, including those taken by federal and non-federal agencies, as well as undertaken by private individuals. Cumulative impacts may result from singularly minor but collectively significant actions taking place over a period of time.

Impact Type

Beneficial/positive impacts are those resulting from management actions that maintain or enhance the quality and/or quality of identified Refuge resources or recreational opportunities.

Adverse/negative impacts are those resulting from management actions that degrade the quality and/or quantity of identified refuge resources or recreational opportunities.

Duration of Impacts

Short-term impacts affect identified refuge resources or recreational opportunities; they occur during implementation of the management action but last no longer.

Medium-term impacts affect identified refuge resources or recreational opportunities that occur during implementation of the management action; they are expected to persist for some time into the future though not throughout the life of the CCP.

Long-term impacts affect identified refuge resources or recreation opportunities; they occur during implementation of the management action and are expected to persist throughout the life of the Plan and possible longer.

Intensity of Impact

Insignificant/negligible impacts result from management actions that cannot be reasonably expected to affect identified refuge resources or recreational opportunities at the identified scale.

Minor impacts result from a specified management action that can be reasonably expected to have detectable though limited effect on identified refuge resources or recreation opportunities at the identified scale.

Moderate impacts result from a specified management action that can be reasonably expected to have apparent and detectable effects on identified refuge resources or recreation opportunities at the identified scale.

Major impacts result from a specified management action that can be reasonably expected to have readily apparent and substantial effects on identified refuge resources and recreation opportunities at the identified scale.