

Aransas National Wildlife Refuge Complex

*Comprehensive Conservation Plan
and Environmental Assessment*

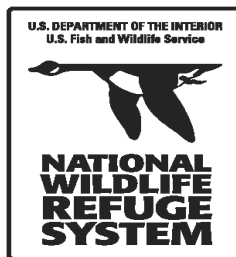


September 2010



U.S. Fish and Wildlife Service Mission Statement

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.



National Wildlife Refuge System Mission Statement

The mission of the National Wildlife 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

Comprehensive conservation plans provide long-term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
P.O. Box 1306
Albuquerque, New Mexico 87103



Dear Reader:

The U.S. Fish and Wildlife Service is pleased to provide you with a copy of the Final Comprehensive Conservation Plan (Plan), Environmental Assessment (EA), and Finding of No Significant Impact (FONSI) for Aransas National Wildlife Refuge Complex in the State of Texas. This Plan identifies the role that the Refuge will play in support of the U.S. Fish and Wildlife Service and National Wildlife Refuge System. It provides long-term guidance to the Refuge's management programs and activities. The Plan was developed by an interdisciplinary planning team that evaluated three management alternatives, resulting in the selection of Alternative B as the Proposed Action. The U.S. Fish and Wildlife Service believes this management action is a positive step in conserving and managing the Refuge's fish and wildlife resources.

The U.S. Fish and Wildlife Service would like to thank you for participating in the planning process. Comments you submitted helped the planning team prepare a better plan for the future of the Refuge.

Additional copies of this Plan may be obtained by contacting: Dan Alonso, Refuge Manager, Aransas National Wildlife Refuge Complex, P.O. Box 100, Austwell, Texas 77950. The Plan is also available on the Aransas National Wildlife Refuge website:

<http://www.fws.gov/southwest/refuges/texas/aransas/index.html>

Thank you for your continued support and interest in our fish and wildlife conservation efforts.

Sincerely,

Dr. Benjamin N. Tuggle, Regional Director
U.S. Fish and Wildlife Service, Region 2

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Aransas National Wildlife Refuge Complex

Comprehensive Conservation Plan

and

Environmental Assessment

September 2010

Prepared by:

**Aransas National Wildlife Refuge Complex
P.O. Box 100
Austwell, Texas 77950**

**U.S. Fish and Wildlife Service
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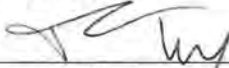
COMPREHENSIVE CONSERVATION PLAN APPROVAL

for the

Aransas National Wildlife Refuge Complex, Austwell, TX

The attached Comprehensive Conservation Plan for the Aransas National Wildlife Refuge Complex has been prepared by Regional Office and Refuge staff. The contents and format are found to be in compliance with Service Policy on the preparation of Comprehensive Conservation Plans, and is hereby submitted for approval.

Submitted by:



Roxanne Turley, Natural Resource Planner
U.S. Fish and Wildlife Service, Region 2

9/9/10
Date

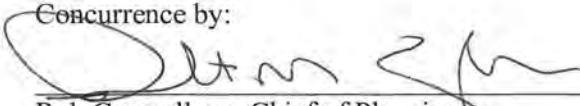
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Dan Alonso, Refuge Manager
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Concurrence by:



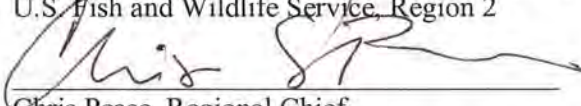
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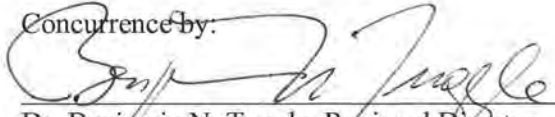
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Chris Pease, Regional Chief
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9-9-10
Date

Concurrence by:



Dr. Benjamin N. Tuggle, Regional Director
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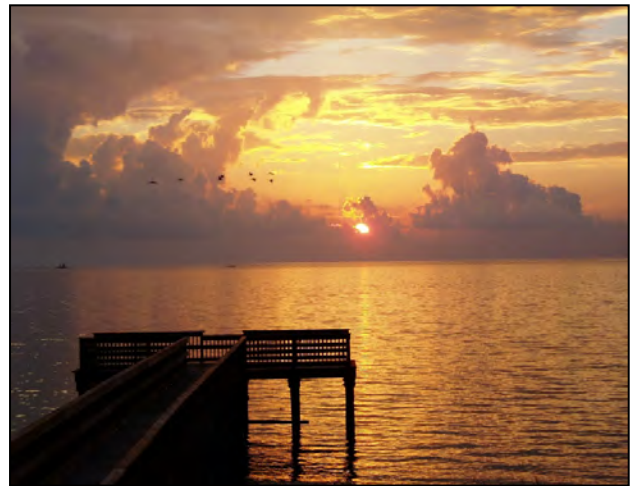
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Refuge Vision

Native coastal habitat is vital to the future of wildlife along the Texas Gulf Coast. Aransas National Wildlife Refuge Complex is unique in its representation of four broadly distinct coastal habitats: barrier island, peninsular, coastal upland prairie, and shoreline. With increasingly diminishing habitats along the Texas Gulf Coast, the Refuge plays a critical role in coastal habitat preservation and management. Lying along the Texas Coastal Bend and consisting of Gulf beach, wetlands, grasslands, woodlands, and tidal lands, the Refuge is a key stopover for migratory birds in the United States. The Refuge continues to provide vital habitat for thousands of migratory songbirds, raptors, shorebirds, waterfowl, and pollinators to rest and refuel before continuing the arduous journey to and from tropical destinations; and serves as the perpetual winter home for a high diversity of migratory birds, chief among these the endangered whooping crane, other threatened and endangered species, and other native wildlife.

The Refuge envisions building native coastal habitat diversity on an ecosystem level with an emphasis on maintaining barrier island and blackland coastal prairie, and restoring and enhancing peninsular upland habitat. Management efforts are focused in peninsular areas overrun with stands of live oak, using techniques that mimic natural ecological processes. Future conservation efforts are guided by the Refuge's commitment to protect, maintain, and enhance the integrity and high intrinsic values of this natural area and its contribution to the Central Flyway migration corridor. Holistic land management practices and scientific research strive for sound stewardship of these natural resources through acquiring, restoring, preserving, and studying coastal wetlands, prairies, woodlands, and their inherent link to estuarine and marine environments. The resiliency of the Refuge, known by its ability to recover from natural disasters, continues, even though altered by climate changes and threatened by adjacent areas becoming increasingly fragmented and modified by human development. To meet these challenges, the Refuge builds and maintains partnerships with other agencies, universities, interest groups, landowners, and local communities, resulting in greater appreciation and protection of the wildlife and fishery resources of the Texas Coastal Bend.



Sunrise over San Antonio Bay. Photo: Kathie Holbrook

A healthy Refuge environment provides opportunities for the public to enjoy abundant wildlife and the Refuge natural setting. The Refuge provides the public a quality experience through a greater awareness, expanded education, meaningful interpretation, and compatible wildlife-dependent recreational opportunities. In partnership with our local communities and governments, the Refuge promotes the area as a regional attraction that contributes to nature-oriented economic development, enhancing the quality of life on the Texas Gulf Coast. Visitors leave the Refuge with a feeling of high regard and a sense of pride that this place of bountiful wildlife, ecological significance, and rich cultural history is protected under the National Wildlife Refuge System now and for many years to come.

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1. Introduction and Background

This Comprehensive Conservation Plan (Plan, CCP) for the 115,931-acre Aransas National Wildlife Refuge Complex (NWRC) (Refuge) will guide management decisions over the next 15 years and set forth goals, objectives, and strategies for achieving the Refuge vision. The Refuge will help conserve and enhance habitat for “Federal trust species,” which includes migratory birds, threatened and endangered species, inter-jurisdictional fish, marine mammals, and other species of concern. The Refuge will maintain and establish good working partnerships with stakeholders as well as provide the greatest opportunities for the public to learn about and enjoy the Refuge experience. The Aransas NWRC is currently comprised of the Aransas Unit (Blackjack Peninsula, 47,261 acres), Tatton Unit (7,568 acres), Lamar Unit (979 acres), Myrtle Foester Whitmire Unit (3,440 acres), and Matagorda Island Unit (56,683 acres). Administratively, Aransas and Matagorda Island each have different organizational codes, but collectively fall under a separate “Complex” organizational code. It is this administrative arrangement that forms the Aransas NWRC, and Matagorda Island is treated as a unit within the Refuge (Figure 1-1).

1.1 History of Refuge Establishment

Aransas Unit (Blackjack Peninsula)

The San Antonio Loan and Trust Company owned the land comprising the Aransas Unit until the Federal government took an active role in wildlife conservation, and the Bureau of Biological Survey (precursor to the U.S. Fish and Wildlife Service) recommended the purchase of the St. Charles Ranch as part of its obligation to preserve and manage waterfowl habitat along the Central Flyway. The Refuge was thus established on December 31, 1937. Aransas NWRC was the 121st refuge to be established in the National Wildlife Refuge System (Refuge System) and second in Texas.

In addition to the general charge of protecting and conserving native wildlife within its boundaries, the Refuge has special responsibilities. Aransas NWRC was established for the benefit of migratory waterfowl passing along the Central Flyway, and, in fact, it was initially called the Aransas Migratory Waterfowl Refuge. In 1940, the Aransas Migratory Waterfowl Refuge became the Aransas National Wildlife Refuge. The \$463,500 purchase price came from the sale of migratory bird stamps. Therefore, management of habitat for ducks, geese, shorebirds, and waders remains a primary purpose. Shortly after World War II, when the impending extinction of the whooping crane became apparent, it was realized by coincidence that the tidal flats of Aransas NWRC included the last significant wintering ground of this bird. Since then, the fate of the whooping crane and recognition of the Refuge have been uniquely joined.

The Aransas Unit occupies Blackjack Peninsula, an isolated neck of land bounded by St. Charles Bay on the west, San Antonio Bay on the east, and the Gulf Intracoastal Waterway (GIWW) along the south; it is 16 miles long and two to seven miles wide. As originally established in 1937, the entire Refuge was contained in these 47,261 sandy peninsular acres, and it is still the site of the Refuge headquarters and most visitor facilities. In addition, the U.S. Fish and Wildlife Service (Service) has jurisdiction over 12,934 acres of open bay waters established by Presidential proclamation in 1938. As a marked buffer zone around the margin of Blackjack Peninsula, the proclamation boundary was established to prohibit migratory bird hunting (see 50 CFR, Part 32.8, Areas Closed to Hunting). This comprises a significant part of

the inviolate sanctuary component found in the original Refuge purpose for this unit, as intended for the protection of waterfowl. Today, this proclamation boundary additionally serves to protect endangered whooping cranes.

Tatton Unit

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, was added in 1967 to the Aransas NWRC by donation. This unit lies primarily in Aransas County and partially in Refugio County. The Tatton Unit is connected to the Blackjack Peninsula at the northeastern terminus of St. Charles Bay. Grazing occurred on the Tatton Unit through 1989 as part of a Habitat Management Plan to support the endangered Attwater's prairie chicken. The purpose of the Tatton Unit is to preserve a remnant of low upland (dark soil) coastal prairie and its associated wildlife. Public use on the Tatton Unit is limited to one observation deck found at the Highway 35 roadside rest stop. Youth hunting is allowed on this unit.

Lamar Unit

The Lamar Unit is a disjunct 979-acre tract of live oak sandy upland and salt marsh located at the tip of Lamar Peninsula, on the west bank of St. Charles Bay midway between the Tatton Unit and Goose Island State Park in Aransas County. It was leased from The Nature Conservancy of Texas (TNC) in 1987, and arrangements for the purchase of 734 acres were completed in 1991. In 2006, an adjoining 245 acres (Johnson tract) of salt marsh was added to the Lamar Unit. The purpose of the Lamar Unit is the protection of salt marsh habitat for the whooping crane and the preservation of native coastal woodlands. The Lamar Unit is not currently open to the public.

Myrtle Foester Whitmire Unit

The 3,440-acre Myrtle Foester Whitmire Unit is a valuable coastal wetland added to the Refuge in 1993 from willing sellers. It is located 22 miles north of Blackjack Peninsula on Powderhorn Lake, near the historic town site of Indianola in Calhoun County. Traditional rice farming that historically occurred on this unit has been replaced by an organic rice farming operation to provide food resources and water for wildlife (mainly waterfowl and shorebirds) without the use of agricultural chemicals. Grazing also occurs on this unit as a grassland management tool. The purpose of the Myrtle Foester Whitmire Unit is to protect important wetland habitat for migrating and wintering waterfowl and to protect vital nesting habitat for resident mottled ducks. The Myrtle Foester Whitmire Unit is not currently open to the public.

Matagorda Island Unit

Matagorda Island is one of five barrier islands fronting the Texas coast. Situated along the mid-Texas coast, Matagorda Island (Island) is located in Calhoun County, approximately nine miles southwest of Port O'Connor and 48 miles southeast of Victoria. The Island is 38 miles long and varies from $\frac{3}{4}$ to $4\frac{1}{2}$ miles wide. The Island is 56,683 acres in size with approximately 30,000 acres of uplands and 26,166 acres of salt marsh, tidal flats, and Gulf beach. Matagorda Island is bounded on the southeast by the Gulf of Mexico, and to the northwest by Espiritu Santo, San Antonio, Ayers, and Mesquite Bays. Matagorda is separated from San Jose Island to the southwest by Cedar Bayou, and separated from Matagorda Peninsula to the northeast by Pass Cavallo. The Island has long been identified as a significant natural area, in spite of the human impacts on its ecology. Matagorda Island's isolation also provides a special

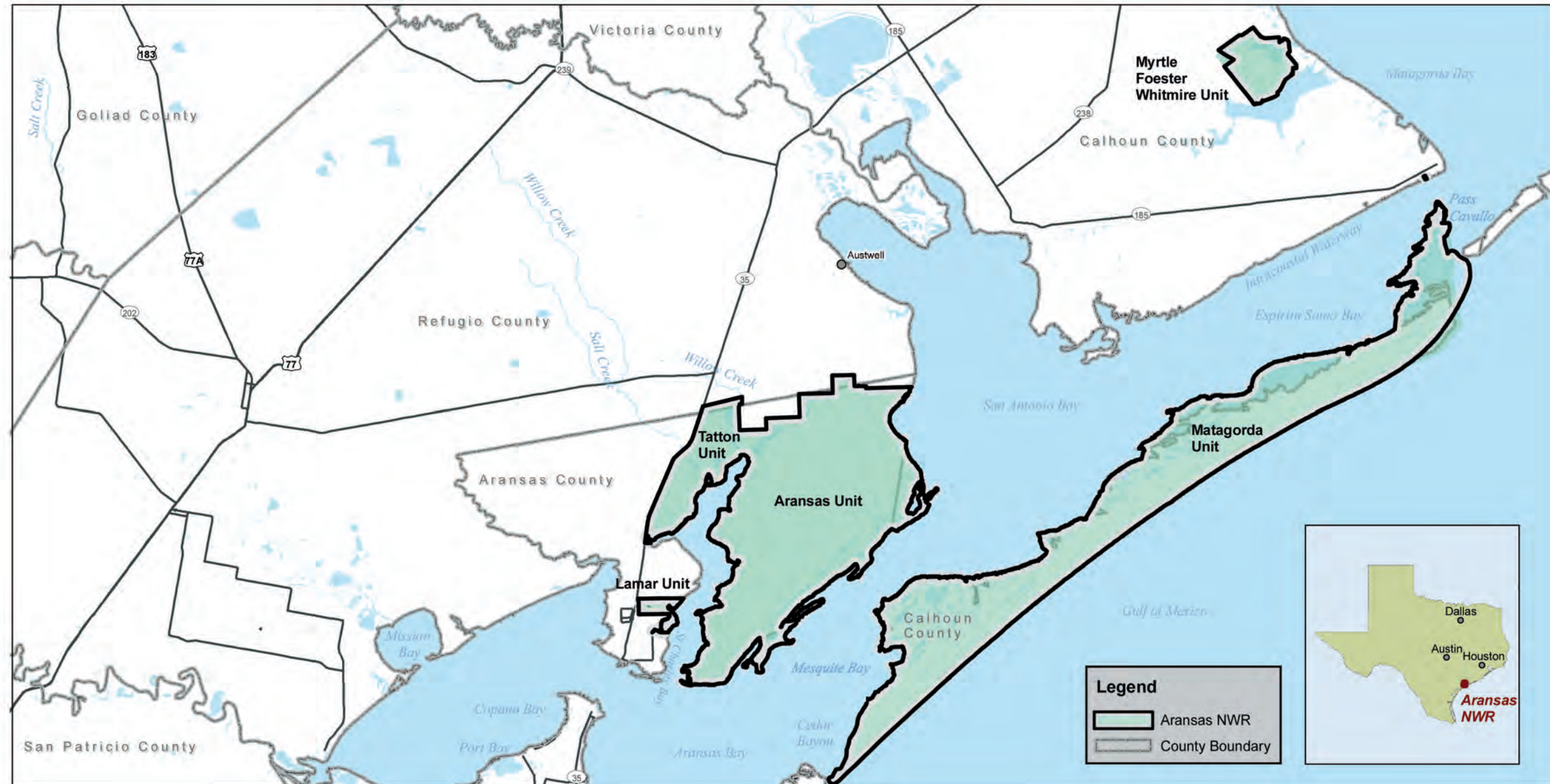


U.S. Fish & Wildlife Service

Aransas National Wildlife Refuge

Aransas, Calhoun, & Refugio Counties, Texas

Figure 1-1. General Refuge Location



PRODUCED IN THE DIVISION OF REFUGE PLANNING
ALBUQUERQUE, NEW MEXICO
LAND STATUS CURRENT TO: 8/17/09
MAP DATE: 5/25/10
BASEMAP: N/A
MERIDIAN: N/A
FILE: lit_maptitle

Figure 1-1. General Refuge Location

opportunity for protection of its natural resources. There is no causeway, highway access, or other vehicular access to the Island. This contributes to its attractiveness to visitors and is one of the primary factors in its unique appeal for preservation, interpretation, environmental education, and recreational uses.

In 1942, the Federal government acquired portions of Matagorda Island for use as a military training base, which became the Matagorda Bombing and Gunnery Range. All of Matagorda Peninsula was leased to the Federal government; the northern 28 miles of Matagorda Island were purchased outright, and the southern 10 miles of Matagorda Island were leased for military operations. About 26,000 acres of surrounding beaches and tidal flats were also leased from the State of Texas (State) to train military pilots. The training base remained in use by the military through the 1950s; by the 1960s, most of the military training programs had wound down. At about this time, county and State officials began demanding public access to Matagorda Island, and the Service became interested because of its importance as a whooping crane use site.

In 1971, the Air Force agreed to let the Service manage that portion of the Island owned by the Federal government (northern 28 miles, or 19,000 acres) for the benefit of whooping cranes. By 1975, the military, through the General Services Administration, began the process of identifying surplus military lands on Matagorda Island. In that same year, the Service submitted a formal request for permanent transfer and ownership of the 19,000 acres of Federal land. In 1976, the State also filed a notice to acquire the Federal property on Matagorda Island. By 1977, all military personnel and equipment were off the Island and the installation officially closed in June 1978. In 1979, the 26,166 acres of salt marsh, tidal flats, and Gulf beach were returned to the Texas General Land Office (GLO), which manages Texas' coastal public lands. Also in 1979, the Matagorda Island State Park and Wildlife Management Area was designated by the Texas State Legislature, comprising 24,891 acres of the same 26,166 acres of GLO lands. In the period from 1975 through 1982, a considerable amount of interaction occurred between Federal and State agency representatives, members of the U.S. Congress, the Texas Legislature, private organizations, news media, and the general public regarding the anticipated declaration of excess Federal property on Matagorda Island.

Finally, on December 8, 1982, the 19,000 acres on the northern 28 miles of the Island were transferred to the Service for "wildlife conservation purposes" and permanent inclusion in the Refuge System. Also, by 1982, State lands (24,891 acres) were now under the supervision of the Texas Parks and Wildlife Department (TPWD) under lease from the GLO. The southern 10 miles or lower one-third portion of Matagorda Island (11,502 acres) reverted back to private use, and cattle ranching was resumed there. State Gulf lands (1,275 acres) along this lower part of Matagorda Island bordering the private land continued to be administered directly by GLO. During this time, the State and the Service entered into an agreement that was to become the basis for the modern management of Matagorda Island. The intent was to bring the northern 28 miles (19,000 acres) of the Island and the adjacent tidelands (24,891 acres) under a unified plan. No property titles were transferred; instead, conservation easements were swapped (cross-easements). The State agreed to place its holdings into the Refuge System, and the Service agreed to let the TPWD include all Federal lands in its Matagorda Island State Park and Wildlife Management Area. Refuge lands (uplands – 19,000 acres) and State lands (beaches, tidal flats, and marshes – 24,891 acres) were then combined for management purposes through a Memorandum of Agreement (Public Law 98-66). This agreement established the Matagorda Island State Park and Wildlife Management Area, a unit of the National Wildlife Refuge System, on December 8, 1982. In effect, this agreement

made the Service the primary authority for wildlife and habitat management on the entire 43,891-acre tract by inclusion of these lands into the Refuge System. This agreement also gave TPWD primary authority for supervising public access and use of the area as a park and wildlife management area. Principal jurisdiction of the Federal land (19,000 acres), by virtue of ownership, remained with the Service, and primary jurisdiction of State lands (24,897 acres) remained with Texas. TPWD was already present and managing the area as a State Park and Wildlife Management Area at the time of the 1982 agreement. Under this arrangement, TPWD managed the area primarily as a Wildlife Management Area and applied cattle grazing as a primary management tool that continued throughout the 1980s. In 1986, the TNC purchased the remaining, privately held, lower one-third portion of Matagorda Island (11,502 acres), and by 1988, the Service acquired title to the TNC land. At this point, the entire Island was under the control of Federal and State governments.

In 1989, officials from the Service, TPWD, and the GLO conceptually agreed to an expanded partnership arrangement for management of the entire Island. The acquisition of the lower portion of the Island by the Service, culmination of a grazing permit up for renewal, expiration of the TPWD management plan, greater planned development of the State Park, and grazing compatibility assessments in 1989, all led to the development of a 1994 Memorandum of Agreement (MOA). Out of this process, livestock grazing on the Island had been eliminated in 1991. The basis for this 1994 MOA, with much retained and adopted from the 1982 agreement, is that the Service and GLO wished to add parcels C and D to the partnership relationship for the management of Matagorda Island (page 2, 1994 Conservation Easement Amendment [CEA] and page 2, 1994 MOA). Hence, Matagorda Island would be managed as one unit. This can be summarized as follows: Matagorda Island parcels A and C (combined uplands – 30,502 acres) are now totally under Federal ownership (page 1, 1994 MOA) and will remain under the primary jurisdiction of the Service (page 3, number 4, 1994 MOA) as Federal lands. The upper two-thirds of Matagorda Island, State and Federal lands combined, parcels A and B (tidal flats and beaches – 24,891 acres) for a total of 43,891 acres, remains under the shared cross-easement agreement established in 1982 (page 2, 1982 MOA and page 2, number 4, 1994 CEA) between the State and the Service. The lower one-third of State Gulf lands, parcel D (beaches – 1,275 acres), starting at Cedar Bayou and extending up the Island about 10 miles, remains with the GLO. These lands (1,275 acres) are not leased to TPWD as part of the State Park and Wildlife Management Area, and were not included in the 1982 cross-easement agreement (page 2 number 4, 1994 CEA). However, this stretch of lower beach became part of the Refuge (page 2, 1994 CEA and page 2, 1994 MOA) and by this agreement, GLO entered directly as a partner with the Service. Finally, the lower one-third of Matagorda Island, parcel C (uplands – 11,502 acres), purchased outright from TNC, remains with the Service and is not included in the cross-easement agreement but simply added to the Refuge lands in the partnership relationship for the management of Matagorda Island (page 2, 1994 CEA, and page 2, 1994 MOA). However, the tidal flats along this lower stretch of the Island, beyond the Refuge boundary, have always been part of the 1982 cross-easement agreement. In summary, the Island is either under the umbrella of State and Federal (GLO, TPWD, and the Service) or Federal and State (Service and GLO) or entirely Federal protection, depending on where one is standing. The only portion of the Island falling exclusively under the Federal (Service) umbrella is the lower one-third uplands (parcel C), due to the outright acquisition of this former TNC land with Land and Water Conservation funds (Figure 1-2).



U.S. Fish & Wildlife Service

Aransas National Wildlife Refuge

Calhoun County, Texas

Figure 1-2. Matagorda Island Unit - Land Status Map

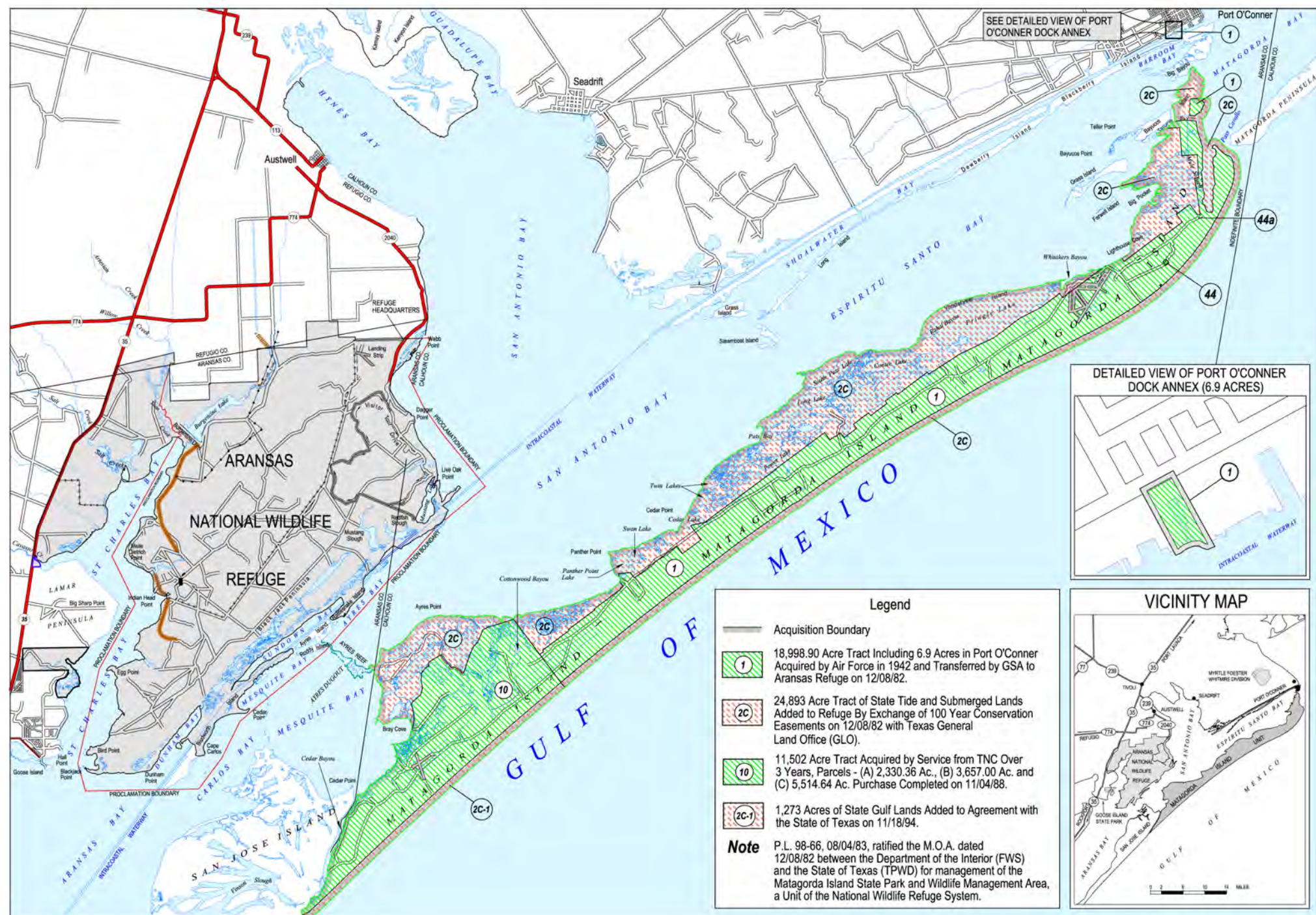


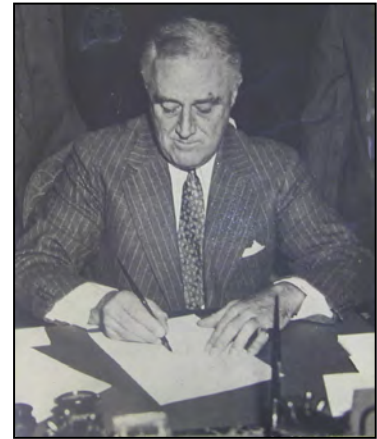
Figure 1-2. Matagorda Island Unit - Land Status Map

The 1994 MOA was authorized on November 18, 1994, by the Secretary of the Interior, Service Director, Texas Governor, Texas GLO Commissioner and Chairman of the School Land Board, and the Chairman of the Texas Parks and Wildlife Commission (see Appendix F). The 1994 MOA delineates current programmatic management responsibilities, land holdings, and cross-easements by amending and superseding the 1982 MOA. The 1994 MOA remains in effect until December 8, 2082 (Appendix F, paragraph 23). According to the 1994 MOA, the Service owns 30,502 acres, including 6.9 acres in Port O'Connor. The State owns approximately 26,166 acres, administered by the GLO, of which 24,891 acres are leased to TPWD. The State and Federal governments concurrently hold cross-easements on each other's acreage, as originally designated by the 1982 MOA. The exception to these cross-easements is the combined 12,775 acres comprised of the lower one-third of the Island and adjacent State Gulf lands. The adjacent State Gulf lands (1,273 acres) remain under the primary jurisdiction of the GLO, and the 11,502 acres remain with the Service by virtue of ownership, and both were added to the Refuge in the 1994 MOA. Per the 1994 MOA, the name for this all-inclusive entity is Matagorda Island National Wildlife Refuge and State Natural Area (MINWR & SNA). In 2000, the Refuge acquired an additional 15.29 acres in a title transfer of lands around the Matagorda Island Lighthouse from the U.S. Coast Guard. Today, a total of 30,517 acres are owned in fee by the Federal government. This means a total of 56,683 acres comprise MINWR & SNA. Texas Parks and Wildlife Department is still responsible for public use, and the Service is responsible for wildlife and habitat management on Matagorda Island.

1.2 *Refuge Purposes and Authorizing Legislation*

The Service defines the purposes of national wildlife refuges when a refuge is established or when new land is added to an existing refuge. The three methods used in establishing Aransas NWRC were: Executive order, transfers and donations, and acquisitions funded through the Land and Water Conservation Fund. The following respective purposes form the foundation upon which management decisions are made, and on which goals, objectives, and strategies are developed in support of these purposes:

Aransas National Wildlife Refuge (Aransas Unit), originally comprising 47,261 acres, 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 that the Refuge is “...for use as an inviolate sanctuary...for any other management purposes...for migratory birds...” (16 U.S.C. § 715d). Additionally, 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.”



President Franklin D. Roosevelt signing the Executive Order establishing Aransas National Wildlife Refuge in 1937. Photo: USFWS

The **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 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, U.S. Department of the Interior (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).

The **Lamar Unit** was established on November 12, 1992, by purchase acquisition of 733 acres, “...for protection of critical habitat for the endangered whooping crane” (Service memo dated November 12, 1992). This acquisition was implemented under the authority of the Endangered Species Act of 1973, which established that the unit serves “... to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants” (16 U.S.C. § 1534). The Johnson tract, forming part of the Lamar Unit, was established on April 7, 2003, by donation of 245 acres from The Nature Conservancy of Texas, “...so that the natural resources that constitute the property, and the wildlife that use the property are protected” (TNC donation letter, April 7, 2003). This acquisition was implemented under the authority of the Endangered Species Act of 1973, which also established that the tract serve “...to conserve (A) fish or wildlife which are listed as endangered species or threatened species...or (B) plants” (16 U.S.C. § 1534).

The **Myrtle Foester Whitmire Unit** was established on March 9, 1993, by purchase acquisition of 3,440 acres from willing sellers, “...to preserve approximately 3,534 acres of important wetland habitat for migrating and wintering waterfowl and to protect vital production habitat for resident mottled duck” (acquisition document dated March 9, 1993). 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).

The **Matagorda Island Unit** (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).

Matagorda Island Unit (second acquisition) was established in November, 1988, by purchase acquisition 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).

Matagorda Island Unit (third acquisition) was established on December 8, 2000, by administrative transfer of 15.29 acres and the Matagorda Island 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 also 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 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).

Much of the Refuge is also designated critical wintering habitat for the whooping crane (43 FR 20938, May 15, 1978).

1.3 Purpose and Need for the Plan

The purpose of this Plan is to fulfill the goals identified for the Refuge through this planning process, including:

Wildlife. To protect, restore, and maintain a diversity of native wildlife with special emphasis on Federal trust species and other species of management concern.

Habitat. To protect, restore, and maintain the prominent features within the Texas Gulf Coast Ecosystem, which include blackland coastal prairie, wetlands, coastal woodlands, barrier island, and tidal and estuary habitats on and near the Refuge while controlling the spread of invasive or exotic plants.

People. To provide quality, wildlife-dependent recreational and environmental education opportunities to a diverse audience and increase Refuge System support by promoting an understanding and appreciation for the unique wildlife, fish, habitats, and cultural history of the Aransas NWRC.

This Plan, with its clear management direction laid out in specific objectives and strategies, is needed to provide a vision for the Refuge and provide management direction for conducting scientific research, restoration, maintenance, and management of compatible public uses of Refuge resources for the next 15 years. Specifically the Plan is needed to:

- Provide a clear statement of Refuge management direction;
- Provide Refuge neighbors, visitors, and government officials with an understanding of Service management actions on, and where applicable, around the Refuge;
- Ensure that the Service’s management actions are consistent with the mandates of the National Wildlife Refuge System; and
- Provide a basis for the development of budget requests for operations, maintenance, and capital improvement needs.

The Plan is also needed to ensure that the Refuge continues to conserve fish, wildlife, and habitat in the face of climate change and related stressors. By preparing this Plan, documenting goals and objectives, and involving partners and the public in the process, we can

gain a better understanding of the Refuge. Sustaining the nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. This Plan will help explain how Aransas NWRC fits into the larger landscape and its role in protecting our natural resources for present and future generations.

1.4 Fish and Wildlife Service Mission

The U.S. Fish and Wildlife Service is the principal Federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service has a primary responsibility to manage and protect Federal trust species, which includes migratory birds, threatened species, endangered species, inter-jurisdictional fish, marine mammals, and other species of concern. Specific responsibilities include enforcing Federal wildlife laws, managing migratory bird populations, restoring nationally significant fisheries, administering the Endangered Species Act, conserving and restoring wildlife habitat such as wetlands, and helping Native American tribal governments and foreign governments with their conservation efforts. It also oversees the Federal Assistance Program, which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to State fish and wildlife agencies. The Service also manages the National Wildlife Refuge System. The mission of the U.S. Fish and Wildlife Service is:

“Working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people”

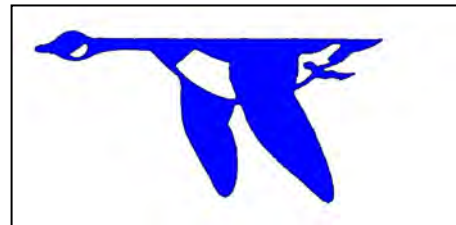
1.5 National Wildlife Refuge System Mission and Goals

The National Wildlife Refuge System (Refuge System, System) is the only existing system of federally owned lands managed chiefly for the conservation of wildlife. Founded in 1903 by President Theodore Roosevelt with the designation of Pelican Island as a refuge for brown pelicans, the Refuge System consists of over 150 million acres in over 551 refuges and 37 wetland management districts in all 50 states and U.S. territories (Figure 1-3).

National wildlife refuges host a tremendous variety of plants and animals supported by a variety of habitats from arctic tundra and prairie grasslands to subtropical estuaries. Most national wildlife refuges are strategically located along major bird migration corridors, ensuring that ducks, geese, and songbirds have rest stops on their annual migrations. Many refuges are integral to the protection and survival of plant and animal species listed as endangered. The Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and ecosystem protection.

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 Blue Goose, the symbol of the National Wildlife Refuge System. Photo: USFWS

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 inter-jurisdictional 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.

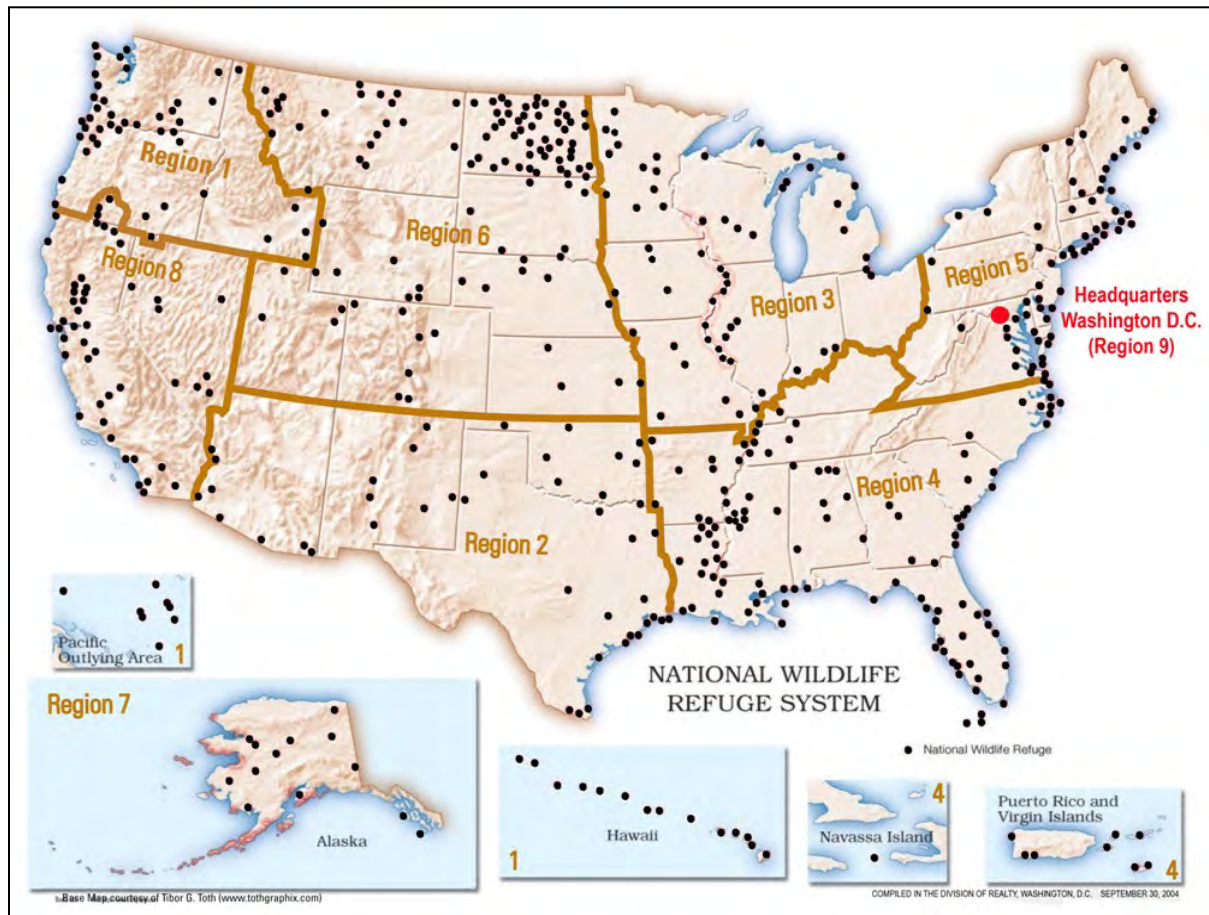


Figure 1-3. The National Wildlife Refuge System

1.6 Legal and Policy Guidance

Administration of national wildlife refuges is guided by refuge purposes, the mission and goals of the National Wildlife Refuge System, Federal law, Presidential executive orders, and international treaties. Refuge management is further refined by Service policy, as provided in the Service Manual, director's orders, and memorandums. Most recently, the National Wildlife Refuge System Improvement Act of 1997, which amended the Refuge System Administration Act of 1966, includes a unifying mission for the Refuge System, a new process for determining compatible uses on refuges, and a requirement that each refuge will be managed under a Comprehensive Conservation Plan. Except where otherwise mandated by law, the Service must determine whether a particular use is compatible with refuge purposes before permitting it (see Appendix G for all Refuge Compatibility Determinations). The Refuge Improvement Act of 1997 also requires the Secretary of the Interior to maintain the biological integrity, diversity, and environmental health of the Refuge System (Biological Integrity Policy; 601 FW 3). For a more complete listing of relevant legal mandates and policies guiding refuge management, see Appendix A.

Coordination with the State of Texas

In administering the Refuge System, the Service will ensure that the Comprehensive Conservation Plan complements State efforts to conserve fish and wildlife and their habitats, and to increase support for the Refuge System and participation from conservation partners and the public. During the development of the Plan, the Service is required to consult and coordinate with affected State conservation agencies, as well as adjoining Federal, local, and private landowners. The Service is required to ensure effective coordination, interaction, and cooperation in a timely and effective manner with the State during the course of acquiring and managing refuges. Under the Refuge Administration Act of 1966 and 43 CFR 24, the Director and the Secretary's designee is required to ensure the Refuge System regulations and management plans are, to the extent practicable, consistent with State laws, regulations, and management plans.

1.7 Existing Partnerships

Aransas NWRC staff work with a variety of individuals and organizations to accomplish habitat and wildlife management, outreach, and environmental education projects. Some current partners include: U.S. Army Corps of Engineers (Corps); The Nature Conservancy of Texas (TNC); Natural Resources Conservation Service (NRCS); TPWD; GLO; National Park Service (NPS); National Oceanic and Atmospheric Administration (NOAA); Texas Forest Service (TFS); Aransas, Refugio, and Calhoun County sheriff's offices; chambers of commerce and volunteer fire departments of Aransas, Refugio, and Calhoun counties; International Bowhunters Education Program; U.S. Coast Guard; Texas Master Naturalists; Coastal Bend Bays and Estuaries Program; Friends of Aransas and Matagorda Island NWRC (FAMI); Golden Crescent Nature Club; Texas Wildlife Association; and Victoria College. Far less would be accomplished within and beyond the Refuge boundaries without these important partnerships.

The Refuge's longstanding and extensive partnership with TPWD includes working with virtually all divisions of this State agency: Law Enforcement, Coastal Fisheries, Parks, Infrastructure, Communications, and Wildlife. Currently, the TPWD Wildlife and Coastal Fisheries Divisions occupy three of the usable buildings on the north end of Matagorda Island and all four buildings at the Port O'Connor Dock Annex. In 1984, Coastal Fisheries Division

began operations at the Port O'Connor facilities. Annually, the Refuge permits and assists TPWD biologists in the banding of mottled ducks on the Myrtle Foester Whitmire Unit (MFW). The Refuge also permitted and assisted TPWD in trapping alligators on the MFW as part of a mottled duck mortality study. Since 2000, the Refuge has permitted, assisted, and funded, via the FAMI group, TPWD special annual youth hunts on the Refuge's Tatton Unit. The Refuge has provided TPWD with a tractor, a roller-chopper, and an equipment operator for use on the Guadalupe Delta Wildlife Management Area. In 2003, the Matagorda Island State Park ferry was destroyed by fire, halting all public transportation to and from the Island. Subsequent to the fire, the Refuge loaned its 42-foot Skimmer (watercraft) to the State Park to resume transports of park visitors. During 2004, the Skimmer was damaged, with repair estimates in excess of \$10,000, and was taken out of service. In December 2005, the Refuge constructed a new \$70,000 boat storage barn at the Port O'Connor Dock Annex and is sharing this boat storage with TPWD, Texas General Land Office, and Service Law Enforcement. All funds for this boat barn came from donations of the FAMI group. Since 1982, the Refuge has provided barge transportation for the State to and from the Island. During the last six years, the Refuge has provided barge transportation for TPWD-State Parks and Wildlife Division to haul equipment, fuel, and supplies totaling more than \$30,000 annually. During the past three years, the Refuge has placed on permanent loan to TPWD six travel trailers for use at the World Birding Center and at other TPWD locations. During fiscal year 2005, the Refuge constructed a new 150-foot radio tower for a new Refuge repeater, also for use by TPWD Law Enforcement Division. This new tower eliminated the tower rental payments that the TPWD was making for their radio communications. Additionally, the Refuge annually provides biological data to TPWD on frog density, box turtle distribution, and whooping cranes. The Refuge has also provided formal invasive species control training for the benefit of Goose Island State Park employees.

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2. Planning Process: Considerations, Perspectives, and Issues

The development of this Comprehensive Conservation Plan has incorporated Refuge purposes and the directives, policies, and regulations of the Service and the Refuge System to assist in providing long-range guidance for the Refuge. In addition, this Plan incorporates important goals and objectives of other applicable plans, approaches, or initiatives such as those described in the following sections.



Photo: USFWS

2.1 Strategic Habitat Conservation

An important overall force guiding the wildlife and habitat goals and objectives of the Plan is a focus on habitat conservation—not just on the Refuge but on a landscape level. In 2006, the National Ecological Assessment Team released the Strategic Habitat Conservation (SHC) report. This report outlines a framework for conservation actions on a landscape level containing four key elements: 1) biological planning; 2) conservation design; 3) delivery of conservation actions; and 4) monitoring and research; all four elements are implemented in an adaptive management loop (USFWS/USGS 2006). Using this approach, our abilities to protect and enhance wildlife populations and their ecology are improved through more efficient uses of resources that are focused on key priority species (i.e., focal species) representative of larger guilds of species or groups that use habitats similarly. The guiding principles of the SHC approach involve defining measurable population objectives, using the best scientific information available, implementing management actions that are defensible, incorporating an “adaptive management” approach, and working with partners. The goal of strategic habitat conservation is the conservation of populations and the ecological functions that sustain them (USFWS/USGS 2006).

2.2 The Ecosystem Approach to Management

The Service has adopted an ecosystem approach to more effectively achieve its mission of fish and wildlife conservation for future generations. The ecosystem approach is defined as “...protecting or restoring the natural function, structure, and species composition of an ecosystem while recognizing that all components are interrelated.” Ecosystem management includes preservation and enhancement of ecological integrity and sustainable levels of economic and recreational activity. Central to the successful implementation of the ecosystem management approach is involvement of partners from Federal, State, and local governments, and the private sector, especially landowners.

The Service has identified 52 ecosystems within the United States (U.S.), based primarily on watershed designations. The Aransas NWRC occurs in the Texas Gulf Coast Ecosystem (see section 3.1 Geographic/Ecosystem Setting). The Service’s goal for the Texas Gulf Coast Ecosystem is to help restore, maintain, and enhance the level of natural species diversity (floral and faunal communities) indigenous to the ecosystem, in close cooperation with resource management agencies, other government and non-governmental entities, industries, private landowners, and other citizenry. The Texas Gulf Coast Ecosystem also comprises the

same area identified by the State of Texas as the Gulf Prairies and Marshes Ecoregion, a high conservation priority area (TPWD 2005). See section 3.1 Geographic/Ecosystem Setting.

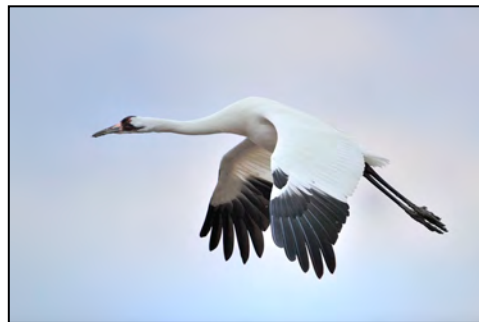
2.3 Other Plans and Initiatives Relevant to Aransas NWRC Comprehensive Conservation Planning

2.3.1 Threatened and Endangered Species Recovery Plans

The following federally listed species in this Comprehensive Conservation Plan are those that regularly or seasonally occur on the Refuge, and for which Refuge management efforts are directed. Although other listed species may incidentally occur on the Refuge (e.g., federally threatened or endangered marine mammals or hypothetical species), these are not addressed in detail in the Plan. The National Marine Fisheries Service, under the Marine Mammal Protection Act and the Endangered Species Act, has jurisdiction for protected marine species such as whales. However, certain marine species such as manatees are under the jurisdiction of the Service.

International Recovery Plan for the Whooping Crane, Third Revision (2007)

In the U.S., the whooping crane (*Grus americana*) was listed as “threatened with extinction” in 1967 and endangered in 1970—both listings were “grandfathered” into the Endangered Species Act of 1973. Critical habitat for this species was designated in 1978, and much of the Refuge is part of this designation (43 FR 20938). The Aransas-Wood Buffalo Population (AWBP) is the only remaining natural population of whooping cranes. This population breeds at the Wood Buffalo National Park



Whooping Crane in Flight.
Photo: Alan Murphy

in Canada and winters at Aransas NWRC. Therefore, much of the Refuge wildlife and habitat management is geared toward protection of the whooping crane, as directed by the Whooping Crane Recovery Plan. Aransas NWRC implements a variety of recovery actions involving protecting and managing their wintering habitat, maintaining freshwater inflows, and monitoring the birds during the wintering months. Habitat management actions proposed in the Plan closely coordinate with important whooping crane recovery items and known crane requirements, as per the recovery plan. The recovery goal is to protect the whooping crane and its habitat and to allow the overall population to reach a level of ecological and genetic stability so that it can be downlisted to threatened status and eventually removed from the lists of Threatened and Endangered Species.

According to the recovery plan, two primary objectives and measurable criteria will help achieve the goal of reclassifying this species as threatened. The first objective is to establish and maintain self-sustaining populations of whooping cranes in the wild that are genetically stable and resilient to stochastic environmental events. The second objective is to maintain a genetically stable captive population to ensure against extinction of the species. For these objectives to be met, recovery actions are outlined in the recovery plan with the intent of reducing threats to the whooping cranes and their habitat. One such action is to protect whooping crane habitat, and the recovery plan specifically discusses the importance of the Aransas NWRC in providing cranes with winter habitat. Other actions described in the

recovery plan are to maintain the Aransas NWRC, to prevent erosion and other disturbances to the quality of habitat available at the Refuge, and to maintain freshwater inflows. The recovery plan also includes an implementation schedule that prioritizes management, as well as a list of individuals who are actively involved in the whooping crane recovery efforts.

Northern Aplomado Falcon Recovery Plan (1990)

The Aplomado Falcon Recovery Plan states that “...suitable habitat in the United States and Mexico should be identified and protected, especially in areas close to reintroduction sites.” Additionally, “Particular attention should be directed toward suitable habitat on public lands.” Other elements of the recovery plan emphasize a reintroduction program to establish populations in the U.S. The criteria for downlisting the aplomado to threatened is when “...a minimum self-sustaining population of 60 breeding pairs has been established in the United States.” Per the recovery plan, releases of aplomado falcons on the Tatton and Matagorda Island Units were conducted for several years up until 2003. Today, aplomado falcons nest primarily on Matagorda Island, and these falcons will continue to be monitored on Aransas NWRC, as directed by the recovery plan.

Attwater’s Prairie Chicken Recovery Plan, Second Revision (2010)

This plan delineates reasonable actions believed necessary to recover and to protect the Attwater’s Prairie Chicken (APC). The 2010 revision of the recovery plan states that the recovery goal is to protect and ensure the survival of the APC and its habitat, allowing the population to reach a measurable level of ecological and genetic stability so that it can be downlisted to threatened and ultimately removed from the endangered species list. The primary strategies to achieve this goal are focused on habitat management, captive and wild population management, and public outreach. The recovery plan outlines four specific objectives necessary to achieve the recovery goal. The first objective involves maintaining and improving the coastal prairie habitat for the APC throughout the bird’s historic range. The second objective is to enhance propagation and release efforts. The other two objectives are 1) establishing populations of at least 500 birds in multiple core areas, allowing for gene flow between populations, and 2) broadening public support and establishing partnerships to aid in recovery efforts. The recovery plan states that the threshold population size of 6,000 birds required for delisting could be achieved within as few as six years, but the plan states that it is more likely that delisting will be achieved within 55 years.

Piping Plover

Because of declines in numbers and breeding sites, piping plover populations became federally listed in 1986 (50 FR 50726-34). Piping plovers on the Great Lakes were listed as endangered, and Atlantic and Northern Great Plains populations were listed as threatened. Piping plovers on migration and in wintering areas (such as at Matagorda Island) are classified as a threatened species. Critical habitat has recently been proposed along the Texas coast (73 FR 29294-29321; May 20, 2008). Piping plovers winter primarily along beaches, sandflats, and algal flats on the Gulf of Mexico and on the Refuge, mainly occurring on Matagorda Island. Some of the actions needed to recover the species include determining current distribution and population trends, and protecting, preserving, enhancing piping plover habitat. Strategies to help implement these recovery actions for the piping plover are included in this Plan. For Aransas NWRC, these include protecting their wintering habitat from undue disturbance and impacts resulting from human activities such as off-road vehicle use along the beach, washover passes, and the algal flats of Matagorda Island.

Sea Turtle Recovery Plans

Major actions needed to achieve sea turtle recovery involve providing long-term protection to important nesting beaches, ensuring hatching success, determining distribution and seasonal movements for all life stages, minimizing mortality from commercial fisheries, and reducing the threat from marine pollution. On the Refuge, the Kemp's ridley nests on the beach. The Kemp's ridley, loggerhead, hawksbill, green, and leatherback sea turtles occur within the Gulf of Mexico and may also occur within bay waters.

The Refuge contributes to recovery plan tasks for sea turtles primarily through monitoring nesting and stranding, patrolling beaches, protecting nest areas, participating in recovery work groups, and partnering with sister agencies such as the National Park Service's Padre Island National Seashore. Nest monitoring includes all-terrain vehicle (ATV) beach patrols on the Matagorda Island Unit from April through June, which corresponds with the nesting season of the Kemp's ridley. The Refuge participates in the Sea Turtle Stranding and Salvage Network, as recommended in these recovery plans. This Plan incorporates habitat and monitoring strategies and other action items beneficial to sea turtles, as they apply to Aransas NWRC.

2.3.2 National Plans and Initiatives

There are several ongoing migratory bird conservation initiatives that all refuges participate in to a practicable extent. Refuge goals, objectives, and strategies identified in this Plan take into account the following plans and initiatives as they relate to the Refuge.

Migratory Bird Program Focal Species

The Service's Migratory Bird Program Strategic Plan 2004–2014 identified 139 species or populations as a priority to increase the percent of migratory birds that are at healthy and sustainable levels. The target for the percent increase was equivalent to five species by fiscal year (FY) 2007, and another five species by FY 2012 (five species per five-year increment). The long-billed curlew, snowy plover, and painted bunting were among those species that occur on the Refuge and were identified as the highest priority focal species to be addressed first (beginning in FY 2005). Migratory Bird Program focal species identified in this Plan that frequently occur on the Refuge include Canada goose, American wigeon, mallard, mottled duck (nests), northern pintail, brown pelican (nests), double-crested cormorant, reddish egret (nests), peregrine falcon, clapper rail (nests), king rail (nests), sandhill crane, snowy plover, Wilson's plover (nests), piping plover, long-billed curlew, gull-billed tern (nests), Caspian tern (nests), yellow-billed cuckoo (nests), loggerhead shrike (nests), seaside sparrow (nests), painted bunting (nests), and eastern meadowlark (nests). Habitat objectives and strategies are geared toward the protection and maintenance of essential habitats for these species. The Refuge will continue cross-programmatic coordination and collaborative efforts with conservation partners for these species that occur on Aransas NWRC.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP) was launched in 1986 in response to record low waterfowl numbers observed in the early 1980s. Recognizing the importance of waterfowl and wetlands in North America and the need for international cooperation to help in the recovery of shared resources, the Canadian and United States governments, and later the Mexican government, developed a strategy to restore waterfowl populations to levels seen in the 1970s. The purpose of the NAWMP is to conserve and increase waterfowl numbers, primarily through habitat protection, restoration, and

enhancement, while maintaining or enhancing the associated ecological values in harmony with human needs (Esslinger and Wilson 2001).

The NAWMP goals seek the protection of 12.2 million acres of wetland habitat and the restoration and enhancement of 15.2 million acres of wetland habitat. Waterfowl population goals continue to be the restoration of the numbers seen in the 1970s. The plan's success depends upon partnerships involving Federal, State, provincial, and local governments; businesses; conservation organizations; and individual citizens. Regional partnerships called joint ventures are the implementing mechanisms of the NAWMP. The Aransas NWRC is within the Gulf Coast Joint Venture–Texas Mid-Coast Initiative area. The Texas Mid-Coast Initiative area occurs along the Texas Coast from Aransas Bay to West Bay, near Galveston Island. The goal of the Texas Mid-Coast Initiative area is to provide wintering and migration habitat for significant numbers of dabbling ducks, redheads, lesser snow geese, and greater white-fronted geese, as well as year-round habitat for mottled ducks. In addition, conservation strategies call for wetland maintenance, restoration, enhancement, and creation. This plan incorporates many of these important waterfowl and wetland conservation activities in support of NAWMP goals and objectives, as they apply to Aransas NWRC.

Partners in Flight

Partners in Flight (PIF) was launched in 1990 in response to growing concerns about declines in the populations of several land bird species and to emphasize the conservation of birds not covered by existing conservation initiatives. The PIF vision is: *“Populations of native birds will occur in their natural numbers, natural habitats and natural geographic ranges, through coordinated efforts by scientists, government and private citizens.”* The initial focus was on species that breed in North America and winter in Central and South America, but it has since expanded to include most land birds and other species requiring terrestrial habitats. Partners in Flight is a cooperative effort involving partnerships of Federal, State, and local government agencies; philanthropic organizations; professional organizations; conservation groups; industry; the academic community; and private individuals. The goal of PIF is to focus the combined resources of these partners on the improvement of monitoring and inventorying, research, management, and education programs relating to land birds and their habitats. Implicit in the plan is the need to identify, protect, manage, and restore essential habitat for declining species.

Aransas NWRC is within PIF Physiographic Area #06, the Coastal Prairies, which covers approximately 1,400 miles (880 kilometers) of coastal shoreline from Atchafalaya Basin, Louisiana, to Baffin Bay, Texas. The inland boundary of this area ranges from about 9 to 94 miles (15 to 150 kilometers) from the coast, encompassing a complex of marshes, upland grassland, coastal woodlands, and a small amount of forested habitat. Marsh vegetation community types range from salt marsh to freshwater marsh. Nearly all grassland habitats have been converted to agricultural use, primarily pasture lands and rice farms. Woodlands occur as long narrow bands of typically hackberry and live oak that run parallel to the Gulf Coast. Forested areas occur primarily along major riverine systems and on coastal cheniers (ancient beachfront ridges), mottes and salt domes, and man-made levees and spoil banks. Bottomland hardwood forests are found along the major river systems that drain the Coastal Prairies range. Aransas NWRC has a mix of these habitats with the exception of bottomland hardwood forests. These habitat types that occur on the Refuge will be protected and maintained for the benefit of PIF species.

U.S. Shorebird Conservation Plan

The U.S. Shorebird Conservation Plan is a partnership involving organizations throughout the United States committed to the conservation of shorebirds. The plan provides multi-scale conservation goals, identifies critical habitat conservation needs and key research needs, and includes education and outreach programs to increase awareness of the threats shorebirds face. At a regional scale, the goal of the plan is to ensure that adequate quantity and quality of habitat is identified and maintained to support the different shorebirds that breed in, winter in, and migrate through each region. At a national scale, the goal is to stabilize populations of all shorebird species known or suspected of being in decline due to limiting factors occurring within the U.S., while ensuring that common species are also protected from future threats. At a hemispheric scale, the goal is to restore and maintain the populations of all shorebird species in the Western Hemisphere through cooperative international efforts.

The plan is designed to complement the existing landscape-scale conservation efforts of the NAWMP, PIF, and the North American Colonial Waterbird Conservation Plan. Each of these initiatives addresses different groups of birds, but all share many of the same conservation challenges. One major task is to integrate these efforts to ensure coordinated on-the-ground bird conservation efforts in the form of specific habitat protection and maintenance unique to the Refuge.

North American Waterbird Conservation Plan

In 1998, the North American Waterbird Conservation Plan (NAWCP) was started to advance the conservation of colonial-nesting waterbirds and their habitats in North America. A partnership of non-governmental agencies, researchers, individuals, and government agencies was assembled to develop this plan. The purpose of the plan was to create a cohesive multinational partnership for conserving and managing colonial-nesting waterbirds (seabirds, wading birds, terns, and gulls) and their habitats throughout North America. The goal was to produce a plan whose implementation results in maintaining healthy populations, distributions, and habitats of colonial-nesting waterbirds in North America throughout their breeding, migratory, and wintering ranges. In 2000, the focus of this conservation planning effort expanded beyond colonial waterbirds to include non-colonial waterbirds and secretive marsh birds not covered by other conservation plans, such as rails, bitterns, and grebes. Several habitat management objectives and strategies in the plan are geared toward conservation of colonial and marsh birds, as they apply to Aransas NWRC.

North American Bird Conservation Initiative

The NABCI was formed in 1998 for the conservation of Native American birds through enhanced coordination, increasing the effectiveness of new and pre-existing bird conservation initiatives, and fostering greater cooperation among peoples and nations of North America. The NABCI is a coalition of U.S., Canadian, and Mexican governmental agencies and private organizations. The NABCI is envisioned as a broad “umbrella” for the many conservation initiatives within the three North American nations. Central elements of the NABCI involve implementation of actions necessary to achieve population and habitat objectives spelled out in the various conservation initiatives that are underway. This conservation approach is expressed through NABCI’s goal of delivering the full spectrum of bird conservation through regionally-based, biologically-driven, landscape-oriented partnerships. One of the ways this is accomplished is the development of worldwide “Important Bird Areas” (IBAs) and “Bird Conservation Regions” (BCRs), which were established by NABCI Committees. These

designations facilitate coordination and focus bird conservation efforts at local, regional, and national levels.

An IBA is defined as any site that provides essential breeding, wintering, and/or stopover habitat for one or more bird species and, in particular, those species or groups of species of conservation concern such as threatened or endangered species. The Refuge's Blackjack Peninsula is a designated Texas IBA because it is where endangered whooping cranes spend their winters; it is a protected area with fish, blue crabs, and clams, which support the cranes as well as a variety of other waterbirds. The Refuge lies within BCR #37 (Gulf Coastal Prairie). This BCR is described by the NABCI as flat grasslands and marshes along the coast of the Gulf of Mexico, from northern Tamaulipas across the mouth of the Rio Grande, up into the rice country of southeastern Texas, and eastward to the Louisiana marshlands at the mouth of the Mississippi River. Some of the continent's highest priority birds breed or winter in this area. These include the reddish egret, roseate spoonbill, northern harrier, brown pelican, yellow-billed cuckoo, burrowing owl, and large numbers of herons, egrets, ibis, terns, and skimmers. This BCR provides critical migratory stopover habitat for such species as buffbreasted sandpiper, Hudsonian godwit, and most of the Neotropical migrant forest birds of eastern North America. Mottled ducks, fulvous whistling ducks, and purple gallinules also breed in the wetlands of BCR #37, and waterfowl numbers in the winter are among the highest on the continent. The Gulf Coast Prairies and Marshes Ecoregion consists of numerous shallow wetlands, tidal flats, grasslands, and woodlands within this BCR. Habitat management objectives and strategies for the Refuge are geared toward conservation of these species and habitats, as they apply to Aransas NWRC.

U.S. Ocean Action Plan (2004)

As part of Oceans Act of 2000 and the U.S. Commission on Ocean Policy, the U.S. Ocean Action Plan recognizes the importance of the ocean, coasts, and Great Lakes of the U.S., and promotes responsible use and stewardship of ocean and coastal resources for the benefit of all Americans. The intent of the plan is to identify immediate, short-term actions that provide direction for ocean policy, and also to outline additional long-term actions that provide direction for the future. The U.S. Fish and Wildlife Service has established guiding principles (June 21, 2007, Memo) to implement relevant aspects of this plan through an ecosystem-based management approach. Some of the guiding principles include a focus on the Service mission; statutory responsibilities; integrating goals and activities across programs and agencies; providing technical assistance to partners; and managing marine and coastal national wildlife refuges for "wildlife first," along with compatible public uses. The Aransas NWRC Plan complements these efforts by incorporating relevant priorities, including but not limited to conserving and restoring coastal habitat, enhancing the conservation of marine mammals and sea turtles, strengthening coordination with other agencies, establishing and maintaining excellent partnerships, and monitoring coastal resources within the management area.

Marine Protected Areas (2000)

Marine Protected Areas (MPAs) are defined as any area of the marine environment reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein. As such, portions of Aransas NWRC qualify as an MPA. Executive Order (EO) 13158 (65 FR 34909–11) directs Federal agencies to work together with states, territories, tribes, and non-governmental partners to maintain the MPA system and to accomplish a variety of related tasks working with public and private partners. The mission statement of the MPA Center's Strategic Plan

(2007) is “*To facilitate the effective use of science, technology, training, and information in the planning, management, and evaluation of the Nation’s system of MPAs.*” The main focus is to ensure that MPAs are coordinated in a larger ecosystem framework to comprehensively protect these natural and cultural resources, and through the National System, that these sites and programs will benefit by working together to accomplish priorities that could not be achieved alone. Through the 1994 Memorandum of Agreement, the Refuge has partnered with TPWD and the GLO to protect the marine environments adjacent to Matagorda Island. In addition, 12,934 acres of open bay waters, established by Presidential proclamation in 1938 as a buffer zone around Blackjack Peninsula, was established to prohibit migratory bird hunting and protect endangered whooping cranes. The Refuge will maintain these existing partnerships and develop new partnerships within the spirit of EO 13158 to further enhance protection of marine environments such as these.

Mission–Aransas National Estuarine Research Reserve System (2006)

Administered through NOAA, the National Estuarine Research Reserve System (NERRS) is a network of coastal sites that operates as a partnership between the Federal government and coastal states. The goal of this non-regulatory program is to perform long-term research in relatively natural settings and to promote the sustainable use of the nation’s coasts and oceans through education and stewardship. The Mission–Aransas NERR, designated on May 3, 2006, will receive funding through NOAA and be managed by the University of Texas at Austin–Marine Science Institute. Other partners include the Service, Texas General Land Office, the Texas Parks and Wildlife Department, the Fennessy Ranch, and the Coastal Bend Land Trust. The Mission–Aransas NERR, named for the two major rivers that flow into the area, was the first reserve in Texas and the only one in the Western Gulf of Mexico Biogeographic Region. The Mission–Aransas NERR is located in Aransas and Refugio counties in the Aransas Bay complex and encompasses a little more than half of the Refuge. As reflected in the plan, the Refuge will continue to work with NERR partners to encourage research and education activities in the Mission–Aransas NERR.

USFWS Rising to the Challenge: Strategic Plan for Responding to Accelerating Climate Change (Draft, 2009)

The *Strategic Plan for Responding to Accelerating Climate Change* outlines the U.S. Fish and Wildlife Service’s vision and leadership role in combating climate change and its impacts. In the plan, the Service proposes three major strategies to address climate change: adaptation, mitigation, and engagement. This combination of anticipatory adaptation, reactive adaptation, reduced greenhouse gas emissions, and increased collaboration with partners and the public is intended to guide the way to innovative solutions to this multi-faceted issue. The plan outlines specific goals and objectives corresponding to each of the three strategies that, in combination, will focus the talents, creativity, and energy of the Service’s employees on a common plan for addressing climate change impacts. In its appendix, the plan includes the detailed *5-Year Action Plan* that provides a tangible course of action to initiate achieving the goals and objectives described in the strategic plan. Some of the actions that step-down from the strategic plan include establishing Regional Climate Teams, introducing Landscape Conservation Cooperatives, and increasing training materials that educate employees and the public on Strategic Habitat Conservation, the Service’s scientific framework for conducting landscape-scale conservation.

2.3.3 *State Plans and Initiatives*

Texas Comprehensive Wildlife Conservation Strategy

The State has developed a Comprehensive Wildlife Conservation Strategy (CWCS) as part of the State Wildlife Grant Program. The CWCS was completed in 2005 to assist the TPWD and its conservation partners with the development of initiatives and goals to address the needs of State wildlife and habitats. The plan provides detailed species and habitat information based on 10 major ecoregions in Texas. Aransas NWRC occurs within the Gulf Coast Prairies and Marshes Ecoregion. This ecoregion follows the Texas Coast and extends inland approximately 60 miles. The Gulf Coast Prairies and Marshes Ecoregion is ranked as a high conservation priority and is considered to be among the most threatened of the 10 ecoregions in the State. Priority species identified in the CWCS that occur or are likely to occur on Aransas NWRC are listed in Appendix B.

A major focus of the CWCS is to provide species and habitat assessments and conservation strategies. The plan indicates that since Texas is more than 94 percent privately owned, “...a strong education program” is also needed to “...gain support for general conservation, as well as specific projects.” High priority conservation actions include vegetation and habitat mapping, biological inventories, data collection and database management, land protection, support of bird joint ventures, land and water monitoring, developing conservation partnerships, and education and outreach activities (TPWD 2005). Habitat management objectives and strategies take into account many of the specific conservation actions in the State plan. Relevant strategies in this plan, which includes monitoring priority species and other wildlife found in the Gulf Coast Prairies and Marshes Ecoregion, take into account relevant conservation actions described in the CWCS.

Welder Flats Coastal Preserve

The Welder Flats Coastal Preserve was established by TPWD and the GLO to manage the sensitive and productive estuarine habitat and to protect the endangered whooping cranes that winter there. It is one of several estuarine areas set aside in a cooperative program established in 1987 by TPWD and GLO under the Coastal Preserve Program. State-owned submerged coastal lands, under the control of GLO, are leased to TPWD with management and protection of fish and wildlife resources given the highest priority. Welder Flats was one of two sites initially selected because of its extremely high estuarine habitat quality, its strategic location near the Aransas NWRC, and its use as a wintering area by an expanding group of endangered whooping cranes. The Welder Flats Coastal Preserve consists of approximately 1,400 acres of submerged land in San Antonio Bay, adjacent to the intersection of the GIWW and the Victoria Barge Canal. This includes about 947 acres of seagrass beds, five acres of oyster reef, and 450 acres of mostly shallow open bay waters, less than two feet in depth. The State lands are complexly interspersed with emergent private lands of the Cliburn Ranch, Falcon Point Ranch, and Welder Ranch. Critical whooping crane habitat has been designated for part of this area and thus, the Refuge’s interest in this area. The Refuge will continue to partner with these State and private landowners to develop additional protected areas for whooping cranes through conservation easements or other means.

Seagrass Conservation Plan for Texas (1999)

Status and trend information on Texas seagrasses, as documented by Pulich and Roberts (1996) and Quammen and Onuf (1993), indicate significant declines, and there are major

conservation and environmental problems affecting the remaining 235,000 total acres of Texas seagrasses. Seagrass meadows are unique subtropical habitats of bays and estuaries that play critical ecological roles in the Gulf Coast Ecosystem. Seagrass meadows provide a major organic source that drives coastal food webs; they help stabilize coastal erosion and sedimentation; they provide important nursery habitat for fish and other marine life; and seagrasses play a natural role in nutrient cycling and water quality processes.

Having State management authority or jurisdiction where seagrasses occur, TPWD, GLO, and the Texas Commission on Environmental Quality (TCEQ) have taken the lead in the development and implementation of this plan. The plan focuses on three issue categories: seagrass research; management/policy; and education/outreach, including cross-agency coordination and cooperation with Federal agencies. Refuge habitat management activities that include protection and maintenance of natural habitats, as compared to increasing development along the Texas coast, indirectly help maintain and protect the quality of seagrass beds that occur on adjoining State lands. The Refuge will promote the value and protection of seagrasses through outreach and environmental education strategies.

Land and Water Resources Conservation and Recreation Plan (2010)

Texas Parks and Wildlife Department developed the Land and Water Resources Conservation and Recreation Plan to aid the agency in conserving the natural and cultural resources of Texas for future generations. The criteria outlined in the plan will provide TPWD a foundation for decision making regarding the State's conservation and recreation needs. The first goal discussed in the plan is to *"practice, encourage, and enable science-based stewardship of natural and cultural resources."* The plan outlines various methods for achieving this goal, which include basing management decisions on best available science, becoming leaders in managing state lands, fostering conservation on private lands, and developing effective conservation partnerships. The Land and Water Resources Conservation and Recreation Plan explains a second goal of increasing access to and participation in the outdoors through actions such as encouraging nature and heritage tourism or facilitating access to private and public lands and waters for recreation purposes. Another goal for TPWD is to *"educate, inform, and engage Texas citizens in support of conservation and recreation."* The fourth goal is to *"employ efficient, sustainable, and sound business practices,"* which TPWD plans to do using means such as technology, professionalism, excellent customer service, financial resources, effective communication, and an organized culture. The plan culminates with a call to action directed at members of the public, motivating them to join in the conservation effort.

Texas Wetlands Conservation Plan (1997)

The goal of the Texas Wetlands Conservation Plan is to *"...enhance our wetland resources with respect to function and value through voluntary conservation and restoration of the quality, quantity and diversity of Texas wetlands."* The plan focuses on a non-regulatory, incentive-based approach to wetlands management and conservation aimed mainly at private landowners. The plan recognizes that over 95 percent of the land in Texas is privately owned and that over 50 percent of the wetlands have been lost due to groundwater pumping, surface water uses, and other development activities. Coordinated by the TPWD, the plan is intended as a guide for wetlands conservation efforts throughout the State. The plan focuses on enhancing the landowner's ability to use existing incentive programs and other land use options through outreach and technical assistance, developing and encouraging land management options that provide an economic incentive for conserving existing wetlands or restoring former ones, and coordinating regional wetlands conservation efforts.

The plan recognizes six wetland regions statewide: East Texas, Gulf Coast, South Texas, High Plains and Rolling Plains of the Panhandle, Central Texas, and Trans-Pecos Texas. The Gulf Coast region, which includes Aransas NWRC, contains a variety of salt, brackish, intermediate, and freshwater wetlands, including wet prairies, forested wetlands, barrier islands, tidal flats, estuarine bays, bayous, and rivers. Coastal prairies also contain rice fields, which can provide excellent wintering waterfowl habitat. The Aransas NWRC has these habitat types with the exception of forested wetlands and rivers. Within the spirit of this plan, the Comprehensive Conservation Plan includes measures for wetland restoration and enhancement, addressing freshwater inflow needs, controlling invasive species, increasing technical assistance and wetland management information to the public, improving cooperation among agencies that affect wetlands, providing educational presentations to school groups about wetland conservation, and maintaining or establishing important wetland conservation partnerships.

A Strategic Plan for Texas Parks and Wildlife 2003–2007

The mission of Texas Parks and Wildlife Department (TPWD) is *“to manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.”* The agency’s philosophy in fulfilling its mission includes: balancing outdoor recreation with conservation as we manage and protect natural and cultural resources; relying on sound science to guide conservation decisions; demonstrating that stewardship can improve current conservation problems and can help Texas meet the conservation challenges of the future; providing the highest possible standards of service, fairness, courtesy, and respect to our customers; and looking to the future to identify new conservation customers and devise programs needed to engage them into the 21st century. Texas Parks and Wildlife Department is functionally organized into 11 divisions: Coastal Fisheries; Infrastructure; Inland Fisheries; Law Enforcement; State Parks; Wildlife (Program Divisions); Administrative Resources; Communications; Human Resources; Information Technology; and Legal (Administrative Divisions). The agency operates approximately 123 State parks and historic sites, 51 Wildlife Management Areas (WMA), 8 hatcheries, and 66 offices statewide. According to the strategic plan, *“...Texas is likely to continue to grow relatively rapidly, and will remain among the fastest growing states in the nation.”* In 2009, the Texas population was approximately 24.7 million, and is expected to continue rising steadily during the next few years (U.S. Census Bureau). Texas Parks and Wildlife Department is expecting this population growth to *“...place increasing pressure on the State’s water and other natural resources...As more highways, buildings, and other structures are built to accommodate additional people, there will be less open space and fish, wildlife, and their natural habitats will suffer.”*

In response to this, TPWD has re-focused State natural resource conservation priorities in several key areas, such as broadening outreach programs, increasing recreational opportunities, and reaching more people through natural and cultural resource education. In addition, TPWD is expanding their resource protection efforts and taking steps to minimize adverse human impacts to the State’s fish, wildlife, and plant resources and their habitats, and to conserve and manage the function and biological diversity of Texas ecosystems. For example, the Texas Legislature has mandated a multi-agency, cooperative data collection and evaluation program to determine instream flow conditions in the State’s rivers and streams necessary to support a sound ecological environment. The TPWD, TCEQ, and the Texas Water Development Board are directed to develop a work plan that identifies priority studies and establishes a timetable for completing them no later than December 31, 2010. According to the plan *“...This will require*

effective planning and guidance, efficient use of resources (e.g., staff, funding, equipment), timely cooperation among participating agencies, a venue for idea exchange, innovative methods and approaches, and an inherent flexibility to address changes in ecological needs, permitting needs and requirements, and water planning evolution.” Another major initiative in the area of education and outreach includes key recommendations such as assessing existing outreach and education programs for effectiveness and duplication, increasing internal oversight over outreach and education, evaluating all proposed new outreach and education programs and events to determine need and duplication of existing efforts, and developing more extensive partnerships with other agencies, universities, and organizations in the coordination of outreach and education programs and events. In consideration of this strategic plan, the wildlife, habitat, and people objectives and strategies of the Comprehensive Conservation Plan focus on these shared concerns.

2.4 Planning Process

The process used to develop a plan is consistent with the planning requirements specified in the National Wildlife Refuge System Administration Act, as amended; the Service’s planning policy (602 FWS); National Environmental Policy Act (NEPA) direction (42 U.S.C. 4321-4347); and the Council on Environmental Quality’s Regulations for Implementing the Procedural Provisions of NEPA.



2.4.1 Preplanning

Preplanning is an important step in developing a quality Plan. Prior to formally initiating the development of this Plan, the following tasks were completed in order to support planning activities:

- Established an interdisciplinary interagency planning team

- Identified Refuge purpose, history, and establishing authority
- Identified all relevant laws, regulations, and policies that would have to be considered during the development of the Plan
- Identified purpose and need for the Plan to make sure all issues are adequately addressed
- Identified planning area and resource data needs

2.4.2 *Initiate Public Involvement and Scoping*

The purpose of this step was to let people know that the planning process was beginning and to solicit ideas on what issues should be addressed in the Plan. Formal scoping began with publication of a Notice of Intent to prepare a Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA), which was published in the *Federal Register* on August 30, 2002 (Volume 67, Number 169, pp. 55682-55863).

The Aransas NWRC Comprehensive Conservation Plan was written with the participation of Service staff, Refuge visitors, and the local community. The Service is grateful to the many people who have contributed their time, expertise, and ideas either by attending open houses or focus group discussions or through written comments. All of the ideas have been valuable and have contributed to a useful Plan.

The planning process began in 2002 with informal discussions among Refuge employees, local residents, and representatives of groups concerned with the future of the Aransas NWRC. A Refuge "Fact Sheet/Briefing Packet" was developed and circulated during the scoping process. In August 2002, the "Notice of Intent to Prepare a Comprehensive Conservation Plan" was published in the *Federal Register* (67 FR 55862). Refuge staff gathered in July and August 2002 to discuss their thoughts and ideas.

Members of the public were notified of open house events held in the local area via news releases in local papers, information on the Refuge website, and Plan information packets distributed in community libraries and the Refuge visitor center. Library information packets were distributed to 21 libraries in the five surrounding counties to serve as notice and as an information source for upcoming public and partners scoping meetings. News releases and packets encouraged people who were unable to attend the open houses to send in written comments on any Refuge issue. The Refuge also employed the use of storyboards in scoping meetings for neighbors, the public, and State partners. Seven open-house style meetings were held in January 2003, plus one partners meeting for the Golden Crescent Nature Club in February 2003:

- Open Houses for Refuge Neighbors – Refuge Visitor Center – January 6–7, 2003, 1–7 p.m.
- Victoria County – Victoria Public Library, Victoria, TX – January 9, 2003, 1–7 p.m.



Wildlife Refuge Specialist Felipe Prieto working with volunteer Jay Thomasson during the Plan development process.

Photo: Bernice Jackson

- Nueces County – Parkdale Branch Library, Corpus Christi, TX – January 14, 2003, 1–7 p.m.
- Refugio County – Refugio City Hall, Refugio, TX – January 15, 2003, 1–7 p.m.
- Calhoun County – Calhoun County Public Library, Port Lavaca, TX – January 16, 2003, 1–7 p.m.
- Aransas County – Aransas County Public Library, Rockport, TX – January 21, 2003, 1–7 p.m.

A total of 32 people attended these meetings. Four TPWD staff attended a Partners meeting held January 23, 2003, and 12 people attended the Golden Crescent Nature Club meeting. In addition to these meetings, State and Federal agencies were invited to participate as members of the planning team. Planning team letters were sent to team members from Texas A&M University, Texas General Land Office, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service–Ecological Services Field Office in Corpus Christi, and the TPWD. Forty-one written comments were received as a result of these meetings and information distribution. In addition to the open house events, the Refuge sought input from technical experts, including a group of regional migratory bird biologists, regional Visitor Services personnel, State partners, and others. All of the group notes and written comments focused on ways to help the Aransas NWRC achieve its goals and purposes.

A wildlife and habitat management review was conducted August 26–28, 2003. This review served as an overview of the Refuge’s current wildlife and habitat management programs and to garner input regarding issues, concerns, or opportunities. Trips were made to Texas A&M at Kingsville and to the Rob and Bessie Welder Foundation to seek relevant information and input from university and foundation personnel. A Public Use/Visitor Services Review was conducted December 8–11, 2003. Weekly Plan staff meetings to discuss review comments and formulate alternatives for the Plan were conducted. Weekly Plan staff meetings to garner thoughts and comments on the goals, objectives, and strategies were also conducted.

2.4.3 *Determine Issues*

To determine the planning issues being addressed in the Plan, the planning team reviewed the concerns identified by the public along with management concerns identified by Refuge staff and those submitted by the State of Texas and Federal agencies. Planning issues are those issues for which multiple approaches to resolving the issue will be evaluated as part of the planning process. The planning team also reviews issues to preliminarily determine whether any actions the Refuge may take to resolve them would result in significant impacts. Section 2.4.2 provides more detail on the process used to identify the issues, and Sections 2.4.9.1 through 2.4.9.3 outline what those issues are.

2.4.4 *Develop and Analyze Alternatives*

The fourth step was to develop alternative approaches to the issues. These alternatives meet the Refuge’s purposes and goals and comply with the Service and Refuge System mission. The planning team developed a range of alternatives that respond to the planning issues and eliminated alternatives that did not meet Refuge purposes or that were outside the Service’s ability to implement. The environmental effects of the alternatives were analyzed, and the results are presented in the Environmental Assessment (EA) found in Appendix I.

2.4.5 *Prepare Draft Plan and EA*

During the fifth step, a draft Plan and EA is concurrently prepared. This step includes an analysis of the potential impacts of implementing each alternative and describes how the Service determined its proposed action. The draft Plan and EA is then submitted for internal review and followed by public review and comment. A draft Plan and EA was distributed for public review on February 12, 2010. Approximately 150 comments were received (see Appendix J).

2.4.6 *Prepare and Adopt Final Plan*

In the sixth step, comments received on the draft Plan and EA are reviewed and analyzed. The Plan and EA is modified as needed. The Proposed Action is determined, and a final Plan and appropriate NEPA documentation is prepared.

2.4.7 *Implement Plan, Monitor, and Evaluate*

A critical component of management is monitoring and measuring resources and social conditions to make sure that progress is being made toward meeting goals. Monitoring also detects new problems, issues, or opportunities that should be addressed. The Refuge is using an adaptive management approach, which means that information gained from monitoring is used to evaluate and, as needed, to modify Refuge objectives.

2.4.8 *Review and Revise Plan*

Agency policy directs that the Plan be reviewed annually to assess the need for changes. The Plan will be revised when significant new information becomes available, ecological conditions change, or the need to do so is identified during the annual review. If major changes are proposed, public meetings may be held, or new environmental assessments and environmental impact statements may be necessary. Consultation with appropriate State agencies would occur at least every 15 years.

2.4.9 *Issues*

Refuge planning policy defines an issue as any unsettled matter that requires a management decision: an initiative, opportunity, resource management problem, threat to Refuge resources, conflict in uses, public concern, or presence of an undesirable resource condition (602 FW 1.6I). Public responses obtained through newsletters and public open house meetings—in addition to management concerns identified by Refuge staff and State and Federal natural resource agencies—were used to identify issues addressed in the Plan and EA.

Public responses identified a broad range of concerns, which were grouped and categorized by how they would be addressed in the Plan. This process helped the planning team identify a wide range of issues, concerns, and opportunities, as expressed during the planning process. Numerous discussions among Refuge and planning staff, focus group participants, and resource specialists brought to light several recurring themes. These have been consolidated into the following broad categories: Wildlife, Habitat, and People.

2.4.9.1 *Wildlife*

A number of concerns were raised regarding the management of threatened and endangered species, wildlife research and monitoring, and staffing constraints. Some of the important issues are discussed in the following paragraphs.

1. With respect to whooping cranes, there is concern that reductions in freshwater inflows into San Antonio Bay and outflow through Cedar Bayou may severely affect the blue crab population, which is a critical food source for whooping cranes. Another concern that has been raised is minimizing disturbances to whooping cranes during their winter stay on the Refuge. Concern was expressed regarding the expanding whooping crane population. About one-third of the population have territories off-Refuge, so there is the need for greater public awareness, expanding the protected areas, and acquiring suitable habitat and/or establishing conservation easements from willing sellers and landowners.
2. Another emerging issue that may adversely affect whooping cranes is the projected construction of wind turbines or wind farms along the Texas coast. Strong coastal winds appear particularly favorable for wind energy development, and the construction of wind farms has already begun. Two in nearby Kenedy County, with up to 157 turbines, have been operational since February 2009; another site near Taft, Texas, has approximately 100 turbines constructed with operations planned before the end of 2009. Locating wind farms and associated infrastructure within sensitive wildlife habitats may lead to significant impacts on these resources, particularly migratory birds. In 2008, the Refuge received several inquiries about the potential impacts of wind farms on whooping cranes. Whooping cranes in migration sometimes reach the Texas coast and then follow the coast southward to reach the Refuge. Wind farm development anywhere along the Texas coast between Corpus Christi and Galveston or along the inland whooping crane migration corridor is a concern. How will the Refuge address concerns over the potential impacts of wind energy developments near the Refuge on Federal trust species such as migratory birds and endangered whooping cranes?
3. There is an issue concerning commercial crabbing in the vicinity of the Refuge, which may be reducing the availability of crabs for wildlife, particularly whooping cranes. Abandoned crab traps take numerous crabs and fish annually, as the dead and dying fish attract others into the traps. Although progress has been made in the last 10 years through the combined efforts of the Refuge and TPWD to collect abandoned traps and in regulating trapping seasons and tag requirements, some commercial crabbing does occur in the Matagorda Island marshes. According to the 1994 MOA with the State, these marshes are to be managed as part of the Refuge with the full intent of allowing traditional uses such as crabbing. However, crabbing is specifically prohibited in any Refuge marshes, including Matagorda Island (50 CFR, Part 32.63). This poses an issue as to whether certain marshes should be off-limits to commercial crabbing for the benefit of sensitive wildlife.
4. With respect to Kemp's ridley sea turtles, there is concern that certain management activities on Matagorda Island (Island) may affect this important sea turtle nesting area, as well as its use by other sensitive species (e.g., piping plover, Wilson's plover, snowy plover, brown pelican). For example, intense use of ATVs and human presence (i.e., sea turtle patrols) along the beach may disturb other sensitive species, as well as detract from the natural character of the beach. While it is understood that monitoring Kemp's ridley sea turtles is an essential conservation tool, a more balanced approach may be needed. Matagorda Island is the only barrier island in Texas that is entirely within the Refuge, and its remoteness translates into little human disturbance. This makes the Island ideally suited for use as a protected nesting area for sea turtles. Beginning in 2005, the first known nesting by Kemp's ridley sea turtles was

- documented on Matagorda Island, and since then, nesting numbers have been steadily increasing. This presents a unique opportunity to allow for the natural establishment of an additional nesting location for this species. Current recovery efforts, based on the 1992 Kemp's Ridley Recovery Plan, emphasize active management of the species involving egg collection, incubation, and hatchling releases on Padre Island National Seashore. Because Matagorda Island is now a unique, protected nesting area for Kemp's ridley, it may be beneficial to allow nests to remain in situ on the Island to expand the number of nesting beaches for this species. What can the Refuge do to protect, enhance, or contribute to the survival of Kemp's ridley and other sea turtles that use Matagorda Island?
5. It is generally believed the Tatton Unit may support potential reintroductions of endangered Attwater's prairie chickens (APC). However, the relatively small size of the unit, its isolation from other suitable habitat, the lack of grassland corridors for dispersal and genetic exchange, its low elevation (which makes it susceptible to coastal inundation), a concern for the spread of communicable disease (avian immune deficiency) to whooping cranes, and the presence of aplomado falcons all may pose problems for APC reintroduction. These issues are not significant enough to preclude reintroduction of APC to the Tatton Unit. However, the limiting factors for the recruitment of young to the population and maintaining viable populations of the APC must first be identified. What role, if any, can the Tatton Unit play in supporting additional populations of Attwater's prairie chickens?
 6. A number of ideas and concerns were expressed about land management practices that could be used to encourage and maintain use of Refuge lands by a wider variety of migratory birds. Discussions focused on maintaining desirable habitat for waterfowl, whooping cranes, and shorebirds, as well as Neotropical migrant songbirds. Consistent with Refuge purposes, how can the Refuge best integrate and implement relevant aspects of the various bird conservation initiatives while ensuring for a diverse mix of species?
 7. In general, some expressed the need to have better wildlife status and occurrence information for each of the Refuge units to facilitate better coordination and support for certain management activities and decisions. For example, there was concern that baseline wildlife surveys and monitoring on units such as the Myrtle Foester Whitmire and others were not occurring. Several priority species (e.g., seaside sparrow, Swainson's warbler, and reddish egret) that use these units should be studied further to identify and protect important feeding and nesting areas. In addition, non-native species such as feral hogs have been adversely affecting native wildlife populations through habitat impacts, impacts to ground-nesting birds, and direct competition for food items such as acorns and grapes. There is concern that feral hogs should be monitored and managed on each unit. Also, game species require basic monitoring to ensure population soundness. How can the Refuge improve wildlife research and monitoring to better direct appropriate management actions for each unit?
 8. With respect to biological program staffing, there are currently two biologists responsible for the entire complex of five units, which comprises over 115,000 acres. The intensive management of a diverse array of habitats demands more biological staff in the field. How many additional biological staff are needed to fully implement Comprehensive Conservation Plan goals, objectives, and strategies during the next 10–15 years?

2.4.9.2 *Habitat*

A primary concern expressed during the planning process has been the future direction of habitat management throughout the Aransas NWRC. Generally, planning participants expressed a desire to see a natural diversity of plant, fish, and wildlife species through the proper management, preservation, and restoration of native habitat at an ecosystem level. Some participants stressed the inviolate sanctuary concept while others suggested that more intensive habitat management, including mowing, disking, and grazing, may be necessary to enhance diversity and use by wildlife. There was a need expressed for new Refuge habitat inventories, monitoring plans, implementation of monitoring efforts, and well thought-out management plans. Additional concerns are as follows:

1. One of the main topics of discussion was determining the current and historic distribution of coastal prairie and a better understanding of peninsular habitat. For example, how many acres of oaks and prairie should there be on the Aransas Unit?
2. Another issue expressed during scoping was whether efforts should be more focused on habitat acquisition rather than on recreational uses and facilities. For example, the increasing whooping crane population and the current rate of coastal development in the area make habitat acquisition an imminent concern. Given current staffing and funding levels, should the Refuge focus more on habitat acquisition and protection than on other important Refuge management activities such as recreational uses or facilities?
3. With respect to improving native habitat on Refuge units, review participants pointed out that habitat management efforts should be based on vegetation types that are best suited to a given soil type. For example, the Blackjack Peninsula, Matagorda Island, and the Lamar Unit are primarily sandy soils and would thus support some combination of oak mottes and woodlands, wetlands, and sandy prairie. The Tatton and Myrtle Foester Whitmire Units have the soils to support true low coastal prairie vegetation. Given soil types and existing habitat conditions, and taking into account Refuge purposes, what are the most appropriate habitat management approaches to be taken for each Refuge unit?
4. Another issue that became apparent is controlling the spread of invasive and non-native species. Chinese tallow, Saltcedar, and Macartney rose are non-native and should be controlled, in compliance with Service policy and EO 13112. However, some Refuge management activities may facilitate the spread of invasive or exotic species. For example, the Wildland Urban Interface (WUI) project, which involves establishing firebreaks around urban developments, has opened up the area along the Lamar Unit's western boundary that could potentially be an avenue for invasives. How can the Refuge control the spread of invasive and exotic species, in compliance with Service policy, while still meeting the objectives of other important programs?
5. Research needs with respect to ongoing habitat management practices involve assessing the effectiveness of the current management regime of roller-chopping and burning "running" live oak stands. This type of habitat management is not reducing the density of live oak but is simply keeping the oaks short. What other ways can the Refuge reduce oak density in areas that otherwise would not contain high density oak stands or in areas where there is a management need to reduce oak density?
6. There is a need to assess the effects of reductions in freshwater inflows to the bays and subsequent outflow to the Gulf of Mexico on Refuge wildlife and habitats. How

- will the Refuge address the lack of freshwater inflows and potential impacts to wildlife and habitat?
7. There is a need to address the accumulation of non-natural beach debris and contaminants on Matagorda Island. At times, the amount of trash, debris, and contaminants such as tires, cans, plastic, fluorescent tubes, household garbage, industrial waste, petroleum products, and medical waste that washes up on the beach is excessive and sometimes harmful, and it accumulates over time. How can the Refuge address the accumulation of trash, debris, and contaminants on the beach caused by the dumping of trash and materials at sea? In addition, a 2002 preliminary survey by the TCEQ conducted on Matagorda Island identified levels of gamma radiation. There is a need to assess potential hazards, if any, associated with this and to conduct follow-up studies.
 8. On the Refuge, there are various mineral lease owners and ongoing oil and gas production activities and facilities such as pipelines, holding tanks, and separating facilities. Oil company crews access the Refuge to monitor production and perform maintenance on the oil and gas infrastructure. Since the mineral rights are privately owned, the Refuge receives numerous requests for oil and gas exploration. Seismic surveys every few years by different companies take up considerable staff time. More importantly, there are whooping crane issues with seismic exploration taking place in the marshes and long-term implications of upland habitat alteration and the spread of invasive plants due to the clearing of vegetation associated with these activities. There is a need to standardize requests for seismic surveys or oil and gas exploration occurring on the Refuge that is consistent with Service policy and provides maximum protection of the surface resources.

2.4.9.3 Public Use

The Refuge audience includes local residents, birders from across the country, winter Texans, and international visitors. The Refuge receives approximately 60,000 visitors annually with peak visitation occurring during the whooping crane wintering season. Aransas NWRC offers a wide variety of wildlife-dependent recreational opportunities such as wildlife observation, photography, interpretation, environmental education, fishing, and hunting. The Refuge also has secondary recreational opportunities, including picnicking and beachcombing. Additionally, the Refuge has been effective in the use of volunteers and Friends of Aransas and Matagorda Island (FAMI) to enhance and supplement the programs offered. Wildlife-dependent recreation was the most frequently mentioned issue by the public. Generally, the public would like to see more opportunities for wildlife-dependent recreation and education and/or expansion of existing public use opportunities. More specific issues, concerns, and opportunities grouped by subject are as follows:

Wildlife Observation and Photography

Several planning participants want more hiking/backpacking opportunities (i.e., walking trails, boardwalks, and observation decks) off the tour loop for greater wildlife viewing capability. Some also expressed a desire to see more Refuge roads opened to access new areas, whereas other participants cautioned against this because of the potential impacts to whooping cranes, migrating birds, and other wildlife. Others supported closing the tour loop to public traffic and providing low pollution vehicles for rent or providing tours using the low pollution vehicles. Another idea was to shorten the existing 16-mile auto tour loop to approximately 8–10 miles.

However, there was a consensus that the current 16-mile auto tour loop was sufficient for current levels of visitor use and vehicle access. In any case, plans for prioritizing, retrofitting, and updating public use facilities will be followed. Other planning participants wanted more photo blinds separate from wildlife viewing blinds and wanted the Refuge to provide photography workshops and contests. Cameras and website links for remote viewing of Refuge wildlife were also put forth. Additional suggestions included providing other accessible formats (e.g., video, audio tape, large print) of brochures and pamphlets for persons with disabilities and providing bilingual versions. The quality and effectiveness of the wildlife observation and photography program should be developed in terms of visitor needs and minimization of wildlife disturbance. In addition, there was a desire to explore wildlife viewing opportunities at the other units. On the Matagorda Island Unit, the TPWD will continue to provide recreational opportunities per the 1994 MOA and 1990 Comprehensive Management Plan (CMP). Concerns about opening the other units to public use and/or wildlife observation without adequate law enforcement and on-site monitoring were also expressed.

Hunting

Requests for expansion of the hunting program were made, alongside concerns for allowing hunting, as long as it is used as a management tool to control over-population of deer and feral hogs. Others indicated there was no need to increase public uses, including hunting. Providing quality hunting opportunities was a common theme, but other issues involved addressing the safety and congestion of hunters that camp along the road or in areas near the Refuge. The issue of camping along Farm road (FM) 2040 outside the front gate has been addressed by the Texas Department of Transportation (TXDOT) through the posting of signs and the reduction in hunter numbers. Should hunter numbers increase in the future, providing suitable accommodations, such as establishing a designated camp area, may need to be addressed. Other interests include accessible hunting, youth hunts, and effectively disseminating hunt information and providing greater hunter orientation. How can the Refuge improve the quality and safety of the hunting program, consistent with wildlife management needs and Refuge purposes?

Fishing

Some want to see more opportunities for wade fishermen, kayakers, and canoers, whereas others want to eliminate seasonal fishing because most of these activities can be enjoyed elsewhere. Ideas to construct facilities such as fishing piers and boat ramps were also mentioned, as was a desire to re-open Cedar Bayou for fishing. However, Cedar Bayou is State owned and not under Service jurisdiction. Disturbance of wintering waterfowl and endangered whooping cranes from the use of airboats around Matagorda Island were concerns. Problems occur when visitors bring ATVs and unleashed pets to the Refuge at Cedar Bayou or Pass Cavallo, as either of these cause damage or destruction to bird nests. Other ideas include the development of an evaluation process for the fishing program in conjunction with, or conducted by, the TPWD. There was a need expressed to engage other local law enforcement personnel in conducting compliance checks on the Refuge during fishing seasons. Other needs expressed were to: 1) maintain fishing records and to establish the Refuge as a "lead-free" area; 2) encourage anglers to fish safely and ethically, and provide more "accessible" fishing facilities; and 3) rewrite and update the fishing leaflet and develop accessible alternatives to fishing publications (e.g., audio tape, large print) for visitors with disabilities. How can the Refuge improve the quality of the fishing program, consistent with Refuge purposes?

Interpretation

People generally indicated the desire for more interpretation and organized guided tours on the Aransas Unit. Concerns were also expressed about keeping the visitor center exhibits up to date and accessible to the public. This included updating printed materials; having them professionally designed and fabricated with a logical flow from one exhibit to the next and reformatted to Service graphic standards; and including a simple and accurate system describing the physical difficulty of trails, sites, and facilities. Other desires were to place kiosks at each trail, tower, or other wildlife watching site, including the auto tour loop. Each kiosk needs key information about trail length, difficulty, interpretation of key resources, associated issues that can be seen from or at the site and management practices that tie back to the main themes of the Refuge.

As in other programs, planning participants expressed a desire to see greater access for persons with disabilities by providing universal access at special events, facility upgrades, literature, and programs. Although signs and information were abundant on the Refuge, they were not consistent in presentation of graphics and information, nor were they in compliance with current standards or always accessible. The need to update animal and plant checklists for accuracy and compliance with graphic standards also became apparent. Additionally, there were suggestions for other alternative accessible formats (video, audio tape, large print) of brochures and pamphlets for persons with visual disabilities, for bilingual publications, and for cameras and website links for remote viewing of Refuge wildlife.

Environmental Education

There was much support for the Environmental Education (EE) Program and, in particular, for the continuation of environmental education activities on Matagorda Island. Although there was concern about “loving the Refuge to death,” others proposed the establishment of a field station on the Island. Overall, these concerns suggest that a well thought-out environmental education program will become a very important element in the Visitor Services Plan. The Refuge maintains a resource center that includes books on natural history and wildlife, lesson plans, and other EE materials and information. The currently designated environmental study areas and facilities are adequate, but there was a need expressed to make EE programs and facilities more universally accessible. There was also a need to develop Refuge-specific curricula or lesson plans and educational materials (e.g., videos, curricula, and teaching trunks) that would be available through the Refuge for use by local educators and the Refuge staff. Additionally, the Refuge should maintain field study equipment (e.g., binoculars, dip nets, bug boxes, and microscopes) that will be available through the Refuge for use by local educators and Refuge staff. Environmental education activities and facilities information should be added to the Refuge website and an EE Program evaluation process developed.

Suggestions for the improvement of the EE Program included: 1) conducting workshops and developing materials dealing with local resource problems and providing teacher training in ecology and field educational strategies; 2) providing special events and symposia for a variety of educators, as well as participation in national Service curricula development; 3) developing off-site environmental education programs and use of live satellite broadcasts; and 4) developing partnerships with local colleges and schools to enhance and improve the education program. This includes working with Scouts, 4-H, Future Farmers of America, adult continuing education, volunteers, home school educators, and others. Programs targeted for non-traditional and under-served audiences (e.g., American Indians, non-English speaking populations, people with disabilities) were also suggested educational improvements.

Outreach

As part of the Visitor Services Plan, there was a need to develop an outreach plan that addresses important individual and long-term resource issues. This included expanding and developing a formal evaluation process to identify the current level of community awareness toward Refuge-related issues and the prevailing attitude toward those issues. This would help identify what audiences are most affected by Refuge-related issues and actions and how the community decision-makers can be part of the decision-making process. Regular contact with area chambers of commerce was suggested to assist in expanding our focus on tourism and the public.

Volunteer Program

The Refuge clearly benefits from the many dedicated friends and volunteers in the current volunteer program. However, suggested important improvements to the program include a need to: 1) consider hiring a full-time volunteer coordinator; 2) develop position descriptions that adequately describe expected duties for all volunteer positions; 3) provide orientation, training, and a written manual that spells out the policies, expectations, and ethics that volunteers are expected to exhibit; 4) develop a formal evaluation process for incorporating comments and suggestions of staff and volunteers each year, and annually update the training manual and policies to reflect those changes; 5) recruit year-round volunteers, involve youth groups, and develop a local Junior Ranger volunteer group; and 6) work with the Regional Volunteer Coordinator to develop a list of needs or issues that can be addressed regionally or nationally to help Refuge programs work more efficiently.

Community Partners/Cooperating Associations

Participants felt that Refuge staff had good cooperative working relations with local non-profit organizations, industry, neighboring landowners, and State and local governments. However, they expressed a need to continue to explore opportunities for additional local industry and corporate partnerships. Other concerns were to: 1) develop a five-year project list with the Friends of Aransas and Matagorda Island and Refuge staff to aid the Friends in their fundraising and operations planning; 2) work with the Regional Friends/Cooperating Association Coordinator to address regional or national issues or concerns that can help the Refuge program work more efficiently; and 3) provide ethics and conduct training and guidance on an annual basis for the Friends group.

Visitor Orientation

Planning participants suggested that kiosks are needed of a standardized design so that information and graphics are consistent throughout the Refuge. This included a need to place a kiosk outside the visitor center, readily visible to the public after hours, which provides relevant visitor information. Better directional signs are needed throughout the Refuge, and there was a need to replace highway signs with the standard two-way sign, which directs visitors to the Refuge. Other identified needs involved: 1) updating brochure and informational signs with accessibility symbols that meet current standards, including a legend for all available facilities; 2) updating the orientation video and make it close captioned for the hearing impaired; 3) updating the Refuge website to reflect current graphic standards and information, and adding other Refuge Unit information; and 4) following the transition plan for the Refuge to upgrade and retrofit visitor facilities.

Facilities and Transportation Infrastructure

Other concerns involving facilities include providing kiosks at each entrance to Matagorda Island that identify the property as part of the Refuge and state the hours open to the public, activities allowed, and a description of our partnership with TPWD. In cooperation with the State, there was a desire to establish a primitive trail system with signs on the Island that would allow visitors to walk or bicycle to Island attractions. This would minimize impacts to Island habitats and help direct people to attractions. On outlying units such as the Tatton Unit, there was support for making the Tatton trail a loop that will take visitors to the observation deck and through the coastal prairie demonstration area. It was suggested the Refuge stop efforts to develop a “park-like” appearance on the Aransas Unit, while others indicated the need to upgrade restrooms and walking trails, put out more benches, update telescopes, give attention to the picnic area, and maintain cleaner restrooms. Additionally, there was a need to mark good viewing areas, make all trails accessible, and include two lanes for the entire tour road.

With respect to transportation infrastructure, there are recurring maintenance needs for all public access facilities, including any new facilities proposed in this Comprehensive Conservation Plan. For example, the Aransas Unit’s 16-mile auto tour loop and associated parking lots, pullouts, kiosks, and trails need routine maintenance such as re-paving, repairing culverts, and repairing damage to roads and trails from erosion. There are opportunities to add a bicycle lane along the existing 16-mile route to improve the visitor experience, but this may be a significant and costly project. On the Matagorda Island Unit, the 35-mile long Main Island Road, which was formerly paved and is now gravel-shell, requires periodic maintenance to support all public uses. However, maintenance costs are significant because of the length of the road and the logistics of transporting road building materials and equipment to the Island. On the Tatton Unit, there is a need to relocate the viewing deck nearer to the parking area for improved visitor use. On the Lamar and Myrtle Foester Whitmire Units, potential opportunities include adding viewing platforms with telescopes, which would involve adding public access roads (approximately one-half mile and two miles, respectively) with parking areas.

Other Important Issues and Concerns

1. As part of the Comprehensive Conservation Plan (Plan) process, proposed or existing uses will be evaluated under the Appropriate Refuge Uses Policy (603 FW 1), which clarifies and expands on the Compatibility Policy (603 FW 2). Activities such as picnicking, swimming, and beachcombing and special use of the Port O’Connor Dock Annex are not wildlife dependent and not one of the six priority public uses. For example, the Port O’Connor Dock Annex has been used for approximately 16 years in support of the Poco Bueno Fishing Tournament, which is sponsored by the Port O’Connor Offshore Association (POA). Until 2005, the Dock Annex was overseen primarily by the Texas Parks and Wildlife Department’s Parks Division, which also used the facility in support of Matagorda Island State Park operations. However, the State Park closed at the end of 2005, prompting the POA, in 2006, to request from the Refuge the continued use of the facility. At that time, the Refuge issued a Special Use Permit to POA under the premise of evaluating this continued use. However, before making a compatibility determination, the Refuge must first consider whether the use is an “appropriate use” according to Service policy. The Refuge monitored the 2006 event, consulted with our State partners that share the Port O’Connor facilities with the Refuge, and came to the conclusion that the fishing tournament may not be an appropriate use of Refuge facilities. Currently, this use is being phased out by requesting users to seek alternative parking for boats and cars off Service lands. This

process, occurring during preparation of the Plan, has identified a previously allowed use that may no longer be considered appropriate on the Refuge.

2. The Refuge's Port O'Connor Dock Annex is currently used by the TPWD Coastal Fisheries Division, TPWD Wildlife Division, and the Service. The partnership with the TPWD Wildlife Division and previously the State Parks Division was the result of the 1994 MOA. However, Coastal Fisheries Division was not a part of this MOA. There is a need to formalize Coastal Fisheries use of the Dock Annex, perhaps through a separate MOA addressing the use of facilities at the Port O'Connor Dock Annex, to further improve partnership opportunities with the State.
3. There is an issue over public perception regarding ownership and management of Matagorda Island. Some believe that Matagorda Island is entirely State-owned, or partially State-owned with Federal ownership of the south end, and is "off-limits" to the public. Recommendations are to clarify public perception over management and ownership of Matagorda Island. Another concern expressed during the planning process was that programs and facilities offered to the public on Matagorda Island do exist, but access to this unit is currently limited to private boats. Past access included a concession-contracted ferry service provided by TPWD, but that is no longer in operation. Therefore, public uses on Matagorda Island are very limited without some form of boat access. Additionally, non-existent land transportation support services and personnel on the Island limit the effectiveness of visitor use. How should the Refuge address this issue?
4. Planning participants indicated the need to address affronts by the public that violate the expressed purpose of the Refuge, namely disturbance of plovers, pipits, and tern nesting sites at Cedar Bayou and Pass Cavallo (J-hook) caused by certain public uses and/or by dogs. Others felt that oil and gas and farming activities should be discontinued on the Refuge, along with unauthorized entry through the waterways. What types and levels of activities, which the Refuge has control over, should be permitted and when and where?
5. Boat launching is occurring on the Tatton Unit at the Cavasso Creek Bridge, along State Highway 35, within the State-maintained road right-of-way. Although unofficial (e.g., not a Refuge facility), this boat launch is often used by duck hunters and fishermen to gain access to St. Charles Bay and surrounding areas. Boat launching and bank fishing from or on Refuge land is not permitted outside of the established Public Use Management Area, which is on the Aransas Unit over 20 miles away from the Cavasso Creek Bridge. Boat launching at the Cavasso Creek location is creating a disturbance issue for whooping cranes that are using the marshy areas along Cavasso Creek and St. Charles Bay, east of the highway. This area falls within the currently designated Critical Habitat boundary (43 FR 20938; see Figure 5-1). These areas are generally occupied by whooping cranes from October 15 through April 15. Elsewhere on the Refuge (i.e., the Public Use Management Area), access to State waters is not allowed during this time period. How can the Refuge address this issue?

After the Plan is completed, a Visitor Services Step-Down Plan will be developed to address the issues, concerns, and opportunities discussed here, as well as to meet the Visitor Services goals described in this Plan.

3. Refuge Resources

Introduction

This chapter describes the general environment, natural resources, socioeconomic conditions, and unique environmental features of Refuge lands and the surrounding area. The descriptions center on those aspects of the environment that may be affected by management actions of this Plan.

3.1 Geographic/Ecosystem Setting

The Aransas NWRC comprises 115,240 acres of wildlife habitat in Aransas, Calhoun, and Refugio counties, along the Texas Coastal Bend, about 80 miles northeast of Corpus Christi. The combinations of terrestrial and aquatic communities on the Refuge are due in large part to the differences in wind direction, water circulation, and vegetation as compared to other coastal areas north and south of the Refuge. In many cases, biogeographic range limits for complementary species occur in this area (e.g., cardinals and pyrrhuloxias, lime ash and lime prickly ash, and Texas and checkered garter snakes).

Because of its geographically strategic location along the Central Flyway, enhanced by the convergence of habitat types and weather patterns from all cardinal directions, the Refuge is a major stopover for migratory birds during their fall and spring migration. In fact, the Texas Gulf Coast is the most important winter region for waterfowl in the Central Flyway.

Waterfowl, shorebirds, raptors, and songbirds are particularly abundant. The combination of mild winters, abundant food sources, and diverse habitats makes the Refuge a prime wintering area for many avian species, including the endangered whooping crane. The same features also combine to make the Refuge a haven for many maritime, temperate, and subtropical species of endemic and non-migratory wildlife.

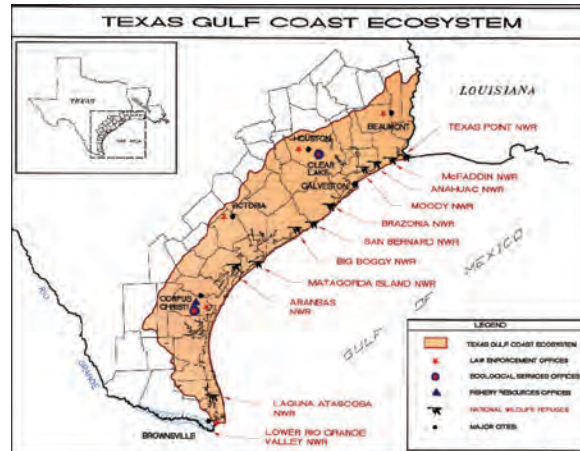
The Aransas Unit consists of 47,261 acres and is centered at 96° 48' west longitude and 28° 16' north latitude, and makes up portions of Aransas, Refugio, and Calhoun counties, Texas. Matagorda Island, located approximately at 96° 20' west longitude and 28° 20' north latitude, is one of the State's five barrier islands, occurring five miles off the coast in Calhoun County. The Island consists of 56,668 acres, and is separated from the mainland by five shallow bays. Fringing the easternmost part of the Island is Matagorda Bay. The other bays, from east to west, are Espiritu Santo San Antonio, Ayers, and Mesquite. The Aransas (Blackjack Unit) is surrounded from east to west by San Antonio, Ayers, Mesquite, Aransas, and St. Charles bays. The smaller Refuge units (Tatton, Lamar, and Myrtle Foester Whitmire) lie within the same counties and are in close proximity to the larger units of Aransas and Matagorda Island. The area is generally flat with a mix of soil types that include dark clays, sandy, loamy, and coastal hydric soils.

The Refuge contains two major habitat types: coastal prairies and marshes. The Coastal Prairies component is primarily comprised of the vast dark-soiled upland prairies near the coast. This habitat type is found just inland of the Coastal Marsh and includes the very closely associated low sandy peninsulas and barrier islands that bound the Coastal Marsh. Along the immediate coastline, within the Coastal Marshes component is a narrow strip of sandy soil, different in character from the clayey soils of the Coastal Prairie. This mosaic of oak woodland and low sandy prairie openings and more open oak savannah found on some peninsulas along the immediate coast is a relatively minor Coastal Prairies component that blends into the Coastal Marshes. The estuaries and bays comprise the balance of the Coastal Marshes habitat

component. Along the immediate coast, these two or three parts are so interwoven and integrated as to make them one. On the Refuge, the Tatton Unit is a remnant of this Coastal Prairie. The remainder of the Refuge lies within the Coastal Marshes habitat type. Currently, less than one percent of the original dark-soiled Coastal Prairie habitat remains, as these areas are principally in agricultural production.

3.1.1 *The Texas Gulf Coast Ecosystem (Coastal Prairies and Marshes Ecoregion)*

The Texas Gulf Coast Ecosystem lies between the Sabine River and the mouth of the Rio Grande and inland to include the historical coastal prairie. It is considered to be part of a larger ecological Coastal Plain Physiographic Province that includes portions of coastal Louisiana and Mexico. Included within the Texas Gulf Coast Ecosystem are the Gulf Coast Prairies and Marshes Ecoregion, as delineated by Gould et al.



(1960) and identified as a high conservation priority area in the State's Comprehensive Wildlife Conservation Strategy. The Refuge lies within the Gulf Coast Prairies and Marshes Ecoregion.

The Gulf Coast Prairies and Marshes Ecoregion occupies about 9.5 million acres along the Texas coast, extending 30–80 miles inland (Scifres 1980, Hatch et al. 1999). This vast area was comprised of immense upland prairies, river deltas and marshes, coastal woodlands and sandy prairie openings, open oak savannah (along select exposed shorelines and soil transition areas), tidal flats, salt marshes, and barrier islands. Gould (1975a) recognized two major divisions of this ecoregion: Coastal Prairie and Coastal Marshlands. The Coastal Prairie, a nearly level, slowly-drained plain, grades into the south Texas Plains on the west, and the Post Oak Savannah and Pineywoods on the east (Scifres 1980). It is recognized as a needlegrass-bluestem (*Stipa-Andropogon*) association (Dodd 1968), with a prominence of bluestem grasses. Soils of the Coastal Prairie are heavy-textured slightly acid clays or clay loams, interspersed with relatively small areas of sandy loam (Gould 1975a). Coastal Marsh, about 0.5 million acres, occupies a narrow zone of lowlands and wet marshlands adjacent to the coast and the barrier islands (Gould 1975a, Hatch et al. 1999). Natural forces that shape these two areas include dominant south to southeast winds, tropical weather systems, and a substantial gradient in rainfall from over 60 inches per year on the upper coast to less than 20 inches per year on the lower coast. Other key systemic processes include flooding and freshwater inflows, which buffer salinities and provide nutrients and sediments. Fire and grazing by buffalo were, prior to colonization, key factors influencing plant succession, particularly in the grasslands.

Coastal Prairie generally grades into the salt meadows and salt marshes of the Coastal Marshlands. Soils of the low coastal uplands, such as those of the Tatton and Myrtle Foester Whitmire Units, are transition zones to Coastal Marshlands. Another more abrupt transition occurs between the Coastal Prairie and the Coastal Marsh when relatively deep sands, such as those common to peninsulas, occur between the two zones. Historically, these sandy peninsulas are not as well described as was the true prairie. Generally, descriptions in the literature of the soils of the Coastal Prairie make no mention of the sandy soils directly along

the coast. More often, these sandy soils are simply lumped in with the overall soil descriptions of the Coastal Prairie. Gould and Box (1965) perhaps best allude to this subtlety in their introductory description of this area as the southernmost part of the Gulf Prairie and the closely associated strip of Gulf Coast marshes. However, they do distinguish between coastal and inland areas in their description of Coastal Prairie “...a dense cover of scrub oak characterizes the vegetation near the coast but further inland the area is a true prairie.”

Coastal Marshlands are mostly tidal but also include both isolated and transitional fresh and intermediate marshes; bays and lagunas, that support extensive seagrass beds, tidal flats, and reef complexes; barrier islands and forested riparian corridors; dense brushy habitat; mottes; and the coastal woodlands of the peninsulas.

The prominent features of the Coastal Prairies and Marshes Ecoregion include the prairies, which in many places include small depressional wetlands now largely fragmented by agricultural and urban development. Over the last century, much of the better soils of the Coastal Prairie have been converted to cultivated crops. Grain sorghum, rice, cotton, corn, flax, and other crops flourish where prairie once prevailed. Before the appearance of European settlers, the Coastal Prairie was probably fairly open grasslands interspersed with honey mesquite and live oak mottes, with scattered post and blackjack oaks (Scifres 1980). Gould and Box (1965) indicate that the grasses associated with this area are typically those of the Coastal Prairie portion of the American tall grass. Scifres (1980) describes the potential vegetation of Coastal Prairie as tall and mid-bunch grasses, with big bluestem, seacoast bluestem, switchgrass, and yellow Indiangrass common on well-managed sites. Hatch et al. (1999) added as climax species for this area: Gulf cordgrass, eastern gammagrass, hairy awn muhly, tanglehead, Texas wintergrass, and many species of *Panicum* and *Paspalum*.

Overall, the Gulf Coast Ecosystem is primarily influenced by human development affecting the quality and quantity of its natural resources. Human influence, past and present, has resulted in the reduction—and in some areas, extirpation—of native plants and animals. The introduction of many non-native plants and animals by people has had various effects on the landscape. Alteration of natural river flows through the construction of dams or diversions for consumptive uses, flood control, and controlled releases have further altered habitats, including native aquatic communities. Land use practices during the past century, such as farming and ranching, have significantly altered surface soils and the vegetation of the area. Continued development of groundwater resources threatens wildlife habitats throughout the Texas Gulf Coast Ecosystem, further increasing the complexity of resource management issues. A diversity of human cultures competing for limited access to water rights and growing resource demands has depleted—and at times, contaminated—ground and surface water. Impacts from oil and gas development, mining, and urbanization further increase the future need for more responsible utilization of land and water resources that support the remaining natural environment.

3.1.2 Climate

The eastern section of the North American central grassland has historically fluctuated between a climate capable of supporting grassland and one supporting forest (Collins and Wallace 1990). This pattern is also exhibited in the Texas Coastal Bend in the mix of coastal grassland and woodland. The grasses are a mix of southern Great Plains and coastal species, whereas the woodland is comprised of primarily eastern species. The coastal prairie changes from north to south and east to west, most noticeably at the mouth of the Guadalupe River (Tharp 1952). This is squarely where the Refuge lies in the local landscape. The curve of the

coastline alters the angle at which prevailing winds strike the landmass (McAlister and McAlister 1995). This affects the pattern of rainfall, with greater amounts to the north and progressively less to the south.

Average annual rainfall is 38 inches for Blackjack Peninsula (Aransas Unit) and Matagorda Island (southern end). The 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. 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 but 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.

The summer peak temperatures are moderated by coastal breezes, and winter lows are constrained by the heat stored in the Gulf waters. The average annual temperature for the Refuge is about 71 degrees Fahrenheit. The coldest month, January, averages 55 degrees Fahrenheit, and July and August average 84 degrees Fahrenheit. However, during the winter months, the typically warm weather is periodically interrupted by the passage of strong but short-lived cold fronts. The growing season for the area averages 312 days annually. The average first frost date is December 16, and the average last frost is February 7. During this period, freezing temperatures usually occur in the hours shortly before sunrise. In general, winters are short and mild, but temperature drops can be rapid. Occasionally, a cold front can lower temperatures fast enough and last long enough to cause fish kills. The worst cold weather situations occur when high winds and low temperatures are combined with light rain that freezes, lasting a couple of days. These conditions can definitely cause fish, plant, and animal kills. Conversely, summer (July, August, and sometimes September) heat, particularly during windless periods, can kill plants and animals, with periods of temperatures in the mid to high 90s and occasionally over 100 degrees Fahrenheit.

The direct mechanical impact of the persistent coastal offshore winds sculpts trees and shrubs, moves loose sandy soils, and causes the movement of water. The wind also has an influence on temperature and moisture through evaporative cooling. The Refuge has two basic wind regimes: 1) persistent and moderately strong southeasterlies, and 2) brief but gusty northerlies. From March through November, there is the prevailing southeast wind. However, in some years there may be periods of noticeable lulls in the southeast winds in late July, August, and early September. Typically, the only interruption during this period is tropical storms and more rarely, strong northern fronts.

From December through February, with some overlap into November and March, there are gusty north winds, usually preceded by moderate southeast winds. The southeast winds during this period are good foretellers of an impending norther. Due to their abrupt arrivals and high energy, northers have their own impacts on the coast. Strong north winds drive bay waters in the opposite direction against southern and western shorelines, often causing bank erosion. In time, this is moderated by the accumulation of decaying sea grasses from the previous growing season. Also, late fall migrant birds use the early northers as tail winds. Occasionally, spring migrants encounter late northers, which cause bird fallouts and often mortality.

Storms (hurricanes and tropical systems) provide another source of wind, rain, and tides that can have seemingly devastating impacts on the landscape. However, from a purely ecological perspective, hurricanes are natural phenomena to which the coastal ecosystem is adapted. Often, following such storms, there is a resurgence of vigor and productivity that may be the result of the re-distribution of nutrients, dispersal of toxins and contaminants, natural pruning and culling, and the cleaning or purging of those species that do not belong.

3.1.3 *Physiography and Geology*

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

The major bodies of water surrounding the Aransas 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, which borders the Lamar and Tatton Units. Several minor bodies of water separate the Blackjack Peninsula from Matagorda Island: Ayers, Mesquite, and San Carlos bays. Salinities in these bays average about 22 parts per thousand (ppt), lower than the Gulf's nearly constant 33 ppt. 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 from the Aransas and Mission Rivers to the west. There is always a salinity drop toward the San Antonio River mouth from San Antonio Bay—through Hynes Bay (a secondary bay)—to the river mouth. After floods, clumps of water hyacinths, logs, and other debris are deposited along the east shore of Blackjack Peninsula. During significant flood events, this debris also flows south, down along the GIWW as it brushes the southeastern edge of the Blackjack Peninsula (Aransas Unit), between San Antonio and Aransas Bays. At times, the minor bays of Ayers, Mesquite, and San Carlos also receive this debris and influx of nutrients. These same processes are at work in the Aransas Bay System along the southwestern edge of the Refuge, into which the Aransas and Mission Rivers flow. 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 is the visible top of an elongated mound of sand some 30–40 feet thick on top of compacted marine and fluvial sediments. The sandy soils of Matagorda Island were derived from the eroded interior of the State and from Gulf deposits. Off the Island's Gulf shore, the substrate is firm sand and crushed shell, whereas on the bay side, the water deepens very gradually, and the bottom ranges from muddy sand to deep ooze. The Island is 38 miles long and varies in width from $\frac{3}{4}$ mile to about $4\frac{1}{2}$ miles. The Gulf shoreline is smooth and linear, whereas the back side makes up about 80 miles of irregularly shaped bay shoreline. The Island encompasses 56,668 acres and is typical of a Gulf barrier island with a broad beach and a prominent line of sand dunes about 15 feet high. Its 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 Matagorda Island from the tip of Matagorda Peninsula. On the other end of the Island lies Cedar Bayou, a shallow natural pass that separates Matagorda Island from St. Joseph Island.

The Aransas 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. This modern landform 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 Matagorda Island. Because of its protective location, Matagorda Island aided in the formation of the Guadalupe and San Antonio estuary, one of the eight major estuaries along the Texas coast. Barrier islands such as Matagorda Island create shallow backside lagoons and protect them from the open waters of the Gulf. These barrier islands form the Gulf-side edge of the Gulf Prairies and Marshes Ecoregion.

3.1.4 Soils

The soils of the Texas coastal prairie and marsh are characterized by vertisols, mollisols, alfisols, and entisols at their broadest levels (Godfrey et al. 1973) (Table 3-1). Four distinct soils associations characterize the Refuge: 1) Galveston-Mustang-Dianola; 2) Narta-Aransas-Victine (Guckian and Garcia 1979); 3) Galveston-Adamsville; and 4) Livia-Francitas (Mowery and Bower 1978). For comparison, the dark fertile coastal prairie soils in agricultural production near the Aransas Unit are of the Victoria-Raymondville-Orelia association (Guckian and Garcia 1979). These soils associations are compared and characterized in Table 3-2. See also Figure 3-1, Figure 3-2, and Figure 3-3.

Table 3-1. Soil Orders of the Texas Coastal Prairie and Marsh

Soil Order ¹	General Features
Vertisols	Vertisols have high clay content that swell when wetted. Vertisols require distinct wet and dry seasons to develop because deep wide cracks are a common feature when dry.
Mollisols	Mostly these are overlain by grassland but with some broadleaf forest covered soil; with relatively dark A horizons. May have B horizons and lime accumulations.
Alfisols	Alfisols develop in humid and subhumid climates, with precipitation of about 20–50 inches, and are frequently under forest vegetation. Plant-available water is a characteristic feature much of the growing season and the soils are slightly to moderately acidic.
Entisols	Entisols have no profile development except a shallow marginal A. Many recent river floodplains, unconsolidated deposits, and sands are Entisols.

¹ Donahue et al. 1983, Boul et al. 1980.

Primary range sites (ecological sites) in the Coastal Prairie include blackland, sandy prairie, and lowland flats (Gould 1975b). 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 (Aransas, Matagorda Island, and Lamar Units), and the Tatton and Myrtle Foester Whitmire Units characterize 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), and soil compaction (vital to root penetration); it will also influence soil fertility (Donahue et al. 1983).

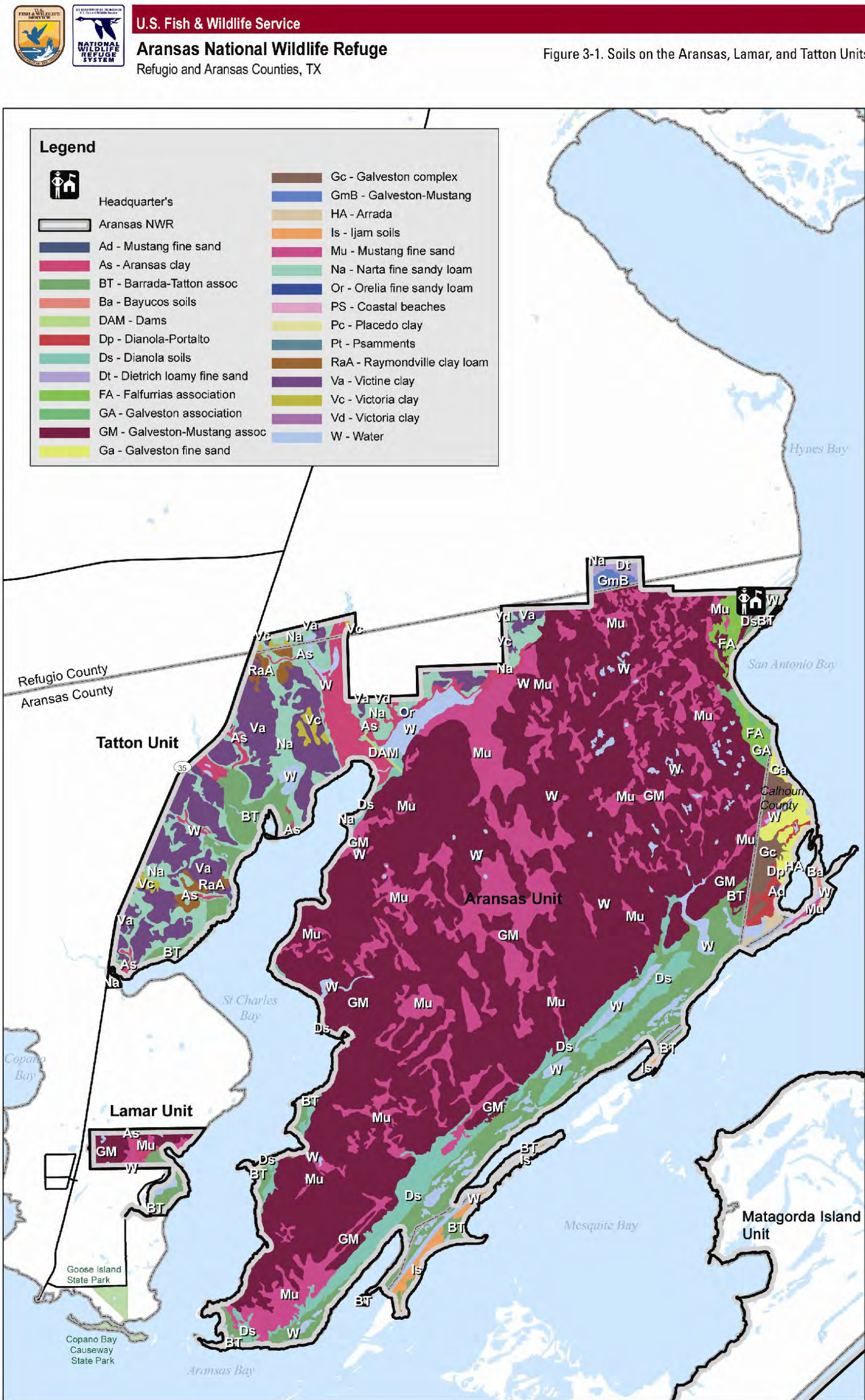


The blackland soils of the coastal prairie in agricultural production near the Refuge. Photo: USFWS

Table 3-2. Soil Associations of the Aransas NWRC and Surrounding Area

Refuge Unit	Soils Association	General Description
Aransas	Galveston-Mustang-Dianola	Nearly level to undulating, rapidly permeable, nonsaline to extremely saline, <i>sandy soils in low coastal areas</i>
Lamar	Galveston-Mustang-Dianola	Nearly level to undulating, rapidly permeable, nonsaline to extremely saline, <i>sandy soils in low coastal areas</i>
Myrtle Foester-Whitmire	Livia-Francitas	Nearly level to gently sloping, non-calcareous, poorly drained, <i>loamy and clayey soils of the low coastal uplands</i>
Tatton	Narta-Aransas-Victine	Nearly level, very slowly permeable, slightly saline to extremely saline, <i>clayey and loamy soils on floodplains and in low coastal areas</i>
Matagorda Island	Galveston-Adamsville	Nearly level to undulating, non-calcareous, somewhat excessively drained and somewhat poorly drained, <i>sandy soils of the coastal beaches</i>
Adjacent Agricultural Lands	Victoria-Raymondville-Orelia	Nearly level to gently sloping, very slowly permeable to slowly permeable, nonsaline to strongly saline, <i>clayey and loamy soils on uplands</i>

Figure 3-1. Soils on the Aransas, Lamar, and Tatton Units



PRODUCED IN THE DIVISION OF REFUGE PLANNING
ALBUQUERQUE, NEW MEXICO
LAND STATUS CURRENT TO: 5/31/09
MAP DATE: 5/25/10
BASEMAP: N/A
MERIDIAN: N/A
FILE:

0 0.375 0.75 1.5
Miles

0 0.4 0.8 1.6
Kilometers



UTM ZONE 14
NAD 83

Figure 3-2. Soils on the Myrtle Foester Whitmire Unit

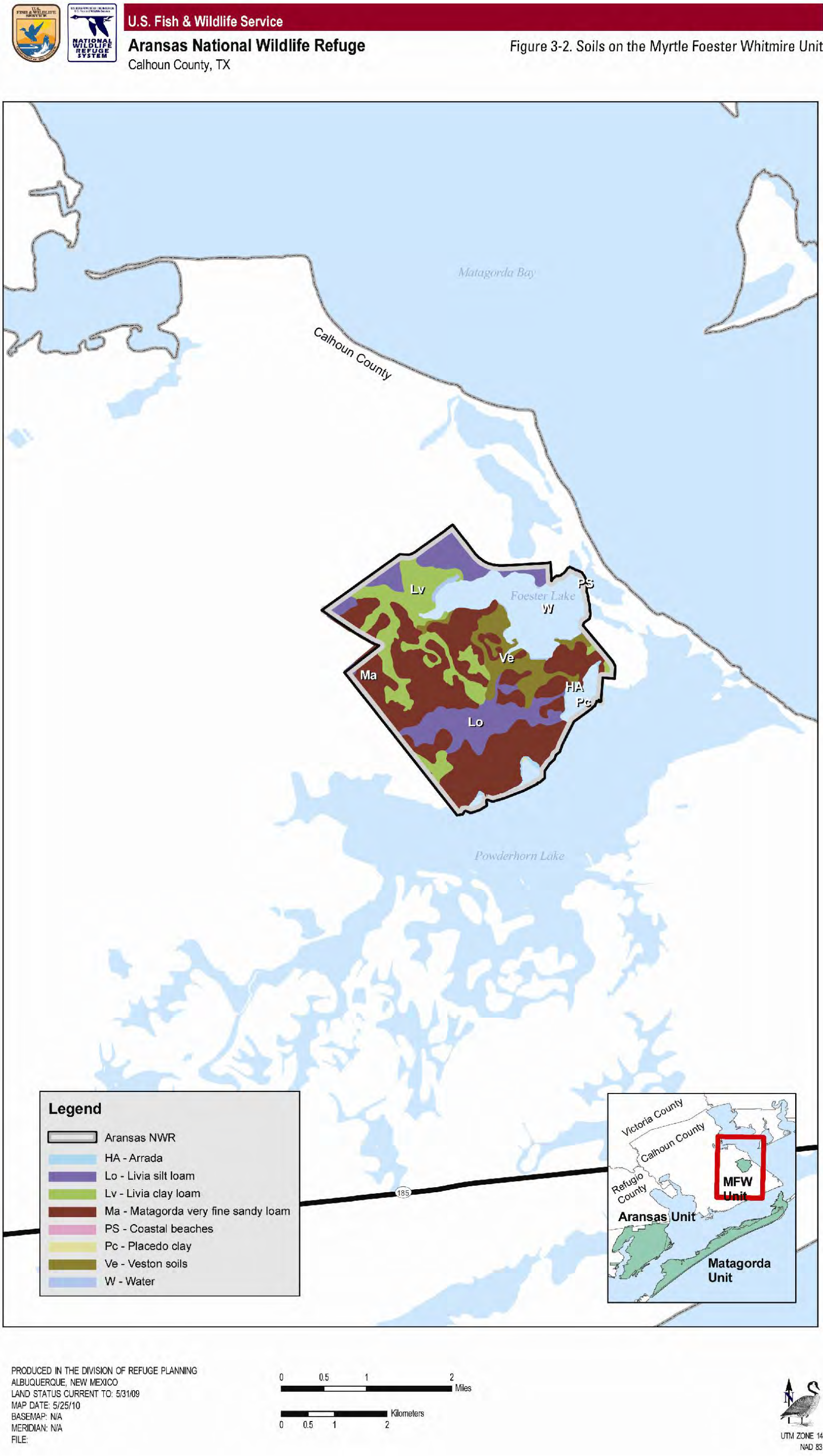
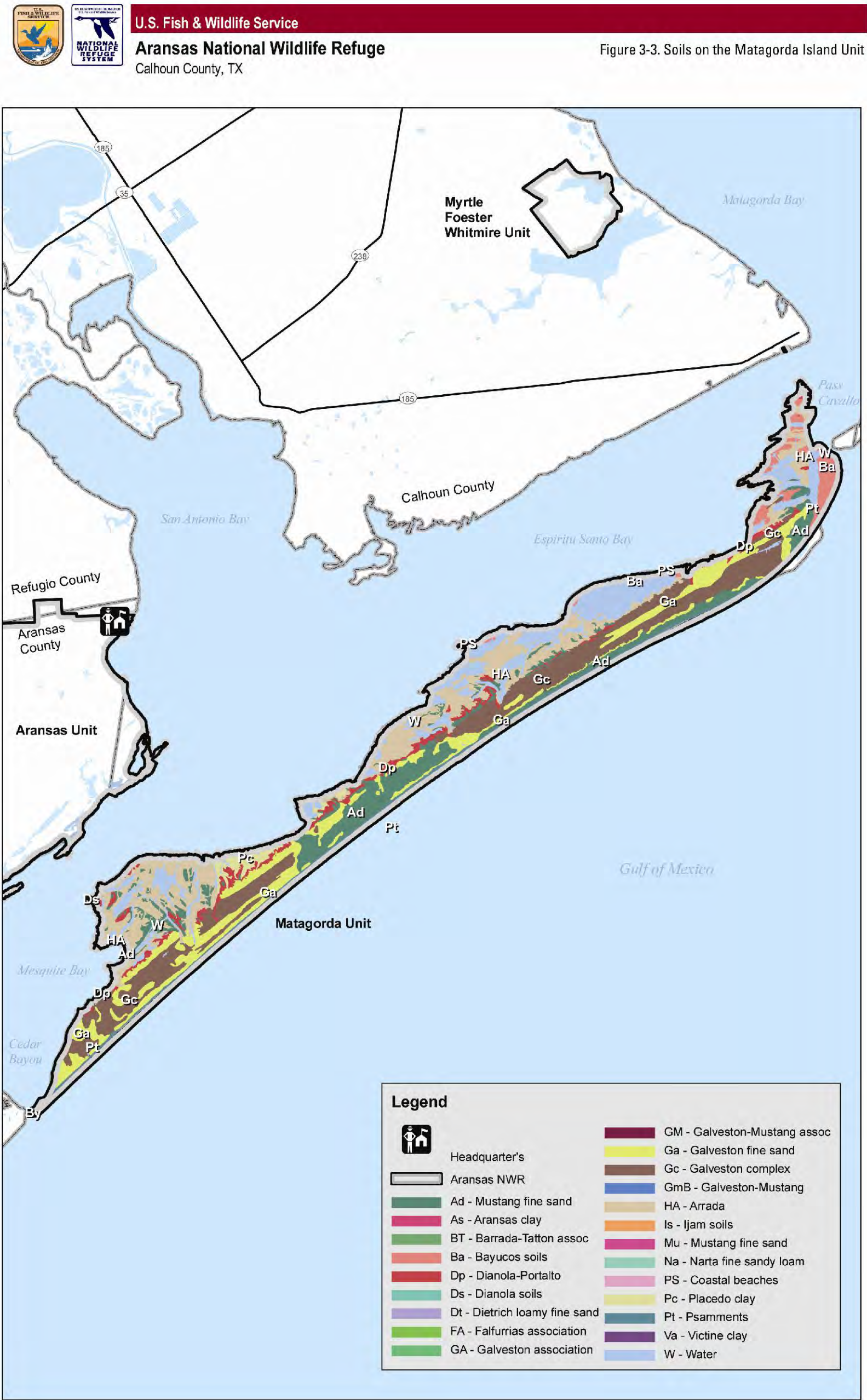


Figure 3-3. Soils on the Matagorda Island Unit



3.2 Biological Environment

This section describes the biological environment in which the Aransas National Wildlife Refuge Complex is found. It includes a description of the present, historical, and potential future condition of terrestrial and aquatic habitat types found on the Refuge (see Figure 3-4, Figure 3-5, and Figure 3-6), as well as the natural processes that influence them. It identifies priority wildlife species and focal species used for monitoring purposes and includes a discussion of various wildlife types found on the Refuge.

3.2.1 Habitat

3.2.1.1 Historical Habitat Descriptions

Notes from Jean Louis Berlandier's personal diary of 1829 describe the area between Goliad and Copano Bay as a vast expanse of grassland over which his party traveled many days, encountering "mojotes" (mottes) of trees only occasionally (Berlandier 1834). Spaight (1882) described the inland areas of Aransas County as broad level prairies, approximately one-third of which were timbered, chiefly with blackjack oak, live oak, and hackberry. There was fine pasturage of native grasses in the county. Mesquite was prominent throughout the year and "sedge grass" was abundant in the summers and "wire grass" in the winters. J. A. Allen (1894) offers the following description of this area:

"...The prevailing tree growth on the peninsulas consists of dwarfed live oaks, sweet bay and huckleberry with scattered groups of anaqua, hackberry, mezquit and prickly ash. The shell ridges along the shores and on St. Joseph and the smaller islands are covered with a tangled growth of chaparral consisting chiefly of dwarfed persimmons, huicache and catclaw with patches of dewberry vines and occasional bunches of prickly pear. On St. Charles Peninsula is a considerable area of black-jack oaks."

"...Along the shores is a belt of comparatively open country, of an average breadth of half a mile, covered with a dense growth of weedy plants, the most common being Croton, Eupatorium, Cassia, Baptisia, Helenium, and Amphiachyris. On the salt flats, Statice and Lycium grow in abundance. The most common grasses on the uplands are Bermuda and burgrass (Cenchrus tribuloides)."

Halloran (1943) described the area as having three different ecological types. The first of these is "oak bush," which covers approximately 75 percent of the land area or roughly 35,700 acres. The dominant species in this community is the live oak, which exhibits two distinct growth forms: the tree and the shrub or shinnery forms. The tree form occurs in mottes, which vary in size from a fraction of an acre to several acres. The aggressive shinnery form is widespread and grows anywhere from a few inches to seven feet in height. The other two ecological types described by Halloran (1943) were "sacahuista grass" and "salt marsh."

Tharp (1952) described a large portion of Aransas County as having a thick covering of sand, blown inland from the beaches, and in the upper portion of the County was an area estimated at 37,000 acres that was devoted to a wildlife preserve. This preserve, which is Aransas NWRC (Aransas Unit) on the Blackjack Peninsula, was described by Tharp (1952) as follows:

"...as occupying a low, sandy peninsula largely covered with blackjack oak and live oak savanna, with grasses ranging from coastal sacahuista on the lowest flats to bluestems, dropseeds, muhlies and artistidias on higher areas. Never having been excessively overgrazed, and today enjoying almost complete freedom from domestic

grazing, it constitutes one of the nearest approaches to virgin conditions of all areas of similar size in the state.”

3.2.2 Existing Habitat Descriptions

3.2.2.1 Upland Plant Communities

Oak-Bay Forest Community

This habitat type is mainly found on the Aransas Unit and somewhat on the Lamar Unit. The primary floral components in this community are live oak, redbay, and laurel oak. Secondary floral components include blackjack oaks, hackberries, tree huckleberry, yaupon, beautyberry, greenbrier, Turk’s cap, and coral bean. This plant community reaches its greatest growth on the deep, well-drained sands found along the northeastern boundary of the Aransas Unit, bordering San Antonio Bay. These deep sands are remnant depositions of old beachfront ridges or coastal cheniers (Gosselink et al. 1979) formed much like the currently accreting barrier islands, and which form the highest points on the Refuge. Common fauna include raccoon, opossum, armadillo, striped skunk, deer, javelina (collared peccary), feral hog, hognose snake, eastern mole, fox squirrel, cardinal, and white-eye vireo. Rare and uncommon fauna include short-tailed shrew, buff-bellied hummingbird, whippoorwill, and yellow-billed cuckoo.

Ridge and Swale Community

On the Blackjack Peninsula, this is the most widespread biotic community, and it owes its occurrence and appearance to both geology and human land use history. The corrugated ridge and swale topography is a result of sand deposition due to wind and wave action that created the Ingleside Barrier. The Ingleside Barrier is basically a windrow of sand heaped up directly on the shoreline similar to that of modern barrier islands. This same pattern can be found on Matagorda Island, and it greatly defines both the distinct and more subtle longitudinal habitats found on the island. On the Blackjack Peninsula, the sandy ridges provide the elevation required for woody perennials to survive being flooded. The frequently flooded sandy swales grow an assortment of annuals and water tolerant herbaceous perennials.

The Ridge and Swale Community can be divided into three components (running live oak thicket, live oak motte/woodland, and grassland). Initially, only two components occurred on the peninsula: the live oak motte/woodland and the grassland. However, human activities on the landscape have been instrumental in creating the running live oak thicket, comprised primarily of dense stands of live oak shoots. This is created through a simple process of removing the dominant growing bud (apical meristem that creates trees) and stimulating subdominant growing buds (auxiliary meristems that create multi-stemmed oak thickets). This multi-stemmed growth is a survival mechanism of woody plants found in harsh environments. Oak thickets can be found naturally and are caused by natural forces and localized events such as intense fire, heavy use by herbivores, and hurricanes. However, this phenomenon can be induced and greatly exacerbated on a larger scale by land clearing, continuous overgrazing, and repeated mechanical treatments over time.

The oak mottes and woodlands component is dominated by live oak, laurel oak, redbay, and lime prickly ash. The understory supports yaupon, greenbrier, and beautyberry. Mustang grape is also usually found growing among the trees. This habitat offers wintertime cover and summertime shade for a variety of wildlife. The live oak thicket is comprised of mostly dense stands of live oak shoots. The grasslands are dominated by an array of mid- and tall-perennial

bunchgrasses, the likes of which are rarely seen outside the Refuge. Primary floral components include bushy bluestem, broomsedge, seacoast bluestem, silver bluestem, big bluestem, and others. These are joined by switchgrass, dropseeds, Gulf muhly, paspalums, sprangletops, and Indiangrass. About 85 grass species have been recorded within the oak mottes/woodland component. In areas where water accumulates, sawgrass, rattlepod, bulrushes, and sedges can be found.

Many of the wildlife species found on the Refuge occur in this interwoven mesh of habitats comprising the Ridge and Swale Community. Common fauna include the white-tailed deer, cotton rat, feral hog, cardinal, bobcat, gray fox, mountain lion, mockingbird, white-footed mouse, rough green snake, rat snake, javelina, meadowlark, savannah and vesper sparrow, slender glass lizard, and northern harrier. Rare and uncommon fauna include the Texas scarlet snake, long-tailed weasel, white-tailed hawk, and aplomado falcon.

Barrier Flat Community

The grassy ridge and swale association that occupies the interior (uplands) of Matagorda Island 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 the 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. Common fauna include white-tailed deer, cotton rat, harvest mice, feral hog, eastern meadowlark, marshwren, dickcissel, slender glass lizard, Gulf Coast ribbon snake, ground skink, ornate box turtle, speckled kingsnake, massasauga rattlesnake, western diamondback rattlesnake, coachwhip, mockingbird, loggerhead shrike, and scissor-tailed flycatcher. Rare and uncommon flora and fauna include ladies tresses, white-tailed hawk, aplomado falcon, American badger, white-tailed kite, Le Conte's sparrow, short-eared owl, and burrowing owl.

Upland Grassland Community

This coastal prairie community occurs on relatively well-drained dark soils. On the Refuge, due to the proximity and influence of coastal bays and the gradual slope in that direction, the remnant that remains of this community is considered low upland prairie (lowland flats). These are transitional areas between the blackland soils and the sandy prairie, and, in some cases, between blackland soils and salt marshes. This grassland is composed of seacoast bluestem and silver bluestems, windmill grass, knotroot bristle grass, white tridens, Texas wintergrass, and an assortment of panic grasses. It is here that the Attwater's prairie chicken once existed on the Refuge. This is home to a variety of grassland birds, raptors, and prairie-dependent species. This community is found on the northern half of the Tatton unit and once existed on the Myrtle Foester Whitmire unit. This is the only remnant on the Refuge of the vast, open, true coastal prairie that once covered much of the area on this soil type and the more fertile blackland soils just inland. Most of this soil type is under cultivation today, used as ranch land or being incorporated into urban development.

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. Birds and mammals more typical of the south Texas brushlands can be found in this community, including cactus wren, Bell's vireo, Bewick's wren, Cassin's sparrow, roadrunner, and wood rat.

3.2.2.2 Shoreline Plant and Animal Communities

Gulf Beach and Dune Communities

This biotic community occurs where the Gulf of Mexico meets the land at the leading edge of the barrier island. The Gulf beach and the dunes are categorized into several zones; beginning at the water's edge and inland are the swash zone, forebeach, berm/strandline, and backbeach, primary, and secondary dunes. Vegetation on the backbeach includes goat-foot morning glory, frogfruit, fleabane, sandpinks, sea rocket, sea purslane, seaside heliotrope, beach evening primrose, ground-cherry, fimbry, coast pennywort, beach amaranth, marshhay cordgrass, gulfdune paspalum, and sea oats.



Gulf beach and dunes on Matagorda Island. Photo: Tonya Nix

The primary dunes include much of the vegetation of the backbeach and may also include Gulf croton, fiddleleaf morning glory, camphorweed, partridge pea, western ragweed, and groundsel. In the secondary dunes, one will find marshhay cordgrass, gulfdune paspalum, American snoutbean, hoary milkpea, coast prickly pear, partridge pea, loosestrife, silverleaf sunflower, and sea oats.

The beach swash zone fauna includes primarily detritivores (mole crab, surf crab, coquina clam, ghost shrimp, sand digger amphipods, and palp worms) and predators (Atlantic moon, lettered olive, Salle's auger, blue and speckled crab, sanderling, and ruddy turnstone). The forebeach consists of transient feeders (juvenile ghost crab, tiger beetle, dragonflies, and robberflies) and loafers (gulls, terns, and brown pelicans). The berm/strandline is utilized by scavengers (beach flea, shore fly, ghost crab, seaweed fly, carrion fly, most shorebirds, crested caracara, turkey vulture, feral hog, and coyote). On the backbeach, ghost crabs, horned larks, jackrabbits, badgers, and coyotes can be found. The primary dunes are home to prairie-lined racerunner, horned lizard, cotton rat, jackrabbit, badger, and coyote. Secondary dune fauna are similar to that of the surrounding grassland. Rare and uncommon fauna include the red land crab, sea turtles, white-tailed tropicbird, Northern gannet, magnificent frigatebird, and sooty tern.

Shell Ridge/Chaparral Community

This habitat type is formed by a windrow of oyster shell, piled by wind-driven waves and associated woody vegetation. This is one of the smallest—yet most distinctive and diverse—communities on the Refuge. It is found scattered about in isolated fragments on the bayside of Matagorda Island, natural islands, and some spoil islands. On the Aransas Unit, this biotic community is found along the Heron Flats Trail and on the Tatton Unit, along Salt Creek. The key feature of this community is the high lime content of the soil, a result of the oyster shell and the lower clay-loam ridges found throughout. The vegetative composition of this community resembles south Texas brush country with a unique sprinkling of maritime influences. On the Aransas Unit, due to its age, occurs a very unique assemblage of the shell ridge community near the visitor center along Heron Flats Trail.

Primary floral components include seashore dropseed, sand saltbush, clammyweed, bushy sea oxeye, sea lavender, mesquite, coral bean, Carolina wolfberry, granjeño, colima, tanglewood, Spanish dagger, snapdragon vine, ivy tree vine, balsam gourd, Texas prickly pear, Texas persimmon, brasil, lotebush, Texas torchwood, lantana, la coma, Berlandier wolfberry, Texas nightshade, and tasajillo. On the mainland, one can add Mexican buckeye, netleaf hackberry, live oak, agarito, retama, epiphytes (Spanish and ball moss, true mosses, fungi and lichens); and the greatest assortment of vines found on the Refuge can be found along Heron Flats Trail. More than 150 species of plants have been identified in the Shell Ridge/Chaparral Community.

On Matagorda Island, specialized ants appear, known as pyramid ants (*Conomyrma flava*), that are not found elsewhere. This habitat also provides some of the best shelter, cover, and feeding areas for Neotropical migrant fallouts. The soil type is the Galveston-Adamsville association with shell and high calcium content. Common Island fauna include ghost crab, sand fiddler crab, imported fire ant, walking stick, wood-boring beetle, cotton rat, raccoon, coyote, diamondback rattlesnake, prairie-lined racerunner, horned lizard, white-tailed kite, white-tailed hawk, and horned owl. On the mainland, one can add the white-footed mouse, fence lizard, green anole, rough green snake, white-eyed vireo, armadillo, opossum, and skunk.

Tidal Shore Grassland (Marshhay Cordgrass and Gulf Cordgrass Communities)

This is the gently sloped linear stretch of land found just inland from the tidal flats community. It is densely covered with marshhay cordgrass and rimmed with Gulf cordgrass and bluestems along the upper edge. The Gulf cordgrass component occurs on saline clay soil types and may also include bluestems. Tidal shore grassland occurs on all units to various degrees and is most extensive along the eastern boundary of the Aransas and Matagorda Island Units. The Gulf Cordgrass Community can also be found on all units to varying degrees, with large stands found north of Burgentine Lake and on the lower third of the Tatton Unit. Its open aspect and heavy rodent population appeals to a variety of raptors, including the white-tailed hawk, white-tailed kite, northern harrier, and loggerhead shrike. Also found here are a variety of sparrows, sedge wren, hispid cotton rat, pygmy mouse, racers, and coachwhip snake.

3.2.2.3 Wetland Plant and Animal Communities

Freshwater Community

Throughout the Refuge are a variety of freshwater plant and animal communities. They include the backbeach, interdune area, barrier flat swales, peninsular swales, ponds, lakes, drainage ditches, and scrapes where rainfall collects. A few of these intercept the perched aquifer and are semi-permanent sources of fresh water; some are filled by windmills, and others receive runoff from artesian wells. During wet years, every swale on the Refuge will be full for weeks. The specific vegetative mix will depend on the permanence of the water.

More permanent water will develop submerged plants like hornwort and southern naiad, as well as floating plants such as duckweed and pondweed. Emergent plants along the shoreline include cattails, California and American bulrush, burhead, arrowleaf and common reed. The bankside trees are typically black willows, and other vegetation includes rattlepods and coffee bean, saltmarsh and spiny aster, and groundsel. The edges of temporary pools are generally marked by a thick stand of bushy bluestem, a variety of rushes and sedges, and also switchgrass and button bush. On the barrier flats, floral components include green algae,

wigeongrass, stonewort, seashore paspalum, American bulrush, burhead, cattails, black rush, coffee bean senna, Bermudagrass, water hyssop, umbrella pennywort, creeping seedbox, smartweed, and saltcedar.

The unifying characteristic of these wetland habitats is that almost all Refuge wildlife depends on the fresh water. Even those species strongly associated with salt water (e.g., gulls and terns) need to drink fresh water daily. Frogs and toads breed only in fresh water, and the mottled duck and black-bellied whistling duck nesting and brood rearing cycle revolves around these freshwater areas. Common fauna of freshwater communities include the water flea, ostracods, larval midge, mosquitoes, dragonflies, whirligig, water boatmen, aquatic snails, mole cricket, staphylinid beetle, earthworm, leopard frog, Gulf Coast toad, narrow-mouthed toad, yellow mud turtle, red-eared slider, Gulf Coast ribbon snake, 20 or so species of fish, ducks, grebes, gallinules and coots, belted kingfisher, marsh and sedge wrens, killdeer, raccoon, feral hog, and white-tailed deer. Rare and uncommon fauna include nutria, blue-winged teal (occasionally nests), yellow and black rails, wood stork, yellow-crowned night-heron, and broad-banded water snake. The most spectacular resident of the Refuge freshwater biotic community is the American alligator.

Tidal Flat/Pool Community (Salt Marsh Community)

This habitat type is often called “salt marsh,” though not really true salt marsh, which is more applicable to the extensive growth of emergent grasses, reeds, and rushes known from about the Colorado River eastward. In the mid- and lower-Texas coast, the shoreline is not regularly flushed by significant tides. Rather, it is washed by freshwater drainage; hence “salt marshes” dwindle rapidly. The only hint of salt marsh in our area consists of a long narrow band dominated by smooth cordgrass a few feet to yards wide at most, and it is not extensive enough to support distinct animal communities. Typically, when the term salt marsh is used, it is referring to the tidal flat community. This area marks the transition from the uplands to the bays, and within it lies the unique community of plants and animals specially adapted to the ebb and flow of 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. Specialized components include blue-green algal mats, which are a mix of algae, diatoms, protozoa, and bacteria, where hordes of black shore flies lay their eggs; tiny maggots feed on the mat, pupate near the surface, and feed flocks of least and western sandpipers. The 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 detritivores—marine worm, clam, ghost shrimp, and many tiny crustaceans; grass shrimp, juvenile brown shrimp, pistol shrimp, blue crab, marsh crab, mud crab, stone crab, hermit crab, marine snails, striped mullet, and killifish; shore flies, shorebugs, beach flea, fiddler crab, shorebirds, waders, herons and egrets, gulls, terns, black skimmer, clapper rail, seaside sparrow, Gulf saltmarsh snake, saltmarsh grasshopper, marsh rice rat, western pygmy blue and great white southern butterflies, tiger beetles, wolf spider, rice rat, raccoon, feral hog; and white-tailed deer. Rare and uncommon flora and fauna include black mangrove, wood stork, diamondback terrapin turtle, white mullet, blue crab, and, of course, the federally endangered whooping crane.

Figure 3-4. Vegetation on the Aransas, Lamar, and Tatton Units

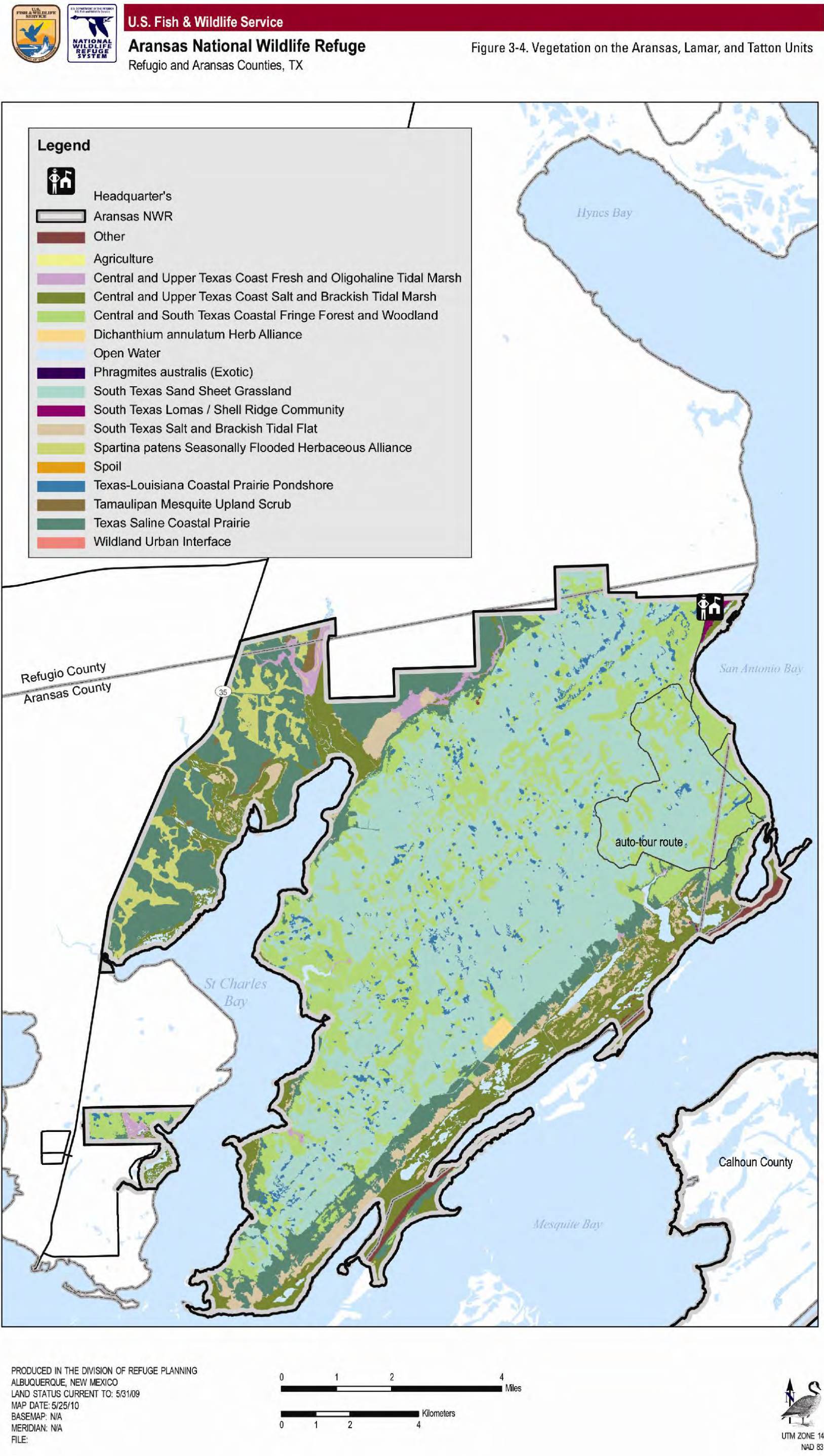


Figure 3-5. Vegetation on the Myrtle Foester Whitmire Unit

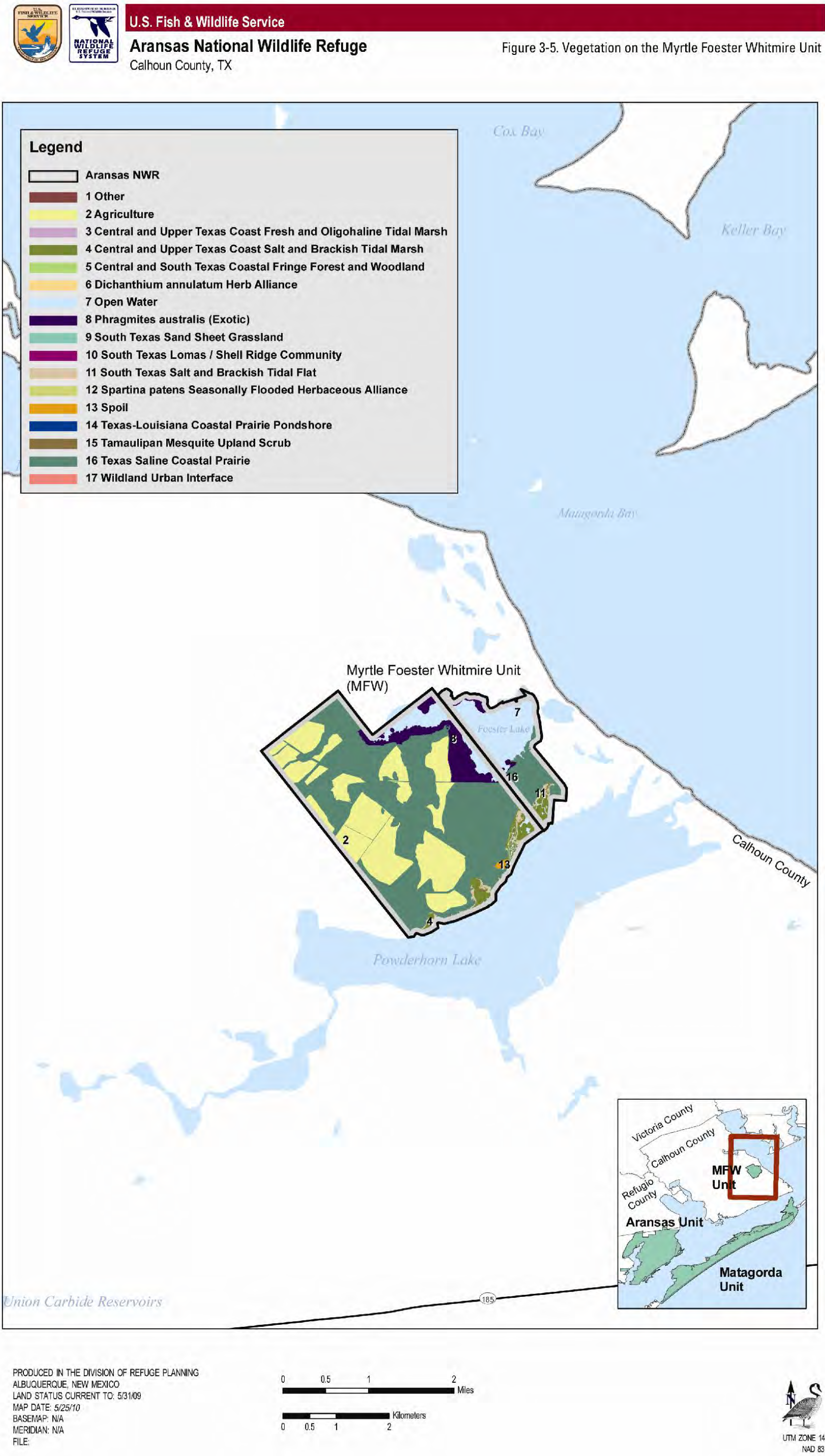
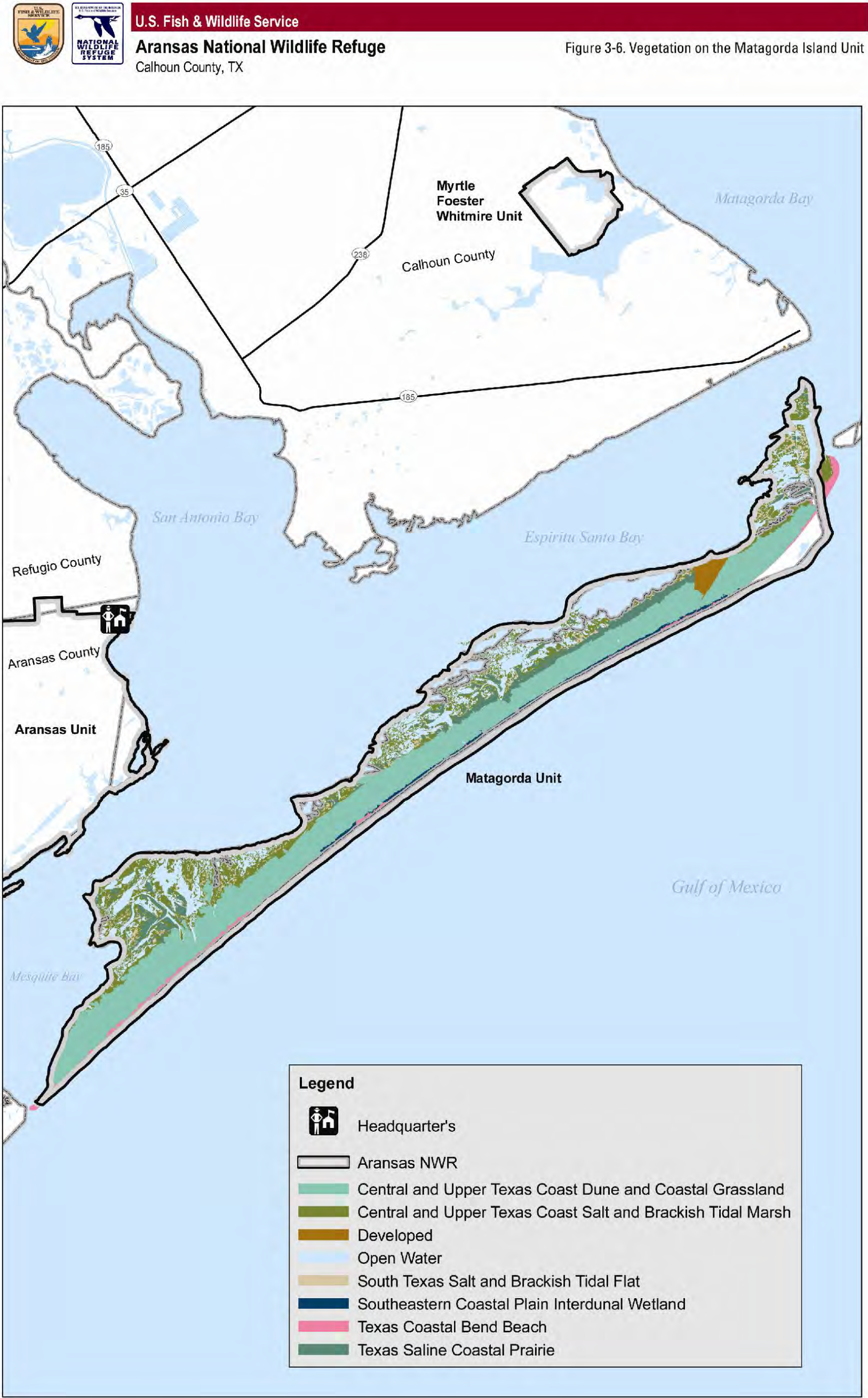


Figure 3-6. Vegetation on the Matagorda Island Unit



PRODUCED IN THE DIVISION OF REFUGE PLANNING
ALBUQUERQUE, NEW MEXICO
LAND STATUS CURRENT TO: 5/31/09
MAP DATE: 5/25/10
BASEMAP: N/A
MERIDIAN: N/A
FILE:

0 1 2 4 Miles
0 1 2 4 Kilometers



UTM ZONE 14
NAD 83

Moist Soil Units

The Myrtle Foester Whitmire Unit contains the only manipulated wetlands on the Refuge. This area is cooperatively farmed for organic rice with the second crop left for wildlife. This habitat provides much needed water during the summer when fresh water is at a premium. These manmade wetlands are surrounded by dikes, which allow for managing water levels for crop or other plant and invertebrate production. Gravity flow and pump systems are used to raise or lower water levels to achieve desired mixes of aquatic plants, thus enhancing their value to wildlife. Managing these wetlands for wildlife is essentially based on controlling plant succession to meet seasonal needs.

Within these marsh complexes, invertebrates such as insects, gastropods, and other organisms living among the vegetation provide an important food source for fish and small vertebrates that are food for larger animals. Waterbirds and other wetland wildlife rely on marsh plants for subsistence, nest sites, and cover, while other wetland wildlife use the fish and invertebrates that inhabit the vegetation. Each habitat component within the marshes attracts its own assemblage of plants, birds, mammals, reptiles, amphibians, invertebrates, and fish. Within the marshes, zonation and succession, in response to environmental conditions, are among the important ecological processes. Water level fluctuation, whether natural or human-induced, and the resultant plant and animal responses are often the most significant driving forces in managed wetland communities.

3.2.3 Wildlife

3.2.3.1 Birds

The Aransas NWRC is located in the Central Flyway, a route traveled annually by numerous waterfowl and migratory birds (Figure 3-7). Over 400 bird species have been documented on the Refuge units (See Appendix B). This diversity of species attests to the attractiveness of existing habitat types in the area and to the strategic location along this major bird migration route. Birds are further concentrated due to the physical barrier presented by Gulf of Mexico and the tendency for migrant birds to follow well-defined landscape "highways" such as shorelines. This natural pathway funnels millions of birds through a relatively narrow area. Hence, the Refuge and surrounding wetland areas are especially important to a great variety of birds, including waterfowl, landbirds, raptors, shorebirds, marshbirds, waterbirds, and wading birds. This includes federally listed species such as the endangered whooping crane, which is critically dependent on the Refuge wetland habitats during the winter.



Whooping cranes foraging along the shoreline. Photo: Steve Sykes

The Texas coastal region is an important staging area for migrant songbirds as they rest up for the passage around or over the Gulf of Mexico in the fall. Conversely, the pattern repeats itself in the spring as birds work their way up the coast and make landfall after crossing the Gulf of Mexico. The abundance and variety of insect prey available in the various wetland and upland habitats of the Refuge permit these birds to refuel for their continued migration. The western Gulf of Mexico shoreline has one of the most dramatic buildups and fallouts of Neotropical migrants in North America during spring migration. Spring migrants pass through the Refuge from March through May, and fall migration begins in August and goes

through October. Peak numbers of wintering birds, such as waterfowl, can be found on the Refuge from November through February (Table 3-3).

The 13 most common resident songbird species, out of 46 species encountered, include the northern cardinal, white-eyed vireo, common yellowthroat, painted bunting, red-winged blackbird, brown-crested flycatcher, bronzed cowbird, Carolina wren, dickcissel, mourning dove, northern bobwhite, yellow-breasted chat, and yellow-billed cuckoo. These species comprised 28 percent of the species encountered and about 96 percent of individuals' detected (Unpubl. Refuge Rept. 1999). Ten species of herons and egrets occur in North America, and the Refuge hosts all of them as resident species. Other large waders and waterbirds include the least bittern, American bittern, white ibis and white-faced ibis, common loon, grebes (six species), brown and white pelicans, black skimmer, roseate spoonbill, wood stork, sandhill crane, and whooping crane. Gulls and terns include the laughing gull, herring gull, ring-billed gull, Bonaparte's and Franklin's gulls, Forster's tern, common tern, royal tern, Caspian tern, least tern, sandwich tern, and black tern.

Shorebird numbers and species using the Refuge can be outstanding, with the greatest variety in the spring and fall. At least six shorebirds nest on the Refuge: killdeer, willet, American avocet, Wilson's plover, snowy plover, and black-necked stilt. Some of the most commonly seen shorebirds include the greater and lesser yellowlegs, black-bellied plover, long-billed dowitcher, and sanderling and western sandpiper. Aransas NWRC is also home to a great number of resident, migratory, and wintering raptors. Residents include the white-tailed kite, white-tailed hawk, crested caracara, aplomado falcon, turkey and black vultures, and red-tailed hawk. Wintering raptors include the northern harrier, American kestrel, peregrine falcon, merlin, osprey, bald eagle, red-shouldered hawk, and Cooper's hawk. Migratory raptors include Swainson's hawk, broad-winged hawk, and swallow-tailed kite.

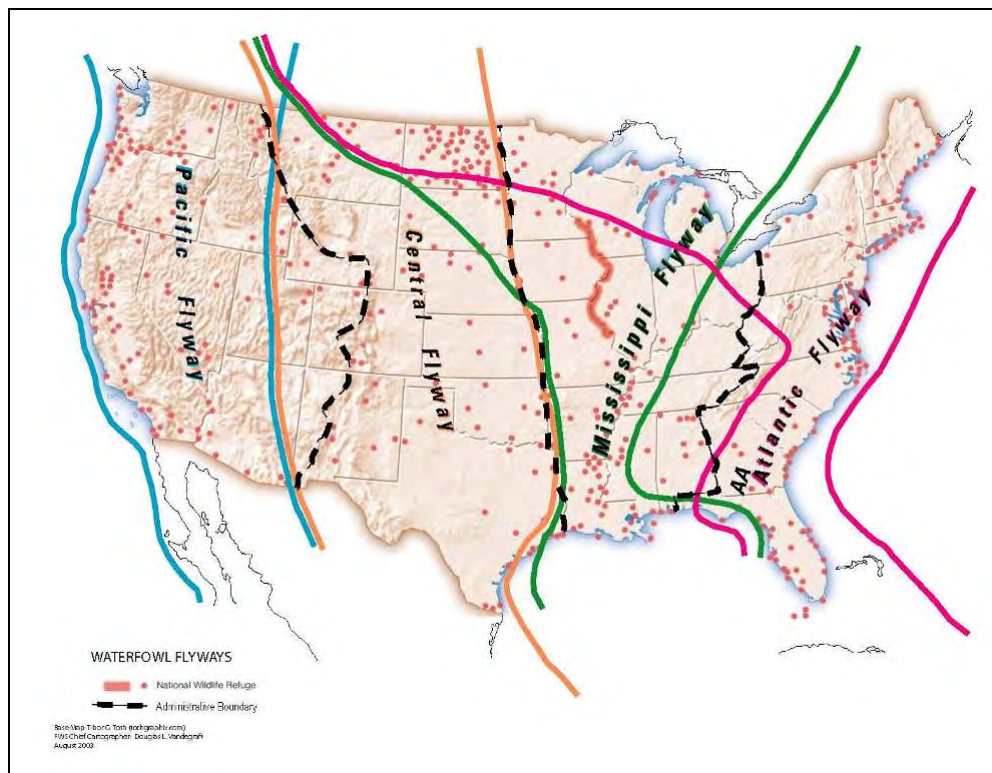


Figure 3-7. Migratory flyways in the United States with NWR locations

During a normal migration, waterfowl use of the Refuge averages approximately 103,000 ducks and 11,000 geese, with the Myrtle Foester Whitmire Unit holding about 30 percent of these birds. Waterfowl comprise a significant group of the avian migration along the Central Flyway, and about two-thirds of these waterfowl winter in Texas. At least 25 species are known to winter on the Refuge.

Snow goose, Northern shoveler, gadwall, Canada goose, American wigeon, Northern pintail, green-winged teal, mottled duck, lesser scaup, redhead, bufflehead, ruddy duck, red-breasted and hooded merganser, and the canvasback are the predominant wintering waterfowl species. Species unique to the area include the black-bellied whistling duck and the fulvous whistling duck.

Gulf Coast marshes comprise the required habitat for mottled ducks, whose breeding and winter ranges are identical. The mottled duck has been affected by shrinking and deteriorating habitat, and the resultant downward population trend has concerned biologists. Food items important for the mottled duck include killifish, mosquito fish, shrimp crawfish and snails; and cultivated rice, spikerush, bulrush, smartweed, wigeongrass, sawgrass, coffeebean, sago pondweed, and others. Other waterfowl species that nest in the area include the blue-winged teal, fulvous whistling duck, and black-bellied whistling duck.

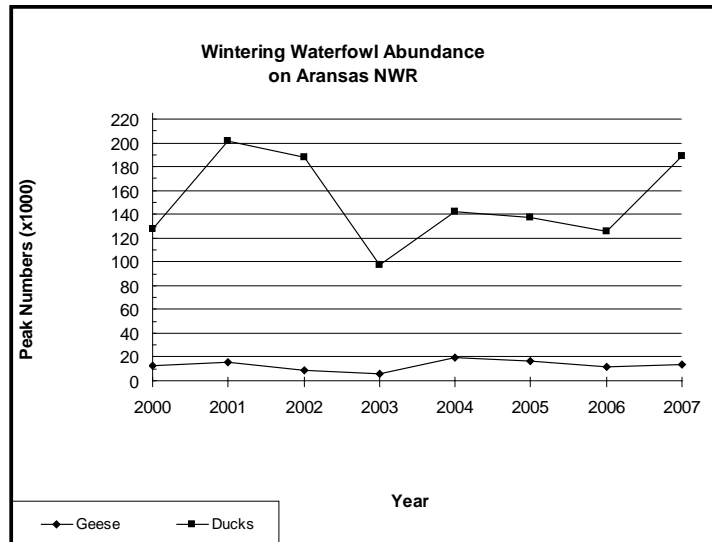


Table 3-3. Waterfowl Abundance Trends Based on USFWS Southwest Region Annual Waterfowl Census

3.2.3.2 Mammals



Javelina. Photo: Steve Sykes

About 39 species of mammals are found on the Refuge. Common species include raccoon, eastern cottontail, javelina, armadillo, opossum, bobcat, striped skunk, white-tailed deer, fox squirrel, gray fox, and several small rodent species. Insectivores include two species of shrew, one mole, and up to eight species of bats. Some of the more uncommon mammals include long-tailed weasel, ring-tailed cat, short tailed shrew, swamp rabbit, eastern spotted skunk, mountain lion, badger, and hog-nosed skunk. Some of the non-native mammals include the feral hog and nutria. Threatened or endangered mammals include the West Indian manatee, which has been known to occur in the local bays. These mammals can be found in various habitats, dependent on cover and food requirements. Unusual mammals reported for the Refuge include the white-nosed coati and jaguarundi, neither of which has been documented on the Refuge.

Feral hogs have periodically become overabundant on the Refuge. An elevated hog population can adversely alter the natural succession and composition of vegetative communities. They can also affect native animal populations through over-browsing and competition for food, depredation, diseases, and habitat damage due to rooting. They are known to damage

neighboring croplands and also constitute a hazard to motorists. Nutria, an introduced South American rodent species, is not abundant enough to greatly affect aquatic vegetative communities. Their numbers appear to be held in check by alligators and the “droughty” bust-or-boom wet cycles. Currently, populations of the feral hog are being controlled, with varying success, through Refuge hunting programs and active hog control on Matagorda Island.

3.2.3.3 Reptiles and Amphibians

Reptiles and amphibians, while often mentioned together, are two natural and distinct classes of vertebrate animals. Many species of snakes, lizards, salamanders, toads, and frogs are common to the Refuge and depend on various habitats for their survival. Amphibians such as frogs, toads, and salamanders depend on quality wetlands for their survival. There are approximately 100 species of reptiles and amphibians on the Aransas NWRC, including sea turtles and species that may occur on the Refuge. Of these, 28 have some protected status or designation in the Gulf Coast Ecosystem. At least three types of salamanders and 13 species of frogs and toads are known to reside here. At least 12 species of turtles, 34 species of snakes, and 12 species of lizards are found on the Refuge. Some, like the Gulf Coast ribbon snake, green treefrog, red-eared slider, ground skink, northern fence lizard, and Gulf Coast toad are abundant. Others, like the tiger salamander, Texas diamondback terrapin, Texas scarlet snake, and Texas horned lizard, are uncommon to rare.



American alligator. Photo: Mickey Bettis

3.2.3.4 Fish and Marine Life



An endangered Kemp's ridley sea turtle coming ashore to nest. Photo: USFWS

Coastal wetlands are a vital component of the Gulf Coast fishery and provide a tremendous food source that supports many of the Federal trust species on Aransas NWRC. They provide spawning, nursery, and rearing habitat for many wetland and tidal-inlet dependent fish species; more than 20 have significant recreational, commercial, or prey value. Generally, the two categories of fish associated with the coastal marshes of this region are (1) species directly dependent

on coastal marshes and (2) species making opportunistic use of coastal marshes. The first category includes species such as shrimp, oyster, crabs, tidewater silversides, southern flounder, killifish (four species), striped mullet, white mullet, inland silverside, spot, pinfish, and redfish, whose dependence on marsh vegetation has been well established. The second category includes near-shore and bay species such as gizzard shad, black drum, spotted seatrout, bay anchovy, silver perch, pigfish, Atlantic croaker, Atlantic and cownose rays, sea catfish, and sheepshead, which have been shown to be seasonally common in coastal marshes as young or adults. Certainly, there are many other species of fish and marine life in the

surrounding waters. (See also *Fishes of the Gulf of Mexico* by H.D. Hoese and R.H. Moore and *Shore Ecology of the Gulf of Mexico* by J.C. Britton and B. Morton).

Fishes of freshwater ponds and ditches found on the Refuge include sailfin molly, spotted gar, warmouth, carp, mosquito fish, yellow bullhead, sheepshead killifish, rainwater killifish, golden topminnow, and four species of sunfish.

3.2.3.5 Threatened and Endangered Species

The primary federally listed species on the Refuge is the endangered whooping crane. The entire natural population of whooping cranes winters on or adjacent to Aransas NWRC.

The Refuge and surrounding areas are also designated critical habitat for this species (43 FR 20938). The designated critical habitat area is described as follows:

“...An area of land, water, and airspace in Aransas, Calhoun, and Refugio Counties with the following boundaries: Beginning at the point where the north boundary of the Aransas National Wildlife Refuge intersects the shore of San Antonio Bay at Webb Point; thence, from this point along a straight line across San Antonio Bay through the westernmost tip of Mosquito Point and inland to a point of intersection with metal surfaced road; thence eastward along a straight line across Espiritu Santo Bay to the intersection of the bay shore and a road at the east end of Pringle Lake on Matagorda Island; thence south along this road to the intersection with the main Matagorda Island Road; southwestward along this main road to Cedar Bayou at latitude 28°04'10" N.; thence due west across Cedar Bayou, Vinson Slough, and Isla San Jose to Gulf Intracoastal Waterway, platform channel marker No. 25; thence north to the southwest corner of the proclamation boundary, just south of Blackjack Point; thence north along the proclamation boundary into St. Charles Bay to a line drawn as an eastward extension of Twelfth Street on Lamar Peninsula; thence westward along this line to intersection with Palmetto Avenue; thence northward along a straight line to the southwest corner of the Aransas National Wildlife Refuge at Texas State Highway 35 and the north shore of Cavasso Creek; thence northeast on a straight line to the corner of the Aransas National Wildlife Refuge north boundary adjacent to triangulation station "Twin"; thence along the north boundary of said refuge to the starting point Webb Point.” (Figure 4-3)

Many of the habitat management activities on the Refuge focus on the whooping crane. Other federally listed threatened or endangered species that may be found locally in suitable habitat, incidentally or otherwise, include the Kemp's ridley sea turtle (endangered), loggerhead sea turtle (threatened), green sea turtle (threatened), hawksbill sea turtle (endangered), leatherback sea turtle (endangered), brown pelican (threatened), piping plover (threatened), and aplomado falcon (endangered). Critical habitat for the piping plover has recently been proposed along the Texas coast and includes Matagorda Island (73 FR 29294-29321; May 20, 2008). These additional species have been documented on or in the nearby waters adjacent to the Refuge (see Appendices C and D).

3.2.3.6 Priority Fish, Wildlife, and Plant Species

Priority species are wildlife or plant species that include Federal trust species such as migratory birds, threatened species, endangered species, inter-jursdictional fish, marine mammals, and other species of concern. Priority species are also rare, declining, or species of management concern that are on lists maintained by natural heritage programs, State wildlife

agencies, other Federal agencies, or professional, academic, and scientific societies, and those mentioned in landscape-level or other conservation plans. Other species included here are of management concern due to their importance as economic and/or recreational sources and/or their status as non-native or invasive species.

A significant majority of Texas's 83 vertebrate wildlife species of concern or State-threatened are dependent on habitats found on the Refuge, and some of these species are known to nest or occur here (see Appendix B). Some of these species on the State list include mottled duck, buff-bellied hummingbird, seaside sparrow, white-tailed hawk, Wilson's plover, yellow-billed cuckoo, and reddish egret. Bald eagles, formerly a federally threatened species (72 FR 37346; July 9, 2007), are occasionally seen near coastal areas during migration and historically have nested on the Aransas NWRC. Additionally, State-listed threatened or species of concern mammals consist of 20 species. Some of these mammals include the hog-nosed skunk, short-tailed shrew, southern yellow bat, river otter, long-tailed weasel, white-nosed coati, big free-tailed bat, eastern spotted skunk, and American badger. State-listed threatened or species of concern reptiles and amphibians consist of 23 species, excluding the sea turtles. Some of these include the Texas scarlet snake, Texas tortoise, diamond-backed terrapin (turtle), Texas horned lizard, and the lesser siren. Also, there are about 97 species of invertebrates that are State species of concern for the Gulf Coast Prairies and Marshes Ecoregion.

3.2.3.7 *Refuge Focal Species*

Focal species are a subset of priority species and represent larger guilds of species that use habitats in a similar fashion. Focal species are selected based on the knowledge that factors limiting their populations are sensitive to landscape scale characteristics, and that by addressing the needs of these focal species, other priority species within a guild are expected to benefit, as are other wildlife. In addition, an appropriate set of focal species includes consideration for the specifics of the respective ecoregion, availability of data and information, and programmatic obligations, as defined in the Strategic Habitat Conservation Report (2006). Therefore, Refuge focal species are those species and their associated habitats included in Comprehensive Conservation Plan (Plan) objectives and strategies for which protection, management, research, and monitoring efforts will be focused, and for which management and protection efforts are necessary to sustain them and which are consistent with Refuge purposes (Table 3-4).

Table 3-4. Refuge Focal Species

Focal Listed (Threatened and Endangered) Species	Focal Bird Species	Focal Waterfowl Species
Whooping crane Kemp's ridley sea turtle Piping plover	Loggerhead shrike Yellow-billed cuckoo Painted bunting Seaside sparrow Northern bobwhite	Mottled duck

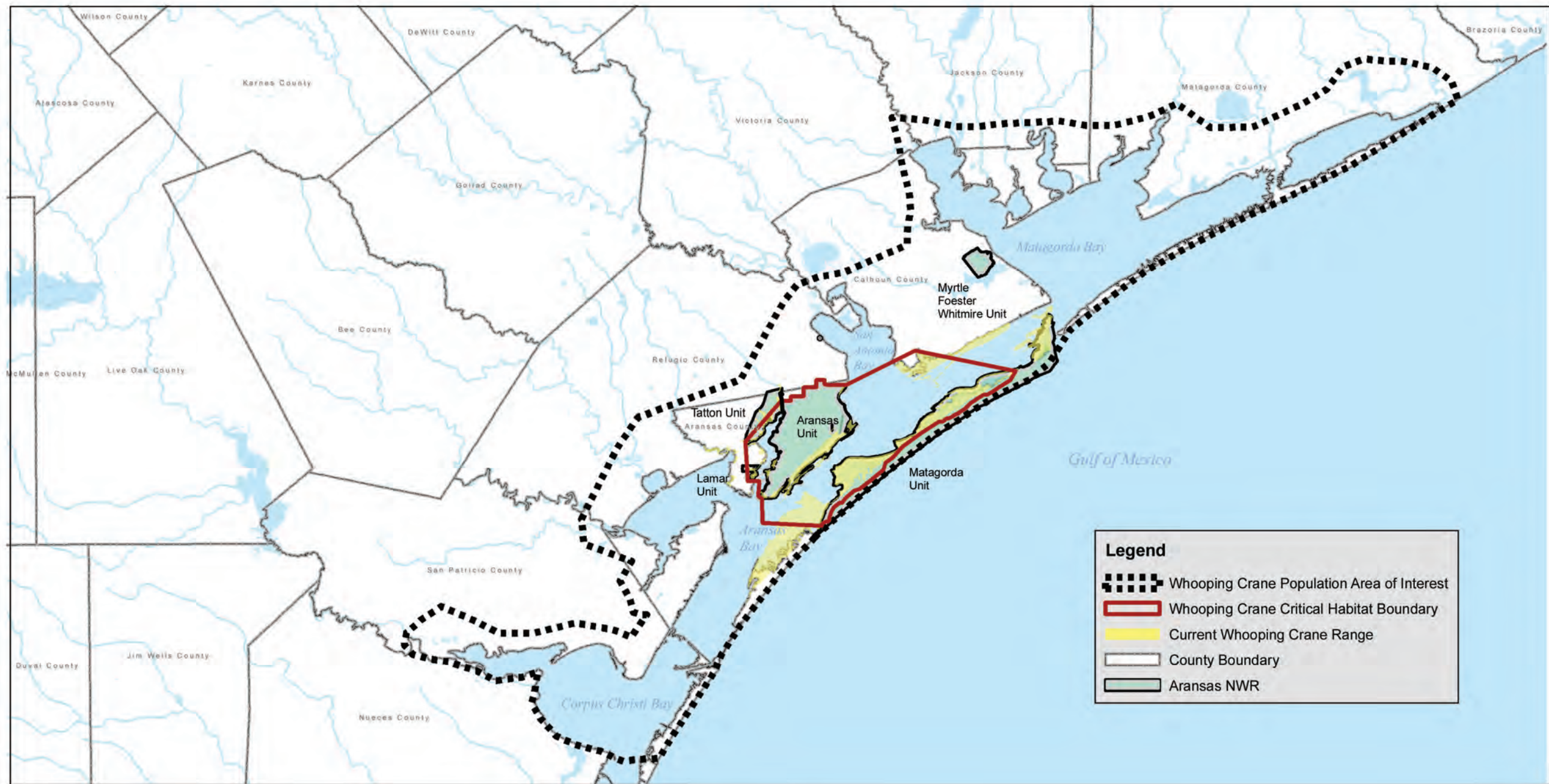


U.S. Fish & Wildlife Service

Aransas National Wildlife Refuge

Aransas, Calhoun, & Refugio Counties, Texas

Figure 3-8. Whooping Crane Current Use Areas



PRODUCED IN THE DIVISION OF REFUGE PLANNING
ALBUQUERQUE, NEW MEXICO
LAND STATUS CURRENT TO: 8/17/09
MAP DATE:
BASEMAP: N/A
MERIDIAN: N/A
FILE: lit_maptitle

0 5 10 20 Miles
0 5 10 20 Kilometers



Figure 3-8. Whooping Crane Current Use Areas

3.3 Archeological, Cultural, and Historical Resources

The area of the Refuge has been inhabited by native peoples for thousands of years and more recently was the scene of Spanish and Anglo settlements, revolutions, and wars. Artifacts from the area suggest that the earliest humans arrived between 6,000 to 8,000 years ago. They hunted bison and mammoths but disappeared as mysteriously as their prey. About 4,000 years ago, a culture of people known as the “Aransas” inhabited areas from around Copano Bay south to Baffin Bay. They were nomadic hunter-gatherers and apparently left the Gulf Coast around about 1200–1300 A.D., leaving little trace of their lifestyle, other than some shell tools and spear points, reflecting a culture adapted to the bays. North of Aransas, in neighboring Calhoun County, Karankawa Indians occupied Matagorda Bay and Matagorda peninsula and moved down the coastal bend around 1400 A.D. in areas previously occupied by the Aransas. Karankawas populated the shoreline and wandered about the area, leaving behind evidence of their existence.

Generally, from about 1000–1850 A.D., the land and bays were the source of life for the Karankawas.

It is believed that the Copanes band of the Karankawa Indians inhabited the Blackjack Peninsula. These seaside natives hunted the shorelines, bays, and offshore islands of the Coastal Bend. Shell middens have revealed shell ornaments, tools, flint points, scrapers, shards of pottery, and other tools. These natives were nomadic people who followed the seasons, anticipating natural fruiting times, animal movements, and turn of tide, always ready to take advantage of whatever came their way. They lived in skin huts on the shell ridges gathering fruits of mustang grape, dewberry, prickly pear, and mesquite, along with roots and nuts. They fished the shallow waters for fish and collected crustaceans, whelks, and oysters. They hunted sea turtles, waterfowl and their eggs, alligators, deer, javelinas, birds, turtles, insects, and whatever else they could catch. Their way of life was harsh, but the Karankawa were a proud tribe. They were unwilling to surrender ancestral lands and customs for those of white settlers. Early Texans found this attitude intolerable and wiped out all the native coastal people. By the time of the Texas Revolution in 1835, the Karankawa had been hunted and harassed to near extinction. One of the last remaining groups of natives was killed near Austwell in 1851.

The first Europeans to arrive included Alonso Alvarez de Piñeda, who charted the Gulf Coast in 1519, and Alvar Nuñez Cabeza de Vaca, who followed the next year. Later in 1528, survivors of the Narvaez expedition made first contact with the natives. The Spanish, however, didn’t take much interest in the area until the French, under La Salle, established a colony in 1685 in present day Calhoun County. Then, by the 1700s, the Spaniards had begun to establish forts and missions in the area to provide a foothold for Spanish claim to the area and to minister to the natives. In the late 1700s, the Spanish had established a fort on Live Oak Point named “Aranzazu,” and ports-of-entry and customhouses were established such as “El Copano” (now Copano Bay area). This particular port was a landing place for colonists and was used as a supply route for the inland Spanish missions such as Goliad, Refugio (last Spanish mission, 1793), and San Antonio de Bexar. The presence of these Spanish missions also helped establish the first cattle ranching operations. By the late 1700s and early 1800s, subsequent Spanish and Anglo settlements appeared in the area. From 1820 through 1835, under the Mexican empresario land grant system, colonists began moving into the area. Under this system, during the early colonization of Texas, individuals known as “empresarios” would be granted the right to settle on land in Mexican territory in exchange for recruiting and accepting

responsibility for the new settlers. Stephen F. Austin, Martin de Leon, Green DeWitt, James Power, and James Hewetson were some of the first empresarios of the area.

The beginnings of Port Lavaca came from a settlement called “Linnville,” where John J. Linn built a small wharf and warehouse in 1831. Around 1832, Aransas City was formed on Live Oak Point (near Rockport), near the Aranzazu site. At this settlement, a post office, customhouse, and some stores were built. Until the birth of Corpus Christi, this was the major port in the area with a population of several hundred. In 1835, Colonel James Power became the first owner of record for Matagorda Island. He established the town site of Saluria on the northwestern tip. After the Texas Revolution (1835–1836) against the Mexican Army, the newly established Republic of Texas sped up the pace of settlement. Mexican land grants were challenged by the newcomers as being void, resulting in legal and land ownership disputes. And, by the 1840s, many of the Indians that had periodically raided the Spanish missions and settlements were pursued and defeated. In addition, many of the Indians died from diseases brought on by the Europeans, melded with other Indian groups, or fled southward into Mexico. By the mid-1800s, practically all of the native Indian groups along the Gulf Coast had disappeared. In 1845, General Zachary Taylor encamped at Live Oak Peninsula (Rockport area) before moving his army southward during the Mexican War of 1846–1848. During the 1840s–1850s, Germans and Polish immigrants established communities such as Seadrift and Indianola. Cattlemen and sailors also established communities along the coast. In 1852, because boat ship traffic and shipping disasters increased in Pass Cavallo, the Federal government erected a full-scale lighthouse (Matagorda Island Lighthouse), and Captain James Cummings was its first “lighthouse keeper.” St. Mary’s of Aransas (at Copano Bay), was an important early shipping port around 1860, providing building materials and goods to the settlements of Refugio, Goliad, Beeville, and San Antonio. St. Mary’s was also an important shipping port for cattle, cotton, hides, and tallow, especially during the Civil War (1861–1865).

However, Civil War times brought the desire to close cotton trade ports and sever military supply lines along the coastline of Texas. War had a devastating impact on these communities, causing vast destruction of facilities and complete disruption of society. Many skirmishes occurred in the area, including one with Union gunboats coming to enforce the blockade of Pass Cavallo. Saluria was burned to the ground by the Confederates, and although ordered to demolish the lighthouse, soldiers were unable to blow it up and only took out the lens. Fort Esparanza was established in 1861 on Matagorda Island by Confederate Major Daniel Shea. To protect the fort from flank and rear assault by land, a series of “fieldworks” or rifle pits were dug from the pass to the bayside marshes on the Island, which are still evident today.

During this time, the area was the scene of several clashes between Union and Confederate troops. St. Joseph’s Island was used by the Union Troops to store cotton captured from the Confederates. Although Confederate troops eventually destroyed Aransas City, Lamar, and St. Mary’s of Aransas, several new towns were formed, such as Fulton (1866) and Rockport (1867). In 1865, the blockade was lifted, and occupation troops left in 1869. After the war, the lighthouse was rebuilt and relocated two miles inland. By the early 1870s, the cattle boom began and these new towns became important shipping and processing centers. Wharf pens and packing plants were established, and for the next 15 years or so, the Rockport-Fulton area was a major cattle processing and shipping port. In fact, by the 1870s–1880s, the Rockport-Fulton area handled more than 90 percent of the Texas beef industry, and during the same time, Rockport became the new county seat of the newly established Aransas County in 1871.

By 1890, farming was beginning on a major scale, and numerous immigrants were drawn to the area from the south and from Europe. However, by the 1920s, following the construction of deepwater ports at Aransas Pass and Corpus Christi, Rockport began to decline as a significant shipping port. Nonetheless, during the early 1900s, other new industries sprang up in the Rockport area, such as commercial fishing, shrimping, tourism, and shipbuilding. During World War II, shipbuilding companies at Rockport were building wooden submarine chasers for the U.S. Navy. Then, in 1936, oil was discovered in the area, much of it offshore. Much of the land comprising Aransas NWRC was used for cattle grazing, even after the Refuge was first established in 1937. Continuing to this day, leading industries in the area are fisheries, agribusiness, tourism, oil and gas, and chemical manufacturing. Recreation and ecotourism (fishing, boating, beach going, hunting, and birdwatching) are increasingly major economic contributors to the Gulf Coast region. (Source: Handbook of Texas Online <http://www.tshaonline.org>)

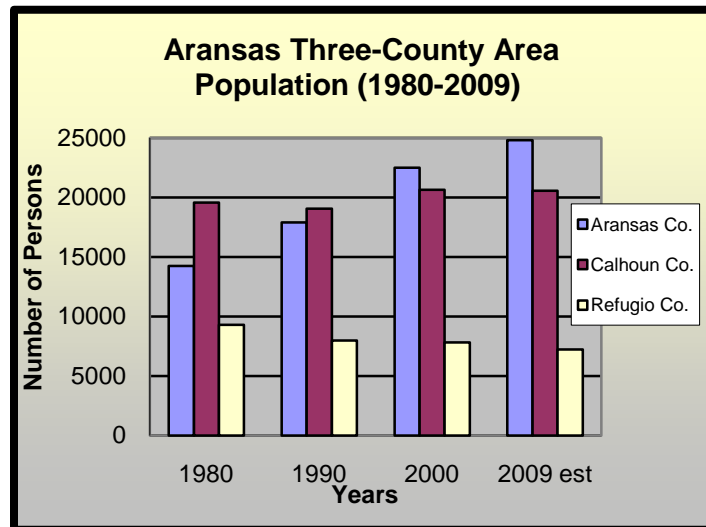
3.4 Social and Economic Context

Population

The Aransas NWRC is spread out over Aransas, Calhoun, and Refugio counties, Texas. The Refuge headquarters is located in Aransas County, approximately six miles southeast of Austwell, Texas. The county seats for Aransas, Calhoun, and Refugio counties are Rockport, Port Lavaca, and Refugio respectively. Although an estimated 1.5 million people live within a three-hour drive of the Refuge, the total population of the three county Comprehensive Conservation Plan study area is currently

52,624 (Aransas County: 24,826; Calhoun County: 20,573; and Refugio County: 7,225) (see Table 3-5). Aransas NWRC is within a 65-mile radius of two large urban areas in Texas. The City of Victoria, with a population of 62,169 (U.S. Census Bureau 2010) is about 41 miles west of the Refuge, and Corpus Christi, with a population of 285,267 (U.S. Census Bureau 2010), is approximately 64 road miles southwest along the coast. Corpus Christi is ranked as the eighth largest city in Texas and is a significant tourist destination, seaport, petrochemical center, and home of the Corpus Christi Naval Air Station and Army Depot. Aransas County has experienced the largest population increase, up 10.3 percent since 2000, while Refugio County has declined by 7.7 percent during the same period. The median household income for the three county areas is \$40,789, which is \$11,240 less than the national median of \$52,029 (U.S. Census Bureau 2010). Most of the population increases within the three county areas have occurred in the Rockport-Fulton area. In fact, Rockport grew by 26 percent from 1990 to 1997, making it the fastest growing area in the coastal bend, according to the U.S. Census Bureau (Corpus Christi Caller-Times; February 6, 2000). Rockport continues to grow as retirees, artists, and young families are drawn to its beautiful coastal scenery, nature, and its

Table 3-5. Aransas NWRC Three-county Area Population



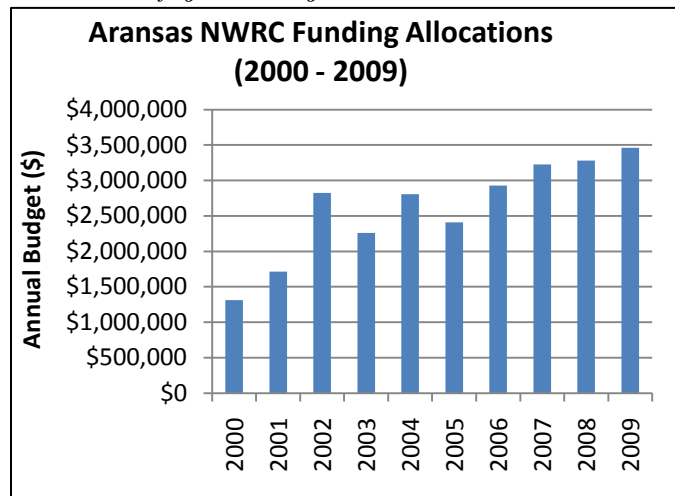
wholesome family community values. According to local realtors, over 80 percent of America's undeveloped oceanfront property is on the Texas Coast. In addition, nature tourism annually draws several hundred thousand people to the Rockport-Fulton area for events such as the Hummer/Bird Celebration held each September, for the arrival of the whooping cranes at the Aransas NWRC; and because Rockport-Fulton is a premier stop along the Great Texas Coastal Birding Trail, established in 1994.

Regional Economic Profile (Growth)

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. Farming and agribusiness has remained the mainstay of the area. The town of Austwell, founded in 1910, was named after two partners, Preston R. Austin and Jessie C. McDowell, who began development of a 181-acre tract of farmland. It became a thriving community in the early 20th century but now has a population of about 192 people (2000 Census Data). 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 48,648 acres of cotton, 33,104 acres of sorghum, and 26,380 acres of corn were planted, the three major field crops in the counties of Aransas, Calhoun, and Refugio (National Agricultural Statistics Service, 2002 data). Other crops include pecans, forage, various grains, and vegetables. Between 1997 and 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, has 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. These industries were originally attracted to the area because of available natural gas supplies, fresh water, distance from heavily populated areas, and the GIWW. 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 (Economic Pulse 2003).

Table 3-6. Refuge Funding Allocations

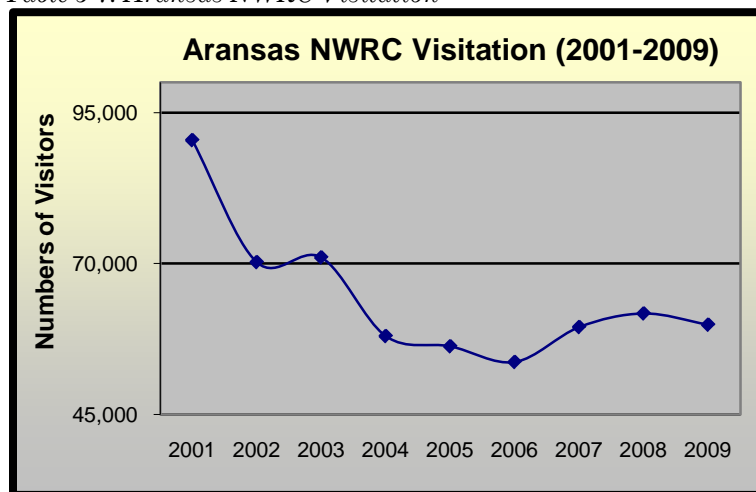


Another industry that has rapidly developed and is particularly important to the Refuge and the region's economy is nature tourism. Nature tourism is defined as "discretionary travel to natural areas that conserve the environmental, social, and cultural values while generating an economic benefit to the local community" (State of Texas Tourism Tip Sheet, March 2004). Nature tourism includes wildlife or bird watching, photography, nature study, hiking, boating, camping, biking, and visiting parks. Nature tourism 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. Nature tourism provides huge benefits to the local retail and services industries.

The Refuge is an integral part of the attraction of the area and is a significant economic engine, providing jobs, customers for local businesses, and tax revenue for local governments. Refuge fund allocations have gradually risen over the years from \$1.3 million in fiscal year 2000 to almost \$3.5 million in fiscal year 2009 (Table 3-6). Nearly all of this money is spent in the local community for goods, services, and through staff salaries. The Aransas and Matagorda Island Units provide various public use activities such as hunting, fishing, bicycling, camping, birding, swimming, picnicking, wildlife observation and photography, and environmental education and interpretation. Between 75,000 and 100,000 tourists visit the Rockport area each year, and many go to the Aransas NWRC to view rare birds such as endangered whooping cranes (Table 3-7). This provides an approximately \$5 million dollar boost to the local economy of the Rockport-Fulton area (State of Texas Tourism Tip Sheet, March 2004). Economic activities on lands surrounding the Refuge include ranching, game management, hunting, recreational and commercial fishing, oil and gas production, bird watching and sightseeing, nature photography by chartered boat, boat landings and travel trailer hookups, and the GIWW (Aransas and Matagorda Island Units). Cedar Bayou Pass and Pass Cavallo near the Matagorda

Table 3-7. Aransas NWRC Visitation



Island Unit provide an attraction for beachgoers, camping, fishing, and picnicking. Areas surrounding the Myrtle Foester Whitmire, Tatton, and Lamar Units are primarily farmed, producing cotton, sorghum, and corn, along with some ranching operations. More recently, there has been an increase in the development of marina communities along the Texas coast in the vicinity of the Refuge. At least two in Calhoun County and three in Aransas County are currently in development, with more likely planned. These developments are becoming increasingly popular and common in the coastal bend because this area represents some of the last undeveloped coastal area in the United States. These communities will likely increase economic growth in the three-county area in the future.

4. Refuge Administration

The Aransas NWRC is managed as a haven for fish and wildlife and their habitats, as well as for public enjoyment. Balancing these varied needs can be challenging, and it is heavily influenced by such things as facility maintenance, public uses, and habitat maintenance needs, including water impoundment and levee infrastructure, roads, fences, windmills, and other facilities. Natural forces, such as the fluctuation of local bay water levels, wind events, and erosion, require a constant need for maintenance of roads and dikes and the skilled staff to complete the work. In addition, managers need to understand the effects of such actions on plant communities that influence wildlife and their habitats. Refuge biologists inventory and monitor local and migrant wildlife populations and provide this information to managers. Finally, much staff time is dedicated to providing the public with quality environmental education and wildlife-dependent recreational opportunities on the Refuge.

4.1 General Management

4.1.1 Fire Management



Wildland firefighters. Photo: USFWS

Fire is an important ecological factor in most terrestrial ecosystems. Fire management activities on Aransas NWRC focus on two major fronts. One is the use of fire as a habitat management tool, including fuels reduction through the use of prescribed burning; and the other is the suppression of unwanted fires that threaten life, property, or other resources. The Refuge Fire Management Plan guides all fire management activities on the Refuge in accordance with policy as presented in the DOI

Manual (620 DM 1-2, Wildland Fire Management), the Fire Management Handbook (621 FW 1-3), and Service policies (232 FW 6, 241 FW 3, and 241 FW 7). Service policy (621 FW 1) directs refuges to “...employ prescribed fire whenever it is an appropriate tool for managing our resources and to protect against unwanted wildland fire whenever it threatens human life, property and natural/cultural resources.” With respect to the use of fire as a habitat management tool, the Fire Management Plan’s objectives focus on restoring fire as a natural ecological process; perpetuating the natural occurrence of native vegetation beneficial to Federal trust species by restoring Texas coastal prairie communities; restoring and perpetuating Federal trust species and other native wildlife by maintaining a diversity of plant communities; developing and implementing a process to ensure the collection, analysis, and application of high quality fire management information needed for sound management decisions; restoring and perpetuating native wildlife species by maintaining a diversity of plant communities; and reducing fuel loading.

Fires are primarily conducted in the summer for maintenance of prairie, and during the winter for whooping cranes. Summer fires have been shown to be particularly effective in reducing eastern baccharis (*Baccharis halimifolia*), a native species with invasive characteristics that can dominate a prairie without a fire regime. The need for fire to maintain prairie is dramatically demonstrated near the Tatton Unit, where brush dominates the private lands across the highway from the Refuge that do not have a summer burning program. Winter burns are conducted primarily to improve upland forage opportunities for whooping cranes. Fire is needed on a three- to four-year cycle to maintain the height of running live oak

less than or equal to four feet tall so that cranes can see over the top of the woody plants, and to benefit acorn production, which can be high the third year after treatment with fire. Whooping cranes respond immediately to winter burns, with groups of up to 20–30 cranes foraging and socializing on these burns. Upland use by whooping cranes is particularly important when blue crabs are scarce in the marshes, with the cranes feeding on acorns, insects, and small invertebrates. Additionally, sandhill cranes use burns for extended periods, as do other birds such as long-billed curlews.

On the Aransas Unit, for the period 1999–2009, an average of 11,940 acres per year was burned to meet the objectives outlined in the previous text. This includes an attempt to protect mature single trees and mottes where they may occur. During the same period, about 5,367 acres per year were burned on Matagorda Island. On the Tatton Unit, about 1,392 acres per year are burned. Prescribed burning does not occur on the Lamar Unit and is not consistently used on the Myrtle Foester Whitmire Unit.

4.1.2 *Water Management and Quality*

Water management on the Aransas NWRC is primarily limited to the Myrtle Foester Whitmire unit. The Service manages this unit as part of the Farming Program to flood rice fields in the summer to provide habitat and food resources for waterfowl and other waterbirds. Water is supplied to this unit through a “Water Sales and Supply Agreement” between the Guadalupe-Blanco River Authority and the Refuge. On the Aransas Unit, water management occurs on Burgentine Lake, and options exist for water management on Big Devil Bayou and Bill Mott Bayou. The Refuge is authorized to maintain an existing dam and reservoir on Burgentine Creek, known as Burgentine Lake, and impounds up to 700 acre-feet of water authorized under State of Texas Certificate of Adjudication #20-4497 (Priority Date: 12/31/1939). Additionally, the Refuge is authorized to store water in natural depressions known as Big Devil Reservoir and Bill Mott Lake. In summary, the Refuge is authorized to divert and use no more than 7,685 acre-feet of water per year to fill the reservoirs for the operation and maintenance of the Refuge and for recreational purposes. The only stipulated condition is that a suitable outlet on Burgentine Lake dam be maintained to allow the free passage of water that the owner is not entitled to divert or impound. Water quality has been tested periodically at various locations on the Refuge (e.g., Burgentine Lake), and harmful levels of contaminants such as agricultural chemicals have not been found to be significant. However, the Refuge periodically tests water quality, particularly at wetlands frequented by migratory birds, to address any potential concerns.

4.1.3 *Farming*

The history of land use on the original Aransas Unit prior to becoming a National Wildlife Refuge included small subsistence farming. Two 80-acre enclosures on the peninsula were regularly farmed to provide for waterfowl and whooping cranes. An additional 185-acre plot was farmed during dry years. Cultivation on several areas of the Blackjack peninsula occurred as early as 1939, with approximately 60 acres used as food plots. In 1951, the Refuge began farming along the boundary north of Burgentine Lake, an area referred to as the black land farming area. This farming area grew to about 370 acres and was for the benefit of ducks and geese. It was farmed extensively until 1979, when the energy shortage halted the Refuge Farming Program. In 1961, sandy land units were farmed, including 158 acres along East Shore Road known as the “Whooper Pens.” These pens were planted in the 1960s and 1970s but were reverted back to sandy prairie because the lack of summer moisture on sandy land units made cultivation problematic.

Rice farming historically occurred on the Myrtle Foester Whitmire Unit, and since its acquisition by the Service, it was converted to organic rice farming. Rice croplands on the Refuge include about 154 acres on this unit. This rice crop is produced by a cooperative farmer and is rotated among the available cropland.

Benefits from organic rice farming come in the form of a second rice

crop, water, and no chemicals. After the first rice crop is harvested, the fields are flooded again, and the second crop of rice is left for wildlife. This method provides a valuable food supply, but more importantly, flooded fields provide shallow water habitat in mid-summer when freshwater is a rare commodity. The remaining fallow fields provide feeding areas for waterbirds and waterfowl with water being added at strategic intervals.



*Rice crops for wildlife on the Myrtle Foester Whitmire Unit.
Photo: USFWS*

4.1.4 Livestock Grazing

For decades, the area comprising the Refuge was used for cattle grazing. Cattle ranching was the major industry of the area in the late 1800s. Between 1919 and 1938, the average number of cattle on Blackjack peninsula was 5,900 (Labuda 1975). The Aransas Unit was historically used as a cattle ranching operation, and beginning with the time of Refuge establishment in 1937 through 1973, grazing continued over large portions of the Blackjack peninsula. An experimental three-year grazing study was conducted from 1982 to 1985 as part of an upland crane use study. When the results of the study indicated the grazing did not benefit whooping cranes, the experiment was discontinued. Grazing persisted on the Tatton Unit in the late 1960s upon becoming part of the Refuge and continued through 1989. The objective of grazing on this unit was to support the endangered Attwater's prairie chicken. However, grazing was terminated when a panel of prairie chicken experts made a range assessment and determined the area was overgrazed and that objectives for the chickens were not being met. Today, the Tatton Unit contains some of the Refuge's best low upland prairie. Grazing has occurred on the Myrtle Foester Whitmire Unit for several years and is now seen as a grassland management tool. Short duration grazing is currently being used on the Myrtle Foester Whitmire Unit, where a cooperative farmer grazes approximately 35 head of cattle for four months per year. The grazing is done to reduce vegetative cover and make the area more attractive for waterfowl, shorebirds, and other migratory birds. Matagorda Island has been grazed by sheep and cattle since the 1850s, but by 1942, two-thirds of the northern portion of the Island was closed to grazing with the creation of the Matagorda Bombing and Gunnery Range. However, the southern one-third of the Island continued to be used for grazing. After the bombing range was closed and the upper two-thirds of the Island were added to the Refuge System in 1982, cattle-grazing was again allowed to occur as a grassland management tool. It wasn't until 1991 that cattle were removed entirely from Matagorda Island upon the Refuge manager's determination that grazing was an incompatible use.

4.1.5 *Reserved Minerals: Oil and Gas Activities on the Refuge*

Oil and gas activities are allowed to take place on refuges for a number of reasons. On the majority of refuges, oil or gas activities occur where private entities, states, or native corporations, rather than the Federal government, own the mineral rights. Owners of these mineral rights have the right to develop, produce, and transport the oil and gas resources located within a refuge (USGAO 2001). However, the U.S. Department of the Interior's regulations require

"...to the greatest extent practicable," that "...all exploration, development and production operations" be conducted in such a manner as to "...prevent damage, erosion, pollution, or contamination to the lands, waters, facilities, and vegetation of the area." Further, *"...so far as practicable, such operations must also be conducted without interference with the operation of the refuge or disturbance to the wildlife thereon"* (50 CFR Part 29.32). Exploring for oil and gas involves seismic mapping of the subsurface topography. Regardless of the technology employed, seismic surveys usually involve surface disturbance. Oil and gas drilling and production often require construction of access roads, pipelines, electrical poles, gravel pads, storage tanks, separating facilities, and compressor stations.



Oil and gas developments on the Refuge. Photo: USFWS

Under the National Wildlife Refuge System Administration Act of 1966, as amended, the Service is responsible for regulating all activities on refuges. The Act requires the Service to determine the compatibility of activities with the purposes of the particular refuge and the mission of the Refuge System and not allow those activities deemed incompatible. However, the Service does not apply the compatibility requirement to the exercise of private mineral rights on refuges. U.S. Department of the Interior regulations also prohibit leasing Federal minerals underlying refuges outside of Alaska, except in cases where Federal minerals are being obtained by operations on property adjacent to the refuge. Nevertheless, the activities of private mineral owners on refuges are subject to a variety of legal restrictions, including Service regulations. A variety of Federal laws affect how private mineral rights owners conduct their activities. Also, Service regulations require that oil and gas activities be performed in a way that minimizes the risk of damage to the land and wildlife and the disturbance to the operation of a refuge. The regulations also require that land affected be reclaimed after operations have ceased. The Refuge reviews permits for oil and gas activities on the Refuge, and special conditions are included in these permits such as seasonal restrictions, mitigation for habitat destruction, drilling fluids removal from the drilling site, and returning the site to as natural a condition as possible. Refuge personnel have established good working relationships with the oil companies resulting in observance of Refuge rules and regulations to help protect Refuge habitats.

On the Refuge, the Aransas Unit has oil and gas production, with Conoco-Phillips as the primary mineral lease holder. Conoco-Phillips is in the process of phasing out operations on the Blackjack Peninsula. Chaparral Energy, formerly Mitchell Energy, also maintains pipelines and a separating facility on Blackjack Peninsula. On the Matagorda Island Unit, oil and gas production is cyclic, with activity spurred by economic incentives. There are various mineral lease holders and facilities such as pipelines, holding tanks, and a separating facility on the Island. Currently, Darcy Energy leases the Emily Hawes field on the north end, and

Davis Gulf Coast leases the Wynne field on the southern end of the Island. On the Myrtle Foester Whitmire Unit, EBR Energy leased and drilled in 2007.

Oil company crews periodically monitor production and perform maintenance on the oil and gas infrastructure occurring on the Refuge. The Refuge receives numerous requests for oil and gas exploration since the mineral interests are privately owned. Seismic surveys every few years by different companies take up considerable staff time. More importantly, there are whooping crane issues with seismic exploration taking place in the marshes, and long-term implications of upland habitat alteration and the spread of exotic and/or invasive species due to seismic clearing of vegetation. Recently, the Tatton Unit saw a great deal of oil and gas seismic activity, which may spur future oil and gas production in this area.

4.1.6 Fee Title Lands and Easements

The entire Refuge Complex is owned in fee title, with the exception of the beach and marsh portions of Matagorda Island, which are owned by GLO and leased to TPWD. There are several easements for oil and/or gas pipelines, mineral rights, and an easement for Highway 35 (Figure 4-1).

4.1.7 Land Protection

Currently, the Texas coast is undergoing rapid development. In response to protecting whooping crane habitat for the expanding population, The Nature Conservancy of Texas, in 2006, applied for a \$3,000,000 Coastal Impacts Assessment Program grant and a \$600,000 Section 6 grant to purchase conservation easements on lands needed by whooping cranes. The Refuge and nearby marshes on San Jose and Welder Flats can currently hold about 500 cranes. The recovery goal is 1,000 cranes, thus the need for additional habitat is readily apparent. Currently, the Aransas NWRC comprises over 115,000 acres in five large units. Additional land protection is needed that would continue to benefit the rich coastal aquatic resources, and threatened and endangered species such as whooping cranes.

4.1.8 Research

The Aransas NWRC receives several requests each year from universities and the scientific community and works with academia to help address issues of interest to the Refuge. For example, Texas Tech University is conducting studies involving bird uses on Matagorda Island compared to bird uses of heavily developed neighboring islands, such as Mustang Island. Texas A&M University is studying freshwater inflows to help predict what the effect of depletions or uses of fresh water may have on the coastal ecosystems that depend on these inflows, including whooping crane habitat and food supply. Other studies involving whooping cranes include voice characterizations to identify individual pairs, human disturbances of whooping cranes, and their behavioral responses to food availability.

Other research issues of interest to the Refuge are the effect(s) that established aplomado falcons have on other wildlife of Aransas NWRC. There is concern that potential reintroduction efforts involving the Attwater's prairie chicken may become inhibited by the presence of aplomado falcons on the Refuge. In addition, there is interest in revising the recovery plan for the endangered Kemp's ridley sea turtle to include natural sea turtle nesting on Matagorda Island and San Jose Island. Between these two protected islands, there is about 65 miles of uninhabited coastline ideally suited for sea turtle nesting. During the last few years, three to five Kemp's ridley sea turtle nests have been found on Matagorda Island per year, and nesting appears to be increasing.

4.1.9 *Research Natural Areas/Other Special Places*

The only research natural area on the Aransas NWRC is a one-mile strip of land spanning the width of Matagorda Island. This conservation area was set aside from active management in 1991 to serve as a baseline for comparison to subsequent habitat management activities on the Island.

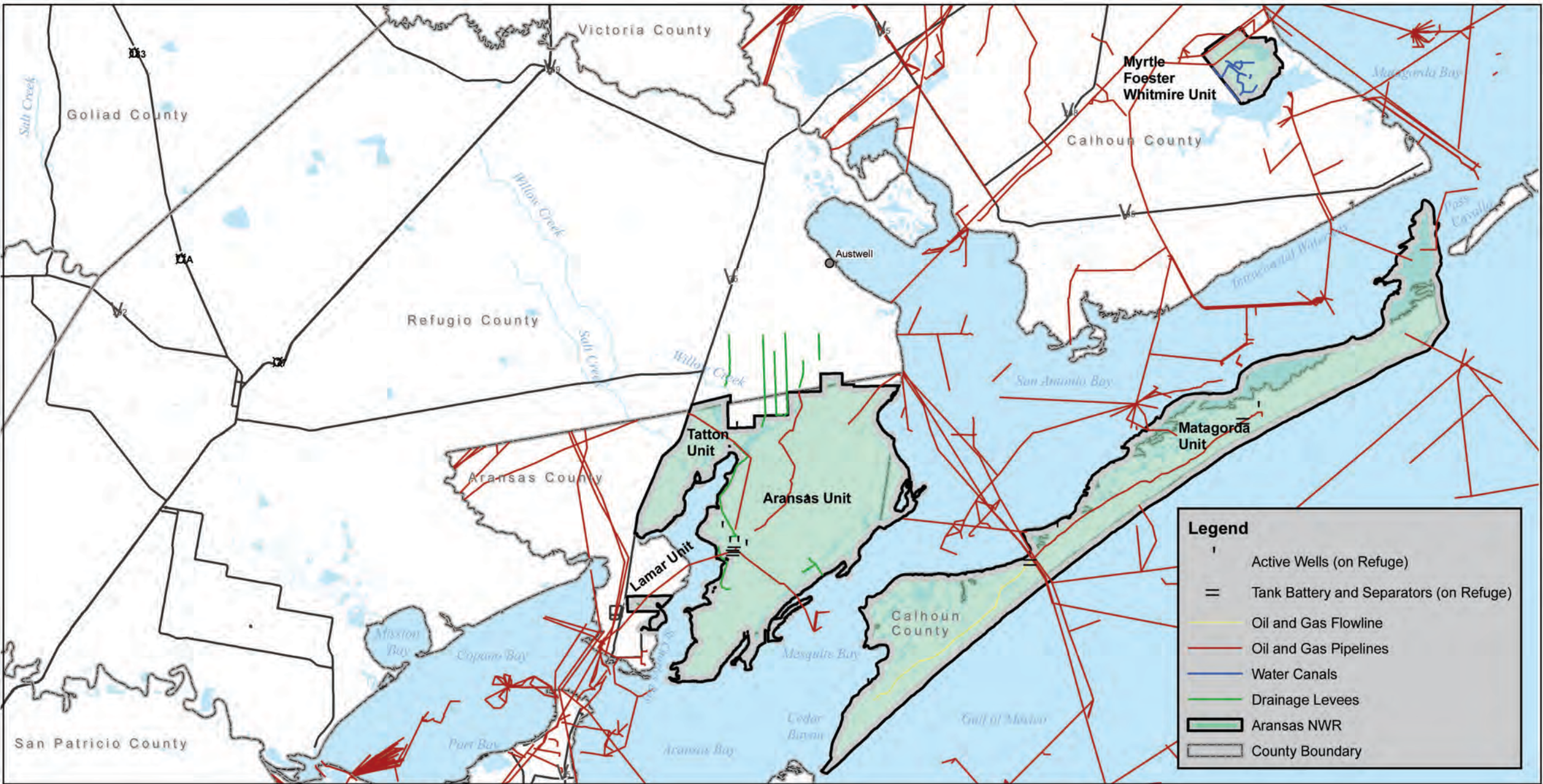
4.1.10 *Staffing and Budget*

The ultimate success of the Aransas NWRC in carrying out its mission depends on staffing patterns and funding levels. Current staffing patterns and funding are described in Table 4-1 and Table 4-2. The Refuge is supported by the Regional Office (Region 2) in Albuquerque, New Mexico; Ecological Services Field Offices in Corpus Christi and Clear Lake, Texas; a Private Lands Office in Victoria, Texas; a Law Enforcement (LE) Office in Corpus Christi, Texas; and the National Office in Washington D.C.



U.S. Fish & Wildlife Service
Aransas National Wildlife Refuge
Aransas, Calhoun, & Refugio Counties, Texas

Figure 4-1. Easements on the Aransas NWRC



PRODUCED IN THE DIVISION OF REFUGE PLANNING
ALBUQUERQUE, NEW MEXICO
LAND STATUS CURRENT TO: 8/17/09
MAP DATE: 5/25/10
BASEMAP: N/A
MERIDIAN: N/A
FILE: lit_maptitle

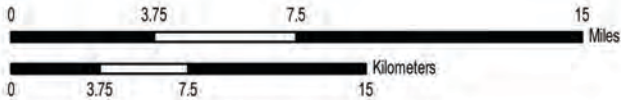


Figure 4-1. Easements on the Aransas NWRC

Table 4-1. Current Staffing and Annual Budget

Wildlife Refuge Manager–Project Leader	GS-0485-13/14
Wildlife Refuge Manager–Deputy Project Leader	GS-0485-12/13
Wildlife Biologist–Whooping Crane Coordinator	GS-0486-12/13
Wildlife Biologist	GS-0486-9
Wildlife Biologist	GS-0486-11/12
Fire Management Officer	GS-0401-12
Wildlife Refuge Specialist	GS-0485-(9/11)
Wildlife Refuge Specialist	GS-0485-7/9
Supervisory Outdoor Recreation Planner	GS-0023-11
Fire Management Specialist	GS-0401-11
Park Ranger/LE Officer	GS-0025-9
Administrative Officer	GS-0341-9
Environmental Ed Specialist	GS-1701-7/9
Engine Boss	GS-0462-6
Biological/Forestry Technician	GS-0404-5
Biological/Forestry Technician	GS-0404-5
Biological/Forestry Technician	GS-0404-5
Fire Program Technician	GS-0303-5
Office Clerk	GS-0303-5
Small Craft Operator	WG-5786-10
Heavy Mobile Equipment Mechanic	WG-5803-10
Maintenance Mechanic	WG-4749-9
Maintenance Mechanic	WG-4749-9
Maintenance Worker	WG-4749-8/9
Maintenance Worker	WG-4749-8/9
Biological Technician	GS-0404-5
Biological Aide (STEP-Temporary full-time)	GS-0404-2
Office Aide (TI-Temporary intermittent)	GS-0303-2
Laborer (STEP-Temporary full-time)	WG-3502-2
Laborer (STEP-Temporary full-time)	WG-3502-2
Fiscal Year 2005 Total Annual Costs	\$2,532,266
Fiscal Year 2006 Total Annual Costs	\$3,120,659
Fiscal Year 2007 Total Annual Costs	\$3,226,964
Average (FY 2005–2007) Total Annual Costs	\$2,959,963

Table 4-2. Aransas NWRC Annual Budget (Fiscal Years 2007-2009)

Annual Staff Costs		\$ 1,580,094
Annual Operation/Maintenance		\$ 1,646,600
Fiscal Year 2007 Budget		\$ 3,226,694

Annual Staff Costs		\$ 1,790,073
Annual Operation/Maintenance		\$ 1,489,554
Fiscal Year 2008 Budget		\$ 3,279,627 (Up 1.6% from FY 2008)

Annual Staff Costs		\$ 1,893,539
Annual Operation/Maintenance		\$ 1,567,154
Fiscal Year 2009 Budget		\$ 3,460,693 (Up 5.5% from FY 2009)

4.2 *Habitat Management*

Refuge habitat management involves a variety of tools and techniques used to control, maintain, and enhance these resources. The primary objective of habitat management is to provide fish and wildlife with diverse habitats to meet the needs of a wide variety of species for resting, breeding, nesting, feeding, and overwintering. Fire is a primary habitat management tool, but other important tools include the use of mechanical and chemical applications, as required. Habitat management activities on Aransas NWRC are generally described as in the following text. (Note: Specific habitat management activities are described in the Habitat Management Plan, a step-down plan of this Comprehensive Conservation Plan.)

4.2.1 *Upland Management*

The Aransas NWRC has little true upland habitat. All the soil types on the Refuge are either fluvial-deltaic (floodplain-low upland soils), coastal hydric (wetlands), or are marine sediments reworked by wind and wave action (old barrier ridges and/or peninsulas) due to the proximity of coastal bays and the Gulf of Mexico. Coastal areas can be inundated with rain or tides from tropical storms or hurricanes. Those areas of the Refuge that tend to be dry are made up of woodland or grassland. Many of these areas are currently managed with fire as the primary tool, followed by mechanical tools when required. These tools create a range of successional stages and desired results depending on the particular objective. Management of these areas is enhanced primarily through the control of invasive and noxious plants (e.g., Chinese tallow and Macartney rose) and exotic animals (feral hog).

Aransas Unit

Prior to European settlement, wildfires were believed to have reached the Blackjack Peninsula every few years as inland fires burned to the coast. Staff observations, research, and historical accounts suggest that the Aransas Unit has become more overgrown with running live oak, a native plant with invasive characteristics. It is believed that the exclusion of intense warm season wildfires through fire suppression, reduction of fuels through grazing, inadequate maintenance of rangelands, and clearing for oil and gas development were factors responsible for leading to this increase in running live oak habitat. These landscape-scale

activities have created a new steady vegetative state, one that shifted from a mix of oak motte/woodland and grassland to that of more woodland (in various stages of growth) and less grassland. Generally, it has been the goal of the Refuge to restore original habitats where feasible. It followed logically that one objective was to reduce the amount of running live oak. This was based on the assumption that a reduction in the amount of running live oak would help restore the historical oak savannah-like habitat (mosaic of oak motte/woodland and grassland) and would benefit coastal prairie and associated wildlife species.

In recent years, the Refuge has revived the tool of mechanical treatment to achieve the generally accepted goal of habitat restoration. Currently, the practice of roller-chopping followed by burning to control the height and attempt to thin stands of running live oak is employed. Roller-chopping reduces fuel heights and flame lengths in follow-up prescribed burns and helps to protect mature trees and mottes. Roller-chopping also aids in creating firebreaks used to control wildfires and prescribed burns. Experience has shown that roller-chopping and burning is a short-term treatment in regards to managing running live oak, as it only “top kills” live oak brush. The running live oak soon returns and remains as a dominant vegetative community. From 2000 through 2005, about 10,327 acres were roller-chopped on the Aransas Unit. Disked firebreaks on the unit total about 79 miles, averaging 16 feet wide. Also, in the past, mowing has been used extensively on the Aransas Unit to try to control brush and increase wildlife viewing opportunities. Currently, limited mowing occurs around the tour loop.

Matagorda Island, Tatton, and Myrtle Foester Whitmire Units

On the Matagorda Island Unit, the mowing and disking of firebreaks and the occasional maintenance of freshwater wetlands comprises the extent of mechanical treatments. The breaks are mowed around three times a year and are disked before a prescribed burn. The length of fire breaks totals about 30 miles with an average width of 16 feet. The Island, containing true grassland, is burned regularly to prevent brush encroachment from invasive woody species to preserve its grassland character. (Note: habitat management details are better reflected in the fire management section.) Much the same can be said for the Tatton Unit, which also contains true grasslands. It is burned regularly, but other management tools (e.g., mechanical treatments) are minimally used. Disking is used to maintain the firebreaks, which cover about 39 miles and average 12 feet wide on the Tatton Unit. The Myrtle Foester Whitmire Unit is minimally burned, and some disking and grazing of drawn-down impoundments occurs for the benefit of Federal trust species. Otherwise, water manipulation is the primary management activity here (see the Wetland Management section in the following text).

Lamar Unit

Currently, no active habitat management is conducted on the Lamar Unit. The habitat consists primarily of larger oak trees on the uplands and salt marsh on the eastern edge of the unit. Control of mesquite, which exhibits invasive characteristics, will be needed on the shell roads that provide access on the unit and around some of the ponds in the unit. Currently, a Wildland Urban Interface boundary is maintained along the western edge of the unit where it abuts a residential area.

4.2.2 Wetland Management

Natural coastal wetlands (salt and brackish), some freshwater managed wetland impoundments, and a few ponds and small lakes are encountered at the Aransas NWRC. Ponds and lakes are managed to provide a mixture of open water, submergent, and emergent

vegetation communities, where appropriate. Wetland management centers on providing high quality food and cover for migrating waterfowl, shorebirds, wading birds, and other wetland-dependent wildlife species. These wetlands generally include combinations of moist soil units and rice crops. They are typically de-watered in the spring to provide shallow water conditions for waterfowl and shorebirds and for plant growth. They are re-flooded in the fall to attract and provide food for fall migrants and overwintering birds. In the off-season, fire and mechanical tools are used to further enhance the wetlands. This keeps these wetlands in a productive state by manipulating water levels which, in turn, stimulates aquatic vegetation growth and a variety of plant and animal species within these wetlands. Permanent and semi-permanent marshes of cattails, bulrush, and other emergent vegetation, as well as a variety of submergent vegetation, also provides habitat for a variety of other wildlife. These areas provide foods in the form of seeds, roots, tubers, and aquatic invertebrates. Conversely, in the coastal wetlands and marshes, the natural ebb and flow of tides and aquatic cycles are the primary forces at work. The Refuge minimizes disturbance and maintains the natural flow of water where required. Overall, this mixture of wetland communities provides diverse habitats that meet wildlife needs for cover, feeding, resting, and reproduction.

Water at Aransas NWRC is used to intensively manage moist soil units at Myrtle Foester Whitmire Unit and used less intensively to manage Burgentine Lake, Foester Lake, and the levee system on the south end of Matagorda Island with the maintenance of culverts. On the Myrtle Foester Whitmire Unit, freshwater is purchased from the Guadalupe-Blanco River Authority and used to supply the moist soil units. Foester Lake is managed to catch moist soil unit runoff, maintain a shallow lake environment, and provide freshwater flow to a created saltwater marsh along the shoreline. On the Aransas Unit, Burgentine Lake is managed only during the winter. The Refuge's current permit allows for impoundment of rainwater during this time for the benefit of migratory birds. For the remainder of the year, boards must be removed from the control structure to provide freshwater flows for bay organisms. Fresh water from this drainage goes into St. Charles Bay, an important secondary bay serving as a nursery area for marine life.



Adjusting water levels on the Myrtle Foester Whitmire Unit. Photo: USFWS

On Matagorda Island, levees constructed on the south end prior to becoming Refuge lands were required by the State General Land Office (GLO) to have culverts installed to provide for normal tidal exchange between the marshes and the bay, and for upland runoff due to rainfall to be part of this natural mix and exchange of water. Over time, some of these levees have washed out or culverts have been displaced. Thus, culverts will need to be routinely replaced or repaired. Repairing the culverts and levees provides access to the levee system, where reinstating water flow and generally creating or enhancing natural conditions is the extent of management. Experience has shown that natural tidal flow with a slight time lag in water ingress and egress has resulted in very good shorebird habitat and exceptional habitat for whooping cranes. Additionally, managing public access for fishing, hunting, commercial crabbing, and associated disturbance of whooping cranes by airboats is an important consideration in this management decision to maintain the culvert and levee system on Matagorda Island. This is an ongoing management activity that comprises a significant amount of effort but is necessary to maintain this levee and culvert system. In 2008, an Adaptive Management Plan for this levee system on the eastern end of Matagorda Island

was developed and is updated at least bi-annually, to be included as a Comprehensive Conservation Plan step-down plan.

4.2.3 Gulf Beach Management

Currently, in cooperation with the Texas GLO, Environmental Protection Agency (EPA), Texas Commission on Environmental Quality (TCEQ), and the U.S. Coast Guard, beach clean-ups targeting industrial waste and petroleum products are conducted annually on Matagorda Island. At times, the amount of trash and debris (e.g., tires, cans, plastic, lumber, fluorescent tubes, household garbage), industrial waste (e.g., benzene, toluene), petroleum products (e.g., motor oils, diesel), and medical waste (e.g., needles, vials, gloves) found on the beach is excessive and sometimes harmful, and it accumulates over time. Accumulation of trash, debris, and contaminants eventually becomes buried, decomposes, and contaminates the beachfront and dunes. There is a need to address the dumping of trash and hazardous materials at sea.



Trash and debris washed ashore on Matagorda Island following the passage of Hurricane Ike (2008). Photo: USFWS

4.2.4 Invasive Plants

Preventing the introduction and spread of invasive species is an ongoing and serious threat to native habitats. Executive Order (EO) 13112 requires, among other things, that Federal agencies use relevant programs, authorities, and funds to monitor, prevent, and control the spread of invasive species. Currently, the Refuge is controlling invasive plants through mechanical and chemical treatments. A complete Integrated Pest and Invasive Species Management Program to combat invasives will be included in the Habitat Management Plan that supports this Comprehensive Conservation Plan. An invasive plant is a non-native plant to an ecosystem that lacks natural controls and tends to aggressively dominate the plant community, often forming extensive monocultures. Invasive species generally reduce the diversity and health of ecosystems when they become dominant. The major non-native invasive plant species of concern on Aransas NWRC may be referenced in Appendix E.

4.2.5 Exotic Species

An exotic species is any species that is non-native to the ecosystem under consideration that was either introduced intentionally or unintentionally. On Aransas NWRC, feral hogs are considered to be the primary exotic pest species. Others include Africanized bees, nutria, and occasionally, exotic game animals. Feral hogs negatively affect all habitat components such as oak woodlands, coastal prairie grassland, marshes, and wetlands. They reproduce at a high rate and are difficult to control. Feral hogs on the Refuge provide recreational hunting opportunities and meat for local charities. Hogs have never been successfully controlled on the Aransas Unit (Blackjack Peninsula) despite many years of effort. Hogs occurring on Matagorda Island used to “plow up” large percentages of coastal prairie, which was particularly noticeable after fire. Recent control efforts on Matagorda have greatly reduced hog numbers, but control efforts still need to be continued. The Habitat Management Plan includes measures to control exotic species and the damage they cause to Refuge habitats.

4.2.6 *Pesticide and Herbicide Use and Biological Control*

Pesticides and herbicides have been used on the Aransas NWRC to control the following nuisance native plants (e.g., mesquite, eastern baccharis, and cattail), invasive species, or insect pests: roaches, fire ants, termites, bees, poison ivy, Chinese tallow, Macartney rose, Camphor tree, and a variety of non-native grasses. Chinese tallow, Macartney rose, and other woody invasives are the main species targeted for control. Application methods include ground and aerial. On average, the Refuge annually treats approximately 60 acres with herbicide to control woody species. Overall, from 2005 through 2008, an average of 900 acres per year was treated to control all invasive or invader plants.

The Refuge will use biological control if the method is shown to be effective at a local scale within proximity to the Refuge with no long-term adverse effects. For example, the Refuge conducted a release of the alligatorweed flea beetle (*Agasicles hygrophila*) on the Myrtle Foester Whitmire unit to suppress alligatorweed (*Alternanthera philoxeroides*) in the impoundments. This species has been proven effective in the surrounding area (i.e., Mad Island Marsh Preserve). Nonetheless, no experimental introductions are undertaken on the Refuge.

4.3 *Private Lands and Surrounding Activities and Influences*

The Refuge provides technical assistance and support to adjacent landowners on an as-needed basis. For example, the Refuge has teamed up with neighbors engaged in feral hog control. The Refuge has also provided assistance on private lands to control water hyacinth, an invasive aquatic plant. The Refuge provides assistance to adjacent landowners for controlling wildfires and helping to conduct prescribed burns, as the need arises.

In the vicinity of the Aransas Unit, ranching (grazing and/or livestock production, game management, and hunting) and farming on private lands are major land uses. In the surrounding bays, recreational and commercial (finfish, oyster, crab, and shrimp) fishing in State waters is the primary activity. During the fall and winter, waterfowl hunting is also a significant activity in State waters. Oil and gas production on both land and water is an ongoing activity. Other recreational activities include bird-watching, sightseeing, and photography by chartered boats and recreational boaters.

Activities surrounding the Matagorda Island Unit include ranching (grazing and/or livestock production, game management, and hunting) on private lands. Recreational and commercial fishing in State waters, including the Gulf of Mexico, are significant activities surrounding the Refuge. Waterfowl hunting during the winter is a significant use of the marshes. Oil and gas production is ever present in the surrounding waters and on the northeast boundary of the Island. Pass Cavallo provides access to offshore oil and gas developments, deep sea fishing, and commercial fisheries. Pass Cavallo is also a significant attraction for beachgoers, and for picnicking, camping, and fishing. On the southwest boundary, about 40 miles down the coast, Cedar Bayou Pass is an attraction for beachgoers, and for picnicking, camping, and especially for fishing.

In the vicinity of the Myrtle Foester Whitmire Unit, rice, cotton, and sorghum farming are the primary land uses. Like the Aransas and Matagorda Island Units, recreational and commercial fishing and waterfowl hunting in State waters and private lands are major recreational activities. Oil and gas production is also ongoing in the area. This unit lies near the township of historic Indianola, an important cultural influence in this area. The Guadalupe-Blanco River Authority regulates and provides irrigation water for agricultural and waterfowl hunting enterprises in the area.

The Tatton and Lamar Units are in close proximity to each other and are surrounded by ranching (grazing and/or livestock production, game management, and hunting) and farming (cotton, sorghum, corn) on private lands. Recreational fishing and hunting and commercial activities occur in the surrounding State waters. The nearby township of Lamar and the Rockport/Fulton area occur along State Highway 35, a major commerce and transport route adjacent to these units. Wildlife viewing opportunities are provided on the Tatton Unit, but the Lamar Unit is closed to the public. Travel rest stops, bed-and-breakfast accommodations, and hotels are found nearby. The St. Charles Bay hunting club also uses the shorelines of these Refuge units. Boat launching and bank fishing occurs at the intersection of State Highway 35 and Cavasso Creek on the Tatton Unit. The boat launching occurs on the road right-of-way, as allowed by the Texas Department of Public Safety. This unofficial boat launch occurs on the extreme west side of the Refuge at the boundary of the whooping crane critical habitat designation. The right-of-way also acts as a parking area for bank fishers and those launching boats. It is often used by duck hunters and fishermen to gain access to St. Charles Bay and surrounding areas. Bank fishing, however, occasionally extends onto the Refuge in the whooping crane critical habitat designation area out of the Public Use Management Area, where it is an unauthorized use.

Overall, the nearby townships of Port O'Connor and Seadrift, northeast of the Aransas Unit, and Lamar and Rockport/Fulton, southwest of the Aransas Unit, provide numerous boat landings and accommodations for hunters and fishermen, supporting a cadre of guide services that make regular use of the waters surrounding Matagorda Island. Additionally, bird-watching, sightseeing, and photography are other economic and recreational activities of chartered boats and recreational boaters. Populated areas near the Refuge Headquarters include the nearby townships of Austwell and Tivoli, within 15 miles, and the cities of Port Lavaca and Rockport, which are each within 35 miles of the Refuge.

4.3.1 *Freshwater Inflows and Tidal Outflows*

Healthy bay ecosystems are dependent on quality and sufficient freshwater inflows. Many sensitive species (e.g., the whooping crane and commercially important shrimp, oysters, and crabs) are affected by reductions in freshwater inflows. The whooping crane's primary food source (blue crabs), are directly affected by lack of freshwater inflows, which in turn may affect whooping crane survival (Tom Stehn, pers. comm.). Also, whooping cranes expend less energy seeking fresh drinking water when freshwater inflows are higher and salinity levels are lower. Freshwater inflows help regulate salinity levels in the bays, and are therefore important for completing the lifecycles of many fin and shellfish, which depend on these lower salinities.

Reductions in Guadalupe River inflows have caused Cedar Bayou, a nearby natural fish pass, to become silted in. Cedar Bayou, located between San Jose and Matagorda Islands, silted in during the summer of 2001. When open, this area provides a major passage for bay and gulf organisms to complete their life cycles. Cedar Bayou has had a history of closings—most recently in 1985 and again in 1994. It tends to silt up during periods of drought and low freshwater inflows. Human water consumption has also contributed to the problem. The “Friends of Cedar Bayou” organization has formed to gather support for the dredging, maintenance, and management of this natural fish pass. The project is a top priority for concerned groups and is ecologically justifiable, but currently there is no funding to implement these corrective actions.

4.3.2 Gulf Intracoastal Waterway (GIWW)

The GIWW is a major thoroughfare adjacent to the Aransas Unit for commercial barge transport of industrial, petrochemical, and agricultural chemicals and products. Concrete mats put in place by the Corps of Engineers along the GIWW have stopped significant erosion of salt marsh areas and have contributed greatly to stabilization on the Refuge.

Erosion does continue to occur on some Refuge (Bludworth and Rattlesnake Islands) and other spoil islands and select areas along the GIWW. These areas will need to be monitored over time and repaired as needed. Barge traffic not only produces shoreline

erosion, but also increases the threat of chemical and petroleum spills across Refuge lands. This requires Refuge personnel to maintain proficiency in first responder spill training, and maintain a strong partnership with the Texas General Land Office Spill Prevention Division. Increasing recreational and tour boat traffic use of the GIWW and surrounding marshes can cause disturbance to whooping cranes and other wildlife. This area and its associated uses will require monitoring and revised management strategies in the future to help determine any increase in impacts to wildlife or other resources. Though the GIWW was constructed through Refuge lands, the Refuge has no jurisdiction over the GIWW and adjacent bays. Therefore, to address important fish and wildlife resources affected by the GIWW, the Refuge must continue to maintain excellent partnerships with the Corps of Engineers, the U.S. Coast Guard, Texas GLO, and TPWD.



Barge traffic on the GIWW. Photo: USFWS

4.3.3 Contaminants

Contaminant surveys conducted in the early 1990s by Service staff have not found significant contaminant problems on the Refuge; only a few samples have shown levels of concern. However, no significant contaminant levels have been found connected with agricultural runoff into Burgentine Lake or in whooping crane food items. Periodic monitoring will continue to determine if problems develop. The inclusion of the Refuge into the National Estuarine Research Reserve (NERR) could provide this type of long-term monitoring. Additionally, the beach on Matagorda Island will need continued monitoring and cleanup, due to the high density of varied debris that washes ashore.

4.3.4 Commercial Crabbing in Local Bays

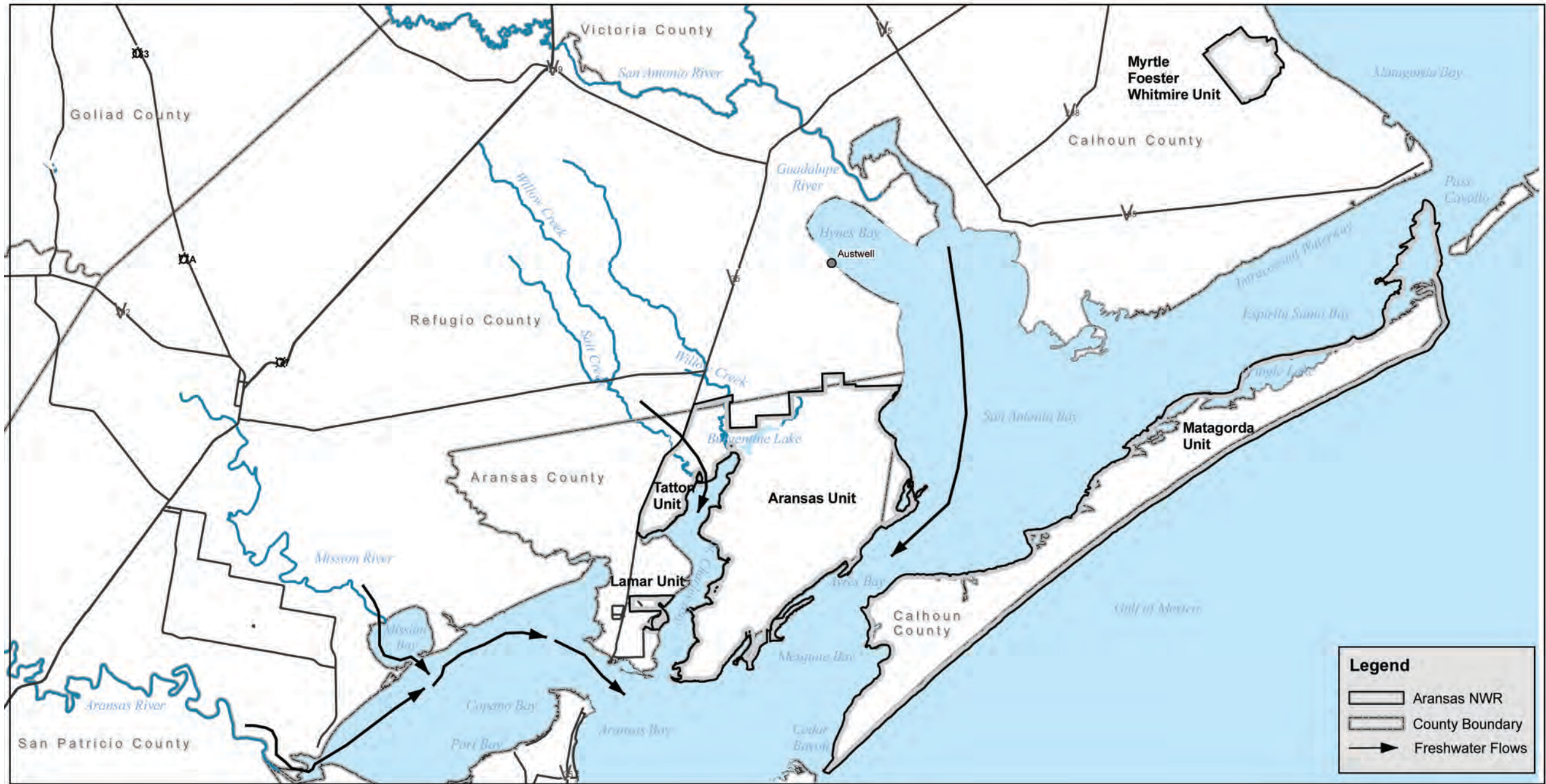
Commercial crabbing in the vicinity of the Refuge may be reducing the availability of blue crabs for wildlife, particularly whooping cranes. Blue crabs are one of the most important whooping crane food items (Hunt and Slack 1989, Blankinship 1976). Abandoned crab traps take numerous crabs and fish annually, as the dead and dying fish attract others into the traps. Although private commercial activities are not allowed on national wildlife refuges, commercial crabbing does occur in the Matagorda Island marshes. Through the 1994 MOA with the State, these marshes are to be managed as part of the Refuge with the full intent of allowing traditional uses. Additionally, in the Code of Federal Regulations, crabbing is prohibited specifically in any Refuge marshes, including Matagorda Island (50 CFR 32.63). Great progress has been made during the last 10 years in collecting abandoned traps and regulating trapping seasons and tag requirements (through the combined efforts of the Refuge and TPWD), and this effort will continue.



U.S. Fish & Wildlife Service

Aransas National Wildlife Refuge
Aransas, Calhoun, & Refugio Counties, Texas

Figure 4-2. Hydrology on the Aransas NWRC



PRODUCED IN THE DIVISION OF REFUGE PLANNING
ALBUQUERQUE, NEW MEXICO
LAND STATUS CURRENT TO: 8/17/09
MAP DATE: 5/27/10
BASEMAP: N/A
MERIDIAN: N/A
FILE: lit_maptitle

Figure 4-2. Hydrology on the Aransas NWRC

4.4 Fish and Wildlife Monitoring

The Aransas NWRC currently engages in a wide variety of natural resource monitoring and research projects. The studies, surveys, and inventories provide valuable information used to make management decisions and in support of statewide and national conservation efforts. Staff biologists are involved in the following ongoing projects to monitor fish, wildlife, and their habitats.

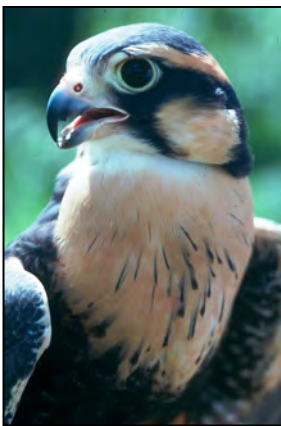
4.4.1 Threatened and Endangered Species

Whooping Crane

The tremendous worldwide interest in the endangered whooping crane, which has come to symbolize conservation in North America, makes it essential to place special emphasis on this species. The Refuge has conducted aerial whooping crane census flights since the 1950s and has accumulated as long and accurate a data set as for any species in the world. Surveys focus on the size of the population, productivity, mortality, distribution, and habitat use. Surveys of blue crabs and acorns are done to estimate the amount of food resources available throughout the winter for the cranes and relate those levels with mortality and productivity. The Refuge works closely with the Canadian whooping crane coordinator on monitoring and research programs. Many factors continue to pose a threat to the cranes at Aransas, including disturbance, chemical spills, and sea level rise. Special attention is ongoing to try to maintain sufficient freshwater inflows from the Guadalupe River as the human population grows and human consumption of water increases. Inflows are needed to support abundant blue crab populations, the primary food of whooping cranes.



Whooping crane family arriving in south Texas after a long migratory journey. Photo: Vicki Swann



*Aplomado Falcon.
Photo: Chris Perez*

Aplomado Falcon

During the past 10 years, aplomado falcons have been released on Matagorda Island and the Tatton Unit as part of the Aplomado Falcon Restoration Program by the Peregrine Fund, Inc. In 2008, three falcon pairs nested on Matagorda Island and fledged nine young falcons. Nest success and productivity that year, however, was low and was attributed to nest depredation by other raptors. Efforts have been made to improve on nest structure design to more effectively exclude predators (Paul Juergens, pers. comm.). In 2009, the Peregrine Fund surveyed falcon territories and found that all 13 were occupied by falcons. In 2010, 12 of the 13 territories were found to be occupied by aplomado falcons. Falcons released on the Tatton Unit all seem to leave, as several have ended up nesting on Matagorda. The Peregrine Fund believes the locally available habitat is currently saturated and discontinued releases as of 2003 on the Refuge. Since then, falcon releases have shifted to west Texas and New Mexico. Statewide, there were 37 nesting pairs of aplomado falcons in 2002. In south Texas, the reintroduction of aplomado falcons has been deemed a success. Populations of aplomado falcons will continue to be monitored as part of the recovery plan.

Piping plover

The federally threatened piping plover has undergone serious declines related to direct and inadvertent harassment of birds and nests by people, dogs, off-road vehicles; destruction of beach habitat for development projects; increased predation due to human presence in formerly pristine beach areas; and water level regulation activities that endanger nesting sites along the Missouri, Platte, and Niobrara Rivers (Haig 1992). The piping plover winters along beaches, sandflats, and mudflats from Florida to northern Mexico (Haig and Oring 1988). Matagorda Island is managed as a natural barrier island. Efforts to protect the piping plover involve minimizing human disturbance. Each fall through spring, the Refuge conducts piping plover surveys to determine their relative abundance on Matagorda Island.



Piping plover on the beach.

Photo: Chris Perez

Sea Turtles and Marine Mammals

Sea turtle strandings have been documented on Matagorda Island for at least 20 years and have provided important data showing a correlation between the start of shrimping season and an increased number of strandings. In addition to stranding data still being collected, surveys for nesting sea turtles began in 2003. Kemp's ridley sea turtle nesting surveys conducted April through June were begun to determine if Matagorda Island is an active nesting site for Kemp's ridley sea turtles and other sea turtles. Since then, Kemp's ridley sea turtles have been documented to nest on the beaches of Matagorda Island. Interestingly, this species' primary range exists further south, along the northern Mexico coastline, and it was not historically known to nest on Matagorda Island. In 2005 and 2006, three and four nests were documented, respectively. In 2007, eight nests were found. Then, 13 nests were documented in 2008 and 8 in 2009. This work is coordinated with the U.S. Geological Survey (USGS) and the National Park Service's Padre Island Field Research Station. Refuge staff also cooperates in collecting data on marine mammal strandings, and mammal stranding surveys have been conducted since 1990 to track the frequency of marine mammal strandings. These surveys are coordinated with the Marine Mammal Stranding and Salvage Network, Padre Island National Seashore.

Attwater's Prairie Chicken

In the 1970s, the Refuge had an active program for monitoring and managing the Attwater's prairie chicken (APC) with an estimated peak population of more than 50 chickens on the Tatton Unit. Cattle grazing was conducted on the Tatton Unit until 1989, when a panel of prairie chicken experts determined the Refuge was overgrazed and nesting cover was inadequate. Although no one knows what caused the extirpation of these chickens from the Refuge, there are currently no plans to reintroduce them to the Tatton Unit due to the unavailability of chicks for release. Though the Tatton Unit is a possible release site and is rated by some as high as second among potential release sites, there are various concerns to overcome. A potential conflict between an immune deficiency disease in introduced prairie chickens and the presence of whooping cranes on the Tatton Unit marshes is of concern for any future reintroductions and may lower the ranking of the Tatton Unit as a future release site. The Tatton Unit is also subject to inundation due to its low elevation, which is undesirable for APC use. Additionally, the presence of aplomado falcons on the Refuge complicates any reintroductions of prairie chickens since they are potential falcon prey items. Lastly, the Tatton Unit may not be sufficiently large enough (approximately 7,500 acres) to maintain a

viable wild population of prairie chickens because it is isolated from other suitable APC habitat, and there is a lack of grassland corridors to allow for dispersal and genetic exchange.

4.4.2 Other Priority Species

Periodic evaluations and monitoring occur to see what endangered, threatened, or species of special concern can benefit from Refuge programs. The Refuge provides excellent habitat for other endangered and threatened species, such as piping plover and brown pelican, and species of concern, including loggerhead shrike, white-tailed hawk, and burrowing owls (see Appendix B). With respect to the presence of endangered cat species, there is no evidence that the federally endangered ocelot or jaguarundi ever occurred historically or are currently present on the Refuge (Mike Tewes, pers. comm.). In an attempt to confirm these species, extensive trapping on the Aransas Unit in the 1990s by Texas A&M Kingsville revealed no evidence of their presence. From 2003–2005, the Refuge installed motion sensitive cameras to detect these cats, but none were detected. The nearest area to the Aransas NWRC where these species have been documented begins roughly near Kingsville, extending south along the Texas coast toward Laguna Atascosa NWR. Nonetheless, the Refuge has either participated in surveys of these species or provided logistical support for researchers working on these species.

4.4.3 Migratory Birds

Waterfowl

The Service conducts monthly aerial waterfowl surveys from September through April along the Texas coast to monitor their populations, general health, and overall conditions. On the Myrtle Foester Whitmire Unit, waterfowl and bird surveys from 2000 to the present have been conducted to obtain avian trend data for the sake of measuring the effectiveness of habitat management activities.

Marsh Birds, Shorebirds, and Wading Birds

Plover surveys have been conducted on the Refuge from 1988–2003. They were developed to document the presence, distribution, and relative abundance of plovers within the Aransas NWRC. This monitoring has been coordinated with other Federal agencies and offices. The Refuge has participated in the colonial waterbird count since about 1970. This survey documents the presence, distribution, and relative abundance of colonial waterbirds in the area. Shorebird surveys are conducted on the Myrtle Foester Whitmire and Matagorda Island Units in an attempt to gather data on species composition, distribution, and relative abundance of shorebirds. Surveys have been coordinated with the International Shorebird Surveys and Manomet Center for Conservation Sciences. Additionally, on Matagorda Island, “beach bird surveys” have been conducted since 1997 to document distribution and relative abundance of birds found along a two-mile transect of Matagorda Island. Since 2005, the Refuge has participated in the National Marsh Bird Monitoring Program.



*Great blue heron catching a fish.
Photo: Steve Sykes*

Passerine/Neotropical Migrants

Breeding bird surveys were conducted in 1998–1999 and again in 2006–2008 to compare bird use between burned and non-burned units and to assist with habitat management decisions. The annual Christmas bird count has been conducted on the Refuge from 1943 to the present. A winter grassland bird survey, beginning in 2001, was developed to acquire information on winter distribution and species diversity of grassland birds on Matagorda Island. Bird banding on the Refuge from 1937 to the present continues but with varied emphasis over time.

Raptors

Raptor surveys are periodically conducted on the Refuge, as need determines. These surveys have been conducted periodically since 1992 to determine species presence and abundance on the Refuge. These surveys help the Refuge document raptor use on the Refuge and collect data for trend analysis.

Pollinators

Pollinators, including bats, bees, butterflies, and other insects, are critical to spreading seeds and pollen. Since 1997, a July 4th Butterfly Count has been conducted on Blackjack Peninsula to provide data to a national database to track butterfly trends (see Appendix B). Currently, there are no surveys targeting pollinators as a group. However, habitat managers strive to keep this ecologically important group in mind. The greatest risk lies in losing species diversity within vegetative communities as a result of narrowly focused habitat management that does not take into account important pollinators.

4.4.4 Other Wildlife

A wildlife road mortality survey was conducted from 2002 through 2004 to record and determine the extent of traffic related wildlife mortality along Refuge service roads. The purpose of the survey was to determine the effect of vehicular traffic from oil and gas and seismic exploration crews and various contractors accessing the Refuge service roads.

Fish

No current monitoring of fishery resources is being conducted. In the past, species inventories have been conducted on parts of the Refuge by TPWD (Matagorda Island) and by academia. The Refuge is currently assessing the freshwater fish assemblage and community composition of temporary lakes and pools.

Amphibians/Reptiles

Amphibian malformation surveys started in 2001 and are periodically conducted to document the frequency and types of malformations within Refuge amphibian populations. Additionally, frog call surveys began in 2003 and are conducted to document the presence, distribution, and relative abundance of frogs on the Aransas NWRC. This work is coordinated with the USGS North America Wildlife Research Center, Frog Watch, and TPWD. Also, on the Aransas Unit, drift fence arrays have been employed since 2002 to compare mortality and recovery rates of small reptiles and mammals between habitat treatment methods (e.g., prescribed fire and roller-chopping).



Green treefrog. Photo: Steve Sykes

Invertebrates

Monarch butterfly surveys are conducted to track and collect migration data for the Refuge. This survey is coordinated with Monarch Watch, University of Kansas, and local schools. Other butterfly surveys track diversity and distribution of butterflies on the Aransas Unit. Additionally, working with Victoria College since 2000, the Refuge conducts standardized quantitative surveys of beach invertebrates. The data collected from these beach surveys will be used to document the effects of storms and other catastrophic events on beach ecology, and it can be used for comparison of the Matagorda Island beach as a control with other beaches in the State.



Monarch butterfly. Photo: Roland Wauer

Mammals

Photo-monitoring of predators and other large mammals began in 2003. The goal is to document the presence and distribution of predators within the Aransas NWRC. During 2002–2004, the short-tailed shrew was inventoried on the Aransas Unit to determine the presence and population density of this uncommon species.

With the help of TPWD, aerial deer surveys have occurred on the Aransas and Matagorda Island Units since about the 1960s to track and identify population trends. Aerial surveys were discontinued in 2005 when TPWD began conducting annual spotlight surveys on the Island. Refuge staff will conduct spotlight surveys in the spring (January) and again in the fall prior to the annual hunt (September) to provide an index to the deer population before and after the annual hunt. In addition, biological data is collected at the hunter check station from harvested deer to provide a better understanding of the Refuge deer population.

4.5 Habitat Monitoring

4.5.1 Burn Effects

Vegetation photo-points have been used on the Refuge since 1987 to help document vegetation changes. Since 1999, photos taken on specific units before and after prescribed burns were used to document habitat change over time as a result of treatment. Live fuel moisture monitoring was implemented in 1999. Using samples taken from live oak, plant stress is monitored to determine if prescription parameters are being met, and it is used as one of the inputs for fire behavior calculations in support of prescribed fire activities. Surveys have been conducted since 2001 to document vertebrate mortality related to prescribed fire activities. Also, drift fences have been implemented since 2002 to monitor herptile and small mammal abundance in areas of prescribed burning and roller-chopping.

4.5.2 Mechanical Control

Mechanical control for habitat restoration and enhancement involves the use of machinery to help control brush encroachment in the grasslands or to help control the running live oak. No current vegetative monitoring of mechanically controlled areas is occurring. Studies have been conducted using mechanical vegetative control methods. These studies serve as the basis for some of the current habitat management practices employed by the Refuge.

4.5.3 *Chemical Control Monitoring*

Invasive plant species surveys of water hyacinth and Chinese tallow began in 2002 and continue today. Other species are inventoried as they are encountered during these surveys. This effort is geared toward collecting information for use in future control efforts and monitoring treatment effectiveness (see Appendix E).

4.5.4 *Grassland Restoration*

Limited grassland vegetative monitoring is occurring today. Past studies and monitoring generally serve as the basis for the current grassland habitat management practices employed on the Refuge. For example, on the Tatton Unit, grassland plots surveyed from 1992 to 1996 to measure eastern baccharis and mesquite mortality in relation to prescribed burn type and time of burn provided the needed information for making adjustments. Today, an overview of the burn records and prevailing habitat conditions serve in determining whether habitat management practices have been effective or not in maintaining or restoring grasslands. Consequently, experience and judgment allows the Refuge to make quick adjustments to maintain and restore the existing grasslands on the Matagorda Island and Tatton Units.

On the Myrtle Foester Whitmire Unit, photo-point monitoring is ongoing in the prairie restoration site to document success rate. Since 2005, the Refuge has been working to restore old rice fields to native coastal prairie. Approximately 50 acres of old farm field have been restored to native coastal prairie, which, over the long term, can potentially provide seed material for additional grassland restoration activities both on and off the Refuge. The project was developed to provide habitat for such species as LeConte's and Botteri's sparrows, aplomado and peregrine falcons, white-tailed hawk, and a host of other prairie-dependent plants and animals.

In regards to the effectiveness of managing running live oak and restoring some of the peninsular savannah-like grasslands, little or no monitoring is occurring. On the Blackjack Peninsula, those areas along the shoreline have generally been the easiest to restore and maintain as grasslands for the benefit of whooping cranes. However, areas further inland prove more difficult to restore and maintain and, over time, there appears to be a stalemate between running live oak growth and encroachment, and grassland restoration.

4.5.5 *Plant Surveys and Monitoring*

The Refuge has a comprehensive plant list (see Appendix B). However, other than invasive plants, plant surveys and monitoring are typically not conducted. Future plans are for Refuge plant communities to be mapped using station Geographic Information System (GIS) capabilities to aid in habitat management decisions.

Water Monitoring

Water flow monitoring was initiated in 2002 to determine the amount of water pumped into the Myrtle Foester Whitmire Unit. The purpose is to measure purchased water and monitor impoundment levels related to moist soil unit management and secondary rice crop production on the Myrtle Foester Whitmire Unit.

Tide gauges are currently installed on Matagorda Island to monitor tidal exchange, flow pathways, and circulation in salt marsh. The purpose of this is to collect data for analysis so that actions can be re-evaluated and future management decisions improved. (For additional details, see the 2008 Adaptive Management Plan, Matagorda Island.)



Checking water control structures. Photo: USFWS

4.6 Visitor Services, Infrastructure, and Wildlife-Dependent Recreational Activities

Nationally, visitation is increasing on national wildlife refuges. According to the Travel Industry Association of America, ecotourism is becoming a major outdoor recreational activity.

Recreational uses on national wildlife refuges generated almost \$1.7 billion in total economic activity during the 2006 fiscal year alone (USFWS 2006). This 2006 report reinforces the travel industry's belief that ecotourism is becoming big business. Aransas is internationally known by birders not only as a critical wintering area for one of the most recognized endangered species, the whooping crane, but also for the fact that the Refuge is a birding hotspot, attracting over 400 avian species from all over. Approximately 60,000 visitors are welcomed annually, most of them keenly focused on viewing whooping cranes and other interesting wildlife. Customer service is an integral part of the Visitor Services Program at the Refuge.

Aransas NWRC accommodates all six priority wildlife-dependent recreational uses (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation) as identified in the Refuge Improvement Act of 1997. The bulk of these activities occur on the Aransas Unit, within the 5,000-acre Wildlife Interpretive Area or Public Use Management Area, which is set aside for public uses. Located in this area is the visitor center with maps, brochures, auditorium, interpretive exhibits, and the FAMI sales outlet. A 16-mile auto tour loop, seven self-guided walking trails, a boardwalk, and viewing decks with telescopes provide opportunities for nature study, wildlife photography, and observation. To accommodate the visiting public's needs, the Refuge maintains a small picnic area along the tour route, complete with restroom facilities, in support of their wildlife-dependent recreation activities. The picnic area offers a peaceful, scenic spot for a quick lunch or birding in the surrounding oak motte. The Youth Environmental Training Area is set aside for groups coming to the Refuge, usually for an overnight stay, to conduct nature studies. The 40-foot high observation tower provides an elevated perspective and grand vista of San Antonio Bay, Mustang Lake, and the GIWW. Archery and firearm hunting is offered during the fall and winter months in the hunt area, and fishing opportunities are available from spring to fall, when whooping cranes are not present.

On the Matagorda Island Unit, a State park was formerly located on the northeast end of the Island, managed through a 1994 MOA between the State (TPWD-Parks Division) and the

Service (see Appendix F). Various public use activities—hunting, fishing, bicycling, beachcombing, camping, birding, environmental education, swimming, picnicking, wildlife observation and photography, and environmental education and interpretation—were supported. The upper two-thirds (19,000 acres) of the Island is cooperatively managed as the Matagorda Island National Wildlife Refuge and State Natural Area. The Service has the main responsibility for managing the wildlife and habitat on the Island, and TPWD is responsible for managing public uses. However, in December 2005, the portion of the Island that was managed by the State's Parks Division for over 10 years was closed due to lack of funding. Currently, the State's Wildlife Division has taken over managing public uses on the Island. Currently, any public access is dependent upon personal watercraft or private charter boats.



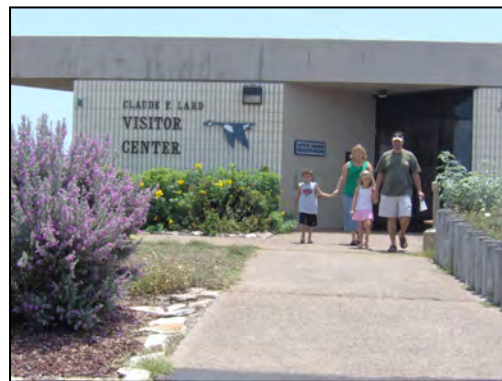
Matagorda Island Lighthouse. Photo: Steve Sykes

Matagorda Island's programs provide a balance of guided and self-guided outdoor interpretive nature study and environmental appreciation. An environmental education center is located at the south end, with wildlife and historical interpretive trails at both the north and south ends. Recreational activities include saltwater fishing, hunting, birding, picnicking, wildlife observation, photography, and historical interpretation. The Matagorda Island lighthouse, dating from 1852, is listed on the National Register of Historic Places and still stands at the northern end of the Island.

With respect to public uses on the Tatton Unit, there is a highway right-of-way rest station, kiosk, and observation deck. Special youth hunts are conducted on the Tatton Unit. Both the Lamar and Myrtle Foester Whitmire units are currently closed to public uses.

Refuge Facilities and Transportation Infrastructure

Existing facilities include the 5,500 square-foot Claude F. Lard Visitor Center, built in 1981. This building contains an after-hours registration area, foyer, bathrooms, exhibit area, auditorium, storage/audio-visual room, and office spaces. Visitors are provided an orientation and map by an employee or trained volunteer. Many additional brochures related to the Refuge System, wildlife, habitat, conservation organizations, and local nature related attractions are available at the front desk.



Aransas NWRC Visitor Center. Photo: Bernice Jackson

Access on refuges is provided primarily to facilitate the six priority public uses of the Refuge System (hunting, fishing, wildlife observation and photography, and environmental education and interpretation), when compatible with refuge purposes and the Refuge System mission. Public access is normally allowed in designated areas and along designated routes of travel (e.g., roads, trails, waterways, and other routes). Designated routes of travel can be public roadways (e.g., State or county roads) and waterways or refuge roads and trails. Refuge routes of travel and access are maintained, improved, or added through various funding sources with one of the main sources being the Refuge Roads Program (RRP).



Bicycling on the Refuge.

Photo: Bernice Jackson

The RRP was established in June 1998, as part of the Transportation Equity Act for the 21st Century (TEA-21) and reauthorized in August 2005 under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). This makes Federal highway funds available for Refuge roads to pay the cost of maintenance and improvement of these roads, as well as parking areas, rest areas, pedestrian and bicycle trails, and related facilities. This also includes administrative costs associated with such maintenance and improvements. Refuge roads are generally any road open to public travel that provides access to or within a unit of

the Refuge System, and for which title and maintenance responsibility are vested in the United States Government.

All projects funded under the RRP must be consistent with the goals and objectives outlined in Comprehensive Conservation Plans and step-down management plans. The Service's refuge planning policy requires that one of the elements to be considered in the development of a Plan are transportation issues, including public use roads and trails, passenger vehicles, pedestrian and bicycle needs, as appropriate for the refuge. Refuge transportation infrastructure and related issues will be coordinated with the respective state or county transportation agencies and metropolitan and rural road planning organizations to assure that, among other considerations, there are no negative impacts to traffic congestion or air quality on the Refuge.

Aransas Unit

Seven walking trails, Tomas Slough Observation Area, the picnic area, Jones Lake viewing deck, a boardwalk, and a 40-foot high observation tower with interpretive signage and telescopes are located along the first five miles of the 16-mile paved driving tour loop. On the remaining 11 miles of the tour loop, the Hog Lake viewing deck, five wayside exhibits, and several pullouts are available. There are also group campsites, photo blinds at Birding Trail #2 and Heron Flats Trail, and comfort stations.



Aransas Unit observation tower.

Photo: USFWS

Tatton Unit

An informational kiosk, interpretive signs, parking, and a viewing deck occur on the Tatton Unit. The Tatton Interpretive Coastal Prairie Trail begins at the State Highway 35 roadside rest area and leads into the remnant coastal prairie for one-quarter of a mile.

Matagorda Island Unit

Matagorda Island has some public use facilities administered by TPWD and the Refuge. Matagorda Island Unit offers interpretive trails at both the south and north ends. At the south end, four trails are located near the Environmental Education Center.

- 1) The Wetlands Trail (three miles) has six interpretive signs, two boardwalks, and an observation platform, providing an elevated view of the salt marsh.

- 2) Bayside Trail (.33 miles) skirts the edge of the salt marsh and is ideal for observing the transition from marsh to grassland.
- 3) Grassland Trail (.75 miles) takes the visitor into a waist-deep stretch of Gulf Coast prairie.
- 4) Sand Dunes Trail (.33 miles) gives the visitor a close-up view of the geology and adapted xeric vegetation of a dune field.

At Shell Reef Bayou, an elevated wooden observation deck overlooks extensive wetlands. Additionally, there are numerous hunter blinds for deer and duck hunting scattered across the Island. All these sites are used by guided groups transported from the Environmental Education Center or from the north end of the Island. On the north end of the Island, the Lighthouse Trail leads from the beach access road across the Civil War trenches to the lighthouse and Gulf Beach. All of the trails and public use facilities on Matagorda Island are interconnected by the Main Island Road, which is currently a 35-mile gravel-shell road. This road had been paved in the past and is the primary artery for access to all public uses on the Island.

Myrtle Foester Whitmire and Lamar Units

These units are currently closed to public use.

Hunting

Wildlife-dependent public uses such as hunting are a priority public use on national wildlife refuges, when they are compatible with refuge purposes.

Aransas NWRC provides annual archery and firearms hunting opportunities for white-tailed deer and feral hogs. Javelinas were excluded from hunting in the early 1980s due to their low numbers. On the Aransas Unit, archery hunting has been allowed since 1966, and firearms hunts began in 1968. The majority of hunts take place on 33,500 acres of the Blackjack Peninsula uplands, apart from the Public Use Management Area. Each year, there are about 1,300 hunters on the Aransas NWRC, making white-tailed deer and feral hog hunting a very popular activity. The hunts are popular because they are an affordable, rare public recreational opportunity. Texas has limited public hunting opportunities, as the vast majority of Texas land is privately owned.

On the Matagorda Island Unit, as part of the agreement with the State to support recreation on Matagorda Island, TPWD provides hunts for waterfowl, feral hogs, and white-tailed deer. Based on annual trend surveys, the deer herd has averaged about 1,580 on the Aransas Unit and 1,000 individuals on the Matagorda Island Unit. About 96 and 40 deer per year are harvested, respectively. Currently, up to 75 hogs are taken by hunters each year on the Aransas Unit and very few on Matagorda Island. Approximately 20,000 acres of upland habitat on the Island are available for hunting, and special permit hunts may be offered for white-tailed deer. Most deer hunting regulations that apply to Calhoun County apply to Matagorda Island National Wildlife Refuge and State Natural Area. Hunters are made aware that endangered species, especially whooping cranes, occur within these areas, and hunters should exercise caution and good judgment at all times while hunting.



TPWD Game Wardens provide support to the hunting program on the Refuge. Photo: Felipe Prieto

Four firearms youth hunts for white-tailed deer and feral hogs are held on the Refuge. One, in which local kids participate, is hosted by the Refuge on the Tatton Unit. The Refuge provides the hunt site and facilities for training, sighting in firearms, and cleaning game. A second hunt is held on Matagorda Island. Both of these two hunts are co-sponsored by the Refuge and the Texas Wildlife Association as part of the Texas Youth Hunting Program. Youth for both hunts, accompanied by a parent, come from all over the State for these weekend hunts on the Island and the Tatton Unit. Up to 10 youth participate, along with parents, employees, presenters, and several volunteers. These youth are chosen by the Texas Wildlife Association through a lottery system. Two additional youth hunts are held on the north end of Matagorda Island and hosted by TPWD. The youth for these hunts are chosen by the TPWD application process. The Youth Hunting Program was established to increase youth participation in safe and ethical hunting and to promote the hunting heritage of Texas.

As governed by State hunting regulations, waterfowl hunting on Matagorda Island is by a State annual public hunting permit and regular hunting license. Waterfowl hunting is permitted in the interior freshwater ponds only on scheduled dates and times during the south zone waterfowl season. Waterfowl hunting is also allowed in the bayside marshes (e.g., Pringle Lake, Contee Lake, South Pass Lake, Long Lake, and Pat's Bay) accessible via boat. However, hunters are cautioned that whooping cranes, an endangered species, frequent the vicinity. Recent changes to the sandhill crane and snow goose seasons, and to closed areas, have been implemented and will require that hunters know the regulations when hunting in the vicinity of the area designated as critical habitat due to the presence of whooping cranes.

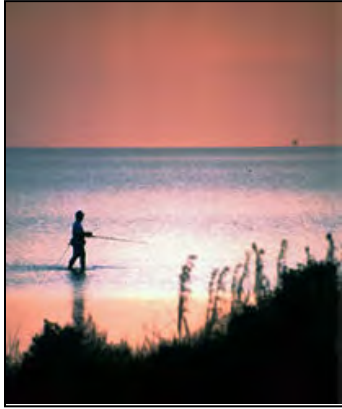
The feral hog is considered to be an exotic pest and is very destructive to habitat. Feral hogs also compete with native wildlife for food such as acorns and grapes; and their aggressive, predatory nature can adversely affect ground-nesting birds and even larger animals such as javelina. A major objective of feral hog hunting is to help control these species on the Refuge, as there is no bag limit for either the firearms or archery hunts.

Fishing

Although the Aransas NWRC itself does not have any waters open to fishing, the tidal waters surrounding the Refuge are State-owned and open to fishing. Since 1980, Aransas has expanded its public use opportunities to include several fishing access points along the shoreline of San Antonio Bay via the auto tour route. Five areas (the Picnic Area, Bay Overlook, Dagger Point, Birding Trail #2, and the Observation Tower area) are made available for fishing access. A 120-foot long fishing pier into San Antonio Bay along the auto tour loop at the picnic area has recently been constructed and is now open year-round. With the exception of the fishing pier, all other fishing access points are closed October 16 through April 14. Currently, the Refuge has no public boat ramp facilities, but in 2004, it began allowing kayak and canoe launching at the fishing access points. Matagorda Island is also a popular fishing area, and visitors can access the Island's shorelines by personal watercraft. Access points and prohibitions do not occur on Matagorda Island, given the fact that these are State waters and access is not through the Refuge. Most of the fishing is wade



Redfish caught at Refuge Observation Tower fishing access point. Photo: Bernice Jackson



*Wade fishing on the Refuge.
Photo: USFWS*

fishing or by small boat entry into the surrounding saltwater flats. Typical fish caught are speckled trout, redfish, black drum, and flounder. To ensure compatibility with Refuge purposes, fishing access and kayak and canoe launching are seasonally permitted from April 15 through October 15, but are prohibited the rest of the year when whooping cranes and major waterfowl and shorebird concentrations are present. Only the fishing pier is open year round.

Wildlife Observation and Photography

By far, wildlife observation and photography are the most popular public uses on the Refuge. In 2005, approximately 91 percent of visitors to the Aransas NWRC came for wildlife observation, and about half of all visitors brought cameras.

Wildlife observation and photography, including the observation of native plants and other natural features, are the most popular recreational uses of the Refuge, attracting about 60,000 visitors annually. Wildlife observation and photography are followed by environmental education and interpretation in popularity. The most popular time of the year for wildlife observation occurs in the fall and winter months when the whooping cranes are here and the temperatures are cooler. On the Aransas Unit, prescribed burning and roller-chopping for prairie restoration have opened up large portions of these areas for visitors to have greater vistas. Benches, photo blinds, feeding stations, and a more extensive trail system beyond the observation tower have not been installed due primarily to costs and maintenance issues. However, as the area's population grows, visitation to the Refuge is expected to increase and along with that, additional opportunities for the public to enjoy quality wildlife observation at the Aransas NWRC.



*Bird watching on the Refuge. Photo:
Tonya Nix*

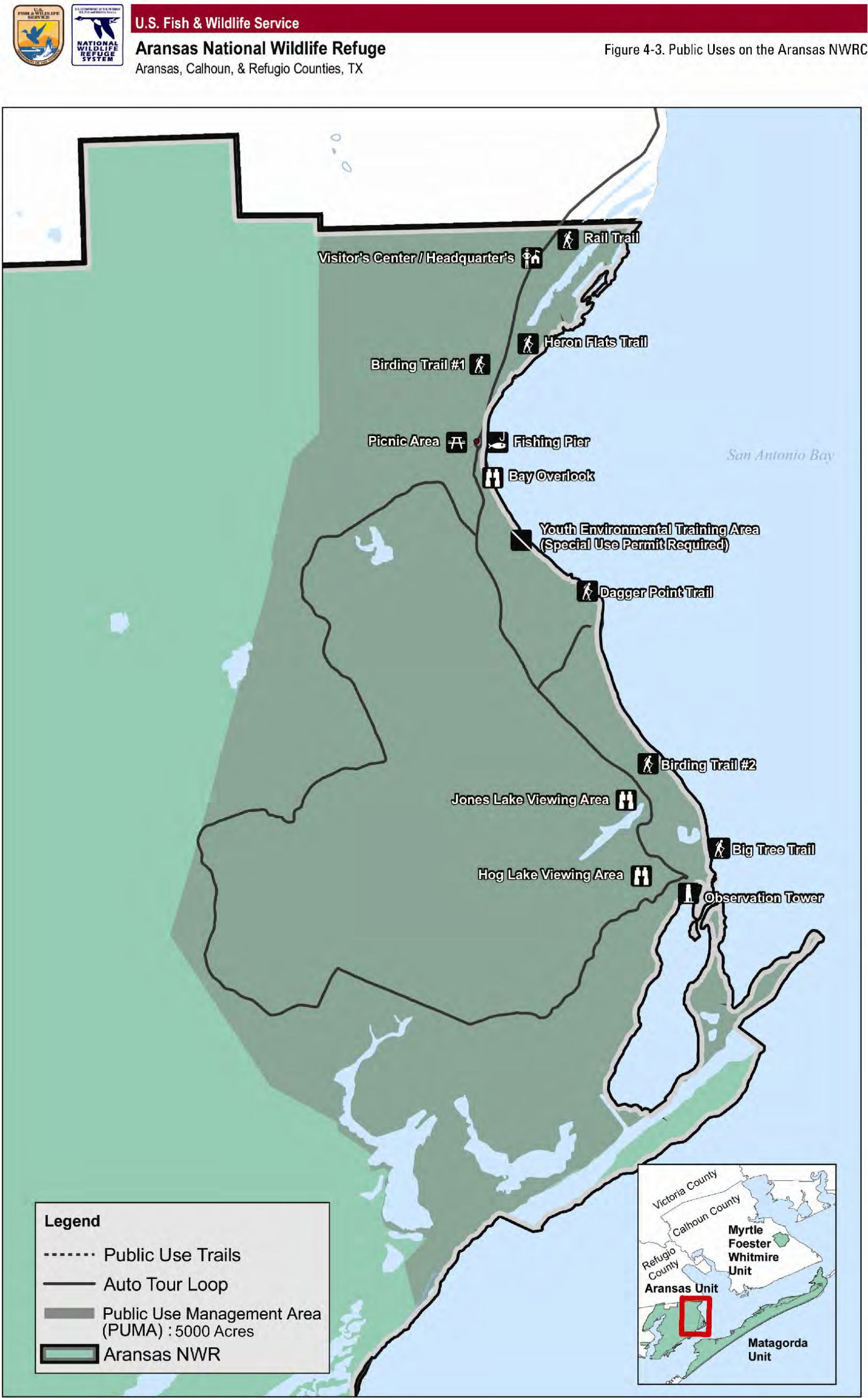
Environmental Education

For years, the Aransas NWRC has been a focal point of national conservation and international acclaim due in large part to the critical wintering habitat of the endangered whooping crane. Therefore, the Aransas NWRC is an ideal place for visitors to learn about the values of the nation's wildlife and wildland heritage, as well as the Service's mission to protect, enhance, and restore these resources. The Refuge Complex offers one of the best outdoor classrooms available for studying wetlands, grasslands, woodlands, and barrier island ecosystems. The environmental education program is designed to take advantage of nature's



*Teaching a school group how to seine.
Photo: Mary Rummage*

Figure 4-3. Public Uses on the Aransas NWRC



classroom to help students develop an integral understanding of the environment and the USFWS role as stewards of the land and wildlife.

Interpretation

The Refuge offers quality interpretive programming with the goal of helping visitors enjoy the outdoors while promoting an understanding of wildlife conservation and stewardship for the resource. Upon arrival at the Visitor Center, visitors are welcomed and offered an orientation. The Refuge fact sheet and map are provided, and questions about wildlife, the Refuge, and the local area are answered. Additional brochures, interpretive exhibits, the Refuge video, and the FAMI nature store—with wildlife and nature books, brochures, animal checklists, and other printed materials—are located in the Center. Welcome programs for groups, educational wildlife videos, interpretive van tours, and Aransas lecture series' with regularly scheduled wildlife-related programs are also offered. New programming includes a Refuge Explorers Summer program, where families, students, and scouts are invited to come out on Thursdays throughout the summer to learn about wildlife topics such as birds, insects, and sea turtles. The Youth Environmental Training Area (YETA) is available for overnight camping and interpretation by organizations such as universities, scouts, and church groups.

Previously, the majority of structured environmental education (EE) for the Refuge was conducted on Matagorda Island. The EE Center provided hands-on training in beach, island, and bay ecology from 1993–2003. The EE Program at Aransas now includes the entire complex and consists of several high quality outdoor classrooms designed to give students the



*Supv. Outdoor Recreation Planner Bernice Jackson providing outreach to local children at the Texas State Aquarium.
Photo: USFWS*

opportunity to enjoy the outdoors, while promoting an understanding of wildlife conservation. Such activities include an introduction to bird, fish and wildlife management, food chain relationships, and animal tracks identification, as well as an understanding of biodiversity and island, beach, and bay ecology. These programs are aligned with the Texas Essential Knowledge and Skills (TEKS) for Science.

The Refuge also offers an orientation to the Refuge, welcome programs for groups, educational videos, interpretive van tours, an Aransas lecture series, a Youth Environmental Education Training Area, and outreach for schools, organizations, and community groups. The Matagorda Island Environmental Education Center offers beach, bay,

and marsh ecology classes open to eighth grade and older students. The Refuge visitor center provides a bookstore containing wildlife and nature books, brochures, animal checklists, and other printed materials.

4.7 Outreach

Outreach efforts consist of staff participating in many community activities throughout the area. The Refuge provides programs on a per-request basis to schools and local conservation and civic groups. Refuge staff attends Chamber of Commerce meetings and serve on conservation committees. At festivals, Refuge personnel work at information or FAMI booths. During the spring, the Refuge hosts two outreach, environmental education, and

interpretation events for local schoolchildren. The events recognize National Fishing and Boating Week, and International Migratory Bird Day. These events bring in over 600 students, plus teachers and parents from the local area.

From 2000 to 2005, the Refuge annually hosted its “Refuge Day Celebration” in October, attracting thousands on that day. A variety of nature-themed activities were featured, which centered on the priority public uses: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. During Refuge Day, live animal displays, vendors, conservation organization booths, target and 3-D archery courses, BB and shotgun skeet shooting, Project Game Thief display, live raptor exhibitions, a youth duck-calling contest, kids’ arts and crafts, “wild” storytelling, Soupbone Chuckwagon, and catfishing in freshwater tanks were among the attractions. Many partners participated in this event, including TPWD, Haydel’s Game Calls, Bass Pro Shops, Pure Fishing, Last Chance Forever, The Texas Zoo, Ducks Unlimited, Friends of Aransas and Matagorda Island, Austwell-Tivoli Independent School District (ISD), Rockport ISD, Tejas Bowmen Archery Club, Padre Island National Seashore, Texas Master Gardeners, Texas Master Naturalists, and local chambers of commerce. Despite the popularity of this outreach event, it depends on the availability of funds each year.



Local Girl Scout troop tours the Matagorda Island Unit. Photo: USFWS

Since 1992, the Refuge has held an annual Wildlife Art Contest in the Austwell-Tivoli Independent School District. In recent years, the contest was expanded to include Aransas and Calhoun County schools. The winning artwork is displayed on Refuge billboards along Highway 35 on the Tatton Unit. The purpose of the contest is to encourage creativity in our local students, foster an appreciation of wildlife and the Refuge System, and form partnerships within our local communities.

Additional outreach efforts to involve local children interested in prairie restoration have been conducted at the Myrtle Foester Whitmire Unit. Students from the Austwell-Tivoli Elementary School embarked on an adventure to plant four acres of native coastal prairie at the Refuge unit. The four-acre planting was completed as part of a Five Star National Fish and Wildlife Foundation grant and was also part of a larger effort to restore 50 acres of coastal prairie on the Refuge. Four different methods were used when planting: broadcasting seeds, sprigging Gulf cordgrass, and planting seed critters and seedlings grown by students. The seed critters were made out of a native prairie mix and clay to aid in germination and protect seeds from animals eating them. The planting field trip was a culmination of four in-school conservation education classes presented by the Refuge Environmental Education Specialist and biological staff. This ongoing outreach effort provides an opportunity for students to learn about prairie restoration, conservation, wildlife, native versus introduced plants, and horticulture.

The Aransas NWRC also regularly maintains a website to provide additional outreach at <http://www.fws.gov/southwest/refuges/texas/aransas>.

Information for visitors, including directions, what to see and do, and brochures about hunting, fishing, bicycling, history, whooping cranes, Matagorda Island, volunteering, and other information, is available.

Volunteer and Friends Program

The Volunteer Program is a vital part of the Refuge operational capacity. Volunteers accomplish numerous work projects such as turtle or other biological surveying, visitor center reception, conducting interpretive guides, and construction and maintenance. Volunteers donate approximately 12,000 hours of service annually in various critical operations of the NWRC.

Generally, the volunteers are divided into four categories: residential, local, birders, and Boy Scouts or Girl Scouts. In the past, volunteers have also come from specialized programs such as the Senior Texan Employment Program (STEP) and the Student Conservation Association (SCA). Residential volunteers are those who come south for the winter and work four days per week for at least three months. In exchange, they live on the Refuge, where they can park their RV on a concrete pad with full hook-ups. They fill positions such as Visitor Center Information Assistant, Maintenance, Biological, or Public Use Assistant, Custodian, Administrative Assistant, Youth Environmental Training Area (YETA) Coordinator,

Festivals Coordinator, Volunteer Coordinator, or Interpretive Guide. Local volunteers come from the neighboring towns of Rockport, Victoria, Tivoli, or Port O'Connor. They volunteer from one day a week to one day a year. They are individuals or can be from special groups such as Texas Master Naturalists, Mid-Coast Chapter; the U.S. Navy-Ingleside; or an employee group from Duke Energy or Dow Chemical. Projects include working the visitor center front desk, turtle patrol, conducting van tours or other visitor programs both on and off the Refuge, assisting with special events, constructing decks and kiosks, remodeling Matagorda Island education facilities, and installing fencing. Boy Scouts and Girl Scouts of America volunteer at the Refuge. Youth groups are permitted to camp in the YETA for environmental education purposes. These groups also assist the Refuge in activities such as trail trimming, construction, other maintenance, planting native plants, and assisting with other biological projects.

The Friends of Aransas and Matagorda Island (FAMI) were organized in 1997 from a handful of local citizens with a concern for the Refuge. Since then, membership has grown, and the group has become an important partner for the Refuge. In 2000, FAMI assumed operation of the visitor center's nature store, providing a full range of retail management functions on a volunteer basis with day-to-day operations provided by Refuge staff and volunteers. With store profits, FAMI is able to support and fund important Refuge projects, such as water windmill restoration, prairie restoration at the Whitmire Unit, Brundrett Lake culvert repair, marsh enhancement at Matagorda Island, Big Devil Bayou culvert repair, Shell Reef culvert project, water hyacinth control at the Myrtle Foester Whitmire Unit, and Port O'Connor boat barn construction; FAMI funds also help with scholarships, grant projects, manager's fund, youth hunts, the Refuge Day Celebration, a fishing clinic, and the migration event. Other activities include conducting van tours, on and off-Refuge presentations, school programs, and guided walking tours; Christmas Bird Count Sponsorship; and support of off-site Refuge festival booths at the Celebration of Whooping Cranes and Other Birds in Port Aransas, the Hummer/Bird Celebration in Rockport, and the annual Conference for the Advancement of Science Teaching. The mission of FAMI is *"to support and assist the Aransas and Matagorda*



Refuge volunteers staffing Refuge information booth. Photo: Bernice Jackson

Island National Wildlife Refuge Complex in its goal of enhancing habitat and wildlife and encouraging compatible wildlife-dependent public uses of the Refuges through educational, interpretive, scientific and other activities appropriate to the mission of these refuges.”

Scenery

Scenery resources on the Aransas NWRC include the views of vistas made available through public use infrastructure such as the 16-mile auto tour loop, seven self-guided walking trails, the boardwalk, the fishing pier, and viewing decks with telescopes. These amenities provide opportunities for enjoying scenic coastal habitats as well as nature study, wildlife photography, and observation. The picnic area offers a peaceful, attractive area for a quick lunch or bird-watching in the surrounding oak motte. The newly constructed 40-foot high observation tower provides an elevated perspective and grand overlook of San Antonio Bay, Mustang Lake, and the GIWW.

4.8 Law Enforcement

Currently there is one full-time Law Enforcement Officer (LEO) assigned to Aransas NWRC. The Refuge Law Enforcement (LE) program focuses on three main areas: 1) visitor assistance and safety; 2) emergency medical response; and 3) crime investigation and prevention. Visitor assistance and safety involves assisting or finding lost persons that have wandered off the trails, vehicle lock-outs, pet issues, disabled vehicles, nuisance animals, and providing advisories on safety awareness and relevant information. Regular law enforcement presence and visitor contact works well as a preventative law enforcement tool. Perhaps one of the most vital functions of the LE program is “first responder” medical response. The Refuge is very remote, as the nearest medical facility is over 40 miles away in Rockport. The Refuge LEO provides life-saving CPR, first aid, and emergency communication and coordination for transportation of injured persons. Crime investigation on the Refuge typically involves hunting and fishing violations and unauthorized plant and animal collecting. The Refuge LEO also enforces vehicle violations, fee compliance, and road closures, and performs accident investigations. Refuge LE also maintains a visible presence on the Refuge in order to help deter such violations. The LE program also has excellent partnerships with Federal, State, and local law enforcement agencies such as with the TPWD and county sheriff’s offices. Partnerships with fellow LE agencies are necessary to allow for more complete LE response and to patrol all five units of the Refuge at all times. Other LE issues include trespass, poaching, wildlife disturbance, and enforcing proclamation boundary zones in the marshes along the GIWW.

4.9 Archeological and Cultural Resources

In 1994, a cultural resources survey was conducted on the Blackjack and Live Oak Peninsulas and the Tatton Unit. Although the Aransas NWRC had 14 known sites on the Aransas, Tatton, and Lamar Units, the plan was to relocate 13 previously recorded sites and record any other sites encountered during this survey. Seven of the 13 sites were located, while the remaining six locations revealed no evidence. One previously unrecorded site was documented. These sites were located primarily along the exposed shorelines of the Refuge. Archeologists determined that shoreline erosion is the probable factor in the loss of some of these sites. Thus, erosion may



Matagorda Island Lighthouse and cemetery. Photo: Mickey Bettis

have some implications for destroyed archeological sites and for Refuge land management. The report determined that sites on the Refuge could include the Paleo-Indian, Archaic, and Late Prehistoric archeological sites. Additionally, the overview survey identified museums where collected items exist and other potentially interested parties that should be consulted in the search for and evaluation of future cultural resources on the Refuge.



Brundrett family on Blackjack Peninsula, circa early 1900s.

Photo: USFWS

Myrtle Foester Whitmire Unit and Matagorda Island have not been as thoroughly surveyed for prehistoric archeological sites. However, Matagorda Island is well known for its rich history. The Island was first inhabited by the Karankawa Indians. In 1528, a Spanish expedition led by Cabeza de Vaca led the first Europeans to explore and set foot on the Island. In 1847, the town of Saluria was built on the northeastern tip of Matagorda Island. Fort Esperanza was also located on the Island. The 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 also exists on the Island. Additionally, at least two other cemeteries exist where

relatives of early ranching families are buried. Also on Matagorda Island are Civil War fortifications (i.e., trenches) used by the Union Army and the Confederacy during military action in 1863. There are 38 documented ship wrecks near the Island dating back to 1685. World War II bombing targets and the old landing field, once comprising the Matagorda Island Air Force Bombing Range, still remain.

The Refuge does not have a museum or museum collections (e.g., art, ethnography, history, documents, and artifacts). To date, some archeological materials have been collected from Refuge lands and lie in the collections of those mentioned in the 1994 cultural resources survey report. Archeological investigations and collections are performed only in the public interest by qualified archeologists working under an Archaeological Resources Protection Act permit issued by the Regional Director. 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.

According to the 1990 Comprehensive Management Plan, cultural and historical sites are to be “*preserved in place*” on Matagorda Island. Future plans for cultural resource inventories on the remainder of the Refuge will be undertaken if required; otherwise, they will be “*preserved in place.*” Prior to Refuge undertakings, appropriate efforts will be made to identify any cultural resources within the area of potential effects, and steps will be taken to avoid affecting these resources. Routinely, Refuge managers consider potential impacts of management activities on historic properties, archeological sites, traditional cultural properties, sacred sites, human remains, and cultural materials. Prior to ground-disturbing activities, the Regional Historic Preservation Officer is contacted in a timely manner to ensure adequate consideration of these resources.

4.10 Indian Tribal Interests

There are no tribally-owned or managed lands or water areas within or around the Refuge, and there are no administered programs on Aransas NWRC that affect Indian tribal interests.

4.11 *Wilderness Suitability*

There are no lands designated as Federal wilderness on the Aransas NWRC. As part of the Comprehensive Conservation Plan process, lands within the legislative boundaries of the Aransas Refuge were reviewed for wilderness suitability. No lands were found suitable for designation as wilderness, as defined in the Wilderness Act of 1964. Lands within the Refuge Complex have been substantially altered by humans either through agriculture, roads, drainage, grazing, habitat manipulation, bombing range activities, or water impoundment construction.



Dagger Point. Photo: USFWS

5. Refuge Management Direction: Goals, Objectives, and Strategies

The following goals, objectives, and strategies reflect the issues and concerns expressed by the planning team and the public. The main priorities for the Refuge include protecting and restoring native habitats; protecting and providing habitat for waterfowl, migratory birds, and federally listed species; and providing increased opportunities for public use. Based on an ecosystem approach, the wildlife and habitat goals and objectives focus more on providing viable and healthy habitats whereby wildlife can naturally flourish. Unless otherwise noted in the text, the following items are expected to be implemented throughout the 15-year term of this Plan, including those in the associated step-down plans. Because the Aransas NWRC Comprehensive Conservation Plan is a working document, modifications (e.g., adaptive management approaches) to the following objectives and strategies are anticipated. Ultimately, these proposed actions are designed to assist in the achievement of both the purposes of the Refuge, the mission of the Refuge System, and the Plan Vision.

5.1 Aransas NWRC Goals

Wildlife: To protect, restore, and maintain a diversity of native wildlife with special emphasis on Federal trust species and other species of management concern.

Habitat: To protect, restore, and maintain the prominent features within the Texas Gulf Coast Ecosystem that include blackland coastal prairie, wetlands, coastal woodlands, barrier island, and tidal and estuary habitats on and near the Refuge while controlling the spread of invasive or exotic plants.

Public Use: To provide quality, wildlife-dependent recreational and environmental education opportunities to a diverse audience and increase Refuge System support by promoting an understanding and appreciation for the unique wildlife, fish, habitats, and cultural history of the Aransas NWRC.

5.2 Wildlife Goal, Objectives, and Strategies

Wildlife Goal:

To protect, restore, and maintain a diversity of native wildlife with special emphasis on Federal trust species and other species of management concern.

Wildlife Objective 1—Monitoring Migratory Birds

Annually monitor all key species groups that include waterfowl, songbirds, shorebirds, marsh birds, raptors, and waterbirds to better understand current population levels, trends, and responses to management.

Rationale: A primary purpose of the Refuge is to protect and manage for migratory birds, which begins with a need to know population status and response to management practices. Monitoring is to be conducted every year or more as needed to meet Refuge needs. This may include several different monitoring efforts.

Strategies for Achieving Migratory Bird Monitoring Objective:

- Complete a Fish and Wildlife Inventory and Monitoring Plan for the Refuge to coincide with the Regional Inventory and Monitoring Program. Incorporate applicable elements of relevant plans and initiatives, as described for this Program. **2011**
- Monitor avian productivity (nesting) and survivorship through partnerships or Refuge staffing. **Ongoing**
- Use approved Service protocols and data analysis procedures to monitor migratory birds. Include modified protocols to meet Gulf Coast Ecosystem objectives. **Ongoing**
- Establish and implement a Geographic Information System database by obtaining basic Refuge layers and inputting new and existing wildlife survey data. **2011**
- Initiate research in cooperation with universities, non-profit organizations, and other agencies to gain current and comprehensive information and analysis on migratory birds and their distribution on the Refuge. **Ongoing**
- Seasonally summarize results of research and monitoring conducted on the Refuge for confirming and evaluating management practices and making needed adjustments. **Ongoing**

Wildlife Objective 2–Monitoring Endangered and Threatened Species

Annually monitor all endangered and threatened species such as the whooping crane, Kemp's ridley sea turtle, piping plover, and aplomado falcon populations that occur on the Aransas NWRC to understand current population levels, trends, and responses to management.

Rationale: A primary purpose of the Refuge is to protect and manage for endangered and threatened species. Monitoring is essential to assess population status and response to management practices. Monitoring is to be conducted every year or more as needed to meet Refuge needs. This may include several different monitoring efforts.

Strategies:

- Conduct surveys to establish presence or absence of endangered and threatened species, particularly on the Tatton, Lamar, and Myrtle Foester Whitmire Units, and on any new acquisitions within one year after acquisition. **Ongoing**
- Consult with local and regional experts within the Service, other cooperating agencies, and appropriate recovery plans to establish sound monitoring protocols. For example, a balanced monitoring approach is needed with respect to sea turtle patrols to ensure such monitoring activities are not adversely affecting habitats or other sensitive species. **Ongoing**
- Input and maintain listed species data into the Refuge GIS database. **Ongoing**
- Summarize results of research and monitoring conducted on the Refuge for confirming and evaluating management practices and making needed adjustments. **Ongoing**

Wildlife Objective 3—Monitoring Refuge Focal Species

Annually identify and monitor four or more Refuge focal species populations (e.g., mottled duck, seaside sparrow, and yellow-billed cuckoo) that occur on the Aransas NWRC to understand current population levels, trends, and responses to management.

Rationale: Focal species are a subset of priority species and represent larger guilds of species that use habitats in a similar fashion. Focal species are selected based on the knowledge that factors limiting their populations are sensitive to landscape scale characteristics and that by addressing the needs of these focal species, other priority species within a guild are expected to benefit, as are other wildlife (see Table 3-4 for a list of Refuge focal species).

Strategies:

- Conduct surveys as needed to establish the presence or absence of Refuge focal species, particularly on the Tatton, Lamar, and Myrtle Foester Whitmire Units, and on any new acquisitions within one year after acquisition. **Ongoing**
- Consult with local and regional experts within the Service, other cooperating agencies, and available literature as needed to establish sound monitoring protocols. **Ongoing**
- Monitor focal species as needed for management purposes and consistent with the Gulf Coast Ecosystem Plan, Texas Comprehensive Wildlife Conservation Strategy, and other applicable plans and initiatives. **Ongoing**
- Input and maintain focal species data into the Refuge GIS database. **2011**
- Summarize results of research and monitoring conducted on the Refuge for confirming and evaluating management practices and making needed adjustments. **Ongoing**
- Annually monitor mottled duck productivity during the months of April, May, and June on the Myrtle Foester Whitmire Unit, and adjust any habitat management practices accordingly to benefit this species. *Note: Because this Unit is highly manipulated, the status of this species on this Unit should be monitored closely. Any habitat management practices that may adversely affect this species should be addressed.* **Ongoing**

Wildlife Objective 4—Monitoring Other Wildlife Species

Annually identify and monitor important wildlife groups (e.g., pollinators, amphibians, reptiles, fish, and mammals) that occur on the Aransas NWRC.

Rationale: “Other wildlife” may be groups or species often not entrusted to the Service but to the State; they include endemic and local species that use existing or historic habitats. Some of these other wildlife groups or species are selected because they are sensitive to landscape-scale changes and may be uncommon or declining. Monitoring other wildlife species, relative to Federal trust species, ensures that management efforts for Federal trust species are not detrimental to other wildlife groups or species. Monitoring efforts should attempt to further knowledge of the resources on an ecosystem level.

Strategies:

- Monitor selected wildlife (e.g., amphibians, pollinators) as appropriate and when needed for management purposes, consistent with the principles of ecosystem management. **Ongoing**
- Summarize results of research and monitoring as these efforts are conducted on the Refuge for confirming and evaluating management practices and making needed adjustments. **Ongoing**
- Maintain accurate and current lists of species that occur on the Refuge. **Annually**
- Input new fish and wildlife survey data into the Refuge GIS database. **2011**
- Coordinate with TPWD on wildlife groups of State interest that occur on the Refuge such as game animals or State-listed species or wildlife groups. **Ongoing**

Wildlife Objective 5–Invasive and Exotic Species Management

By 2024, reduce the number of feral hogs to the point that five percent (5,797 acres) or less of the areal extent of the Refuge is affected by hog-rooting activities.

Rationale: Preventing the introduction and spread of invasive species is an ongoing and serious threat to native habitats and wildlife. Executive Order 13112 requires, among other things, that Federal agencies use relevant programs, authorities, and funds to monitor for, prevent, and control the spread of invasive species. The Refuge’s primary invasive and exotic wildlife species is the feral hog. The feral hog poses a significant threat to native habitats and other animal populations by directly damaging habitat, competing for resources, and predating native wildlife. Currently, about 54 percent of the Refuge’s areal extent or approximately 62,731 acres are affected by hog-rooting activities. Active hog control (i.e., specifically intensive population control) currently occurs on the Matagorda Island Unit only. Otherwise, hog control is essentially opportunistic or passive (i.e., taking feral hogs during public hunts or incidentally by staff). Efforts to control feral hogs need to be carried out over the entire Refuge Complex in a regular, systematic way for the benefit of many native species, including piping plover, Kemp’s ridley sea turtles, whooping cranes, and other wildlife.

Strategies:

- Review and update the Integrated Pest and Invasive Species Management Plan to address Refuge habitat needs and comply with Federal mandates and Service policy. The Integrated Pest and Invasive Species Management Plan includes strategies for surveying, mapping, monitoring, and controlling invasive species per existing budgets and staff. **Ongoing**
- Annually inventory feral hogs on each unit of the Refuge to determine effectiveness of control methods, conducted each year. This includes monitoring the areal extent of rooting, which is an indication of numbers of feral hogs. **Ongoing**
- Control feral hogs using approved methods each year, prioritizing units with the highest numbers of feral hogs or as determined by availability of control teams and logistics. **Ongoing**

- Partner with others, including adjacent landowners, TPWD, and USDA-Wildlife Services, to more effectively control exotic and invasive wildlife for the mutual benefit of the Refuge, stakeholders, and partners. **Ongoing**
- Monitor for and map other invasive and/or exotic species as indicated by an Integrated Pest and Invasive Species Management Plan. **Ongoing**

Wildlife Objective 6–Raptor Conservation

Periodically (i.e., every three years) evaluate the distribution and abundance of breeding and migratory/wintering raptors on the Refuge, with special attention to the white-tailed kite, crested caracara, white-tailed hawk, aplomado falcon, and great horned owl (breeders), and the northern harrier, peregrine falcon, and merlin (migrants/wintering) in order to understand long-term trends in their populations as they may relate to environmental changes and management practices on the Refuge.

Rationale: Raptors are well represented in the avifauna of Aransas NWRC, with some 25 recorded diurnal and 5 nocturnal species, and they deserve special consideration in the management decisions of the Refuge. Raptors are often among the first species of birds to show population responses to critical and sometimes subtle environmental changes that have long-term consequences if not detected and dealt with early (e.g., pesticide and other chemical pollution effects; lead poisoning; diseases such as West Nile virus; changes in abundance of prey populations; changes in habitat, as seen in horned owl increase with increase in woodlands; increased or decreased interspecific competition for nest sites; impacts of climate change on habitats; and direct human disturbances resulting from increased use and occupancy of the land).

The focal species chosen here are associated with a variety of different ecological relationships and trophic pathways in the coastal ecosystem so that they can potentially reveal environmental perturbations, or normality, in various ways and at different links within the community of organisms. The caracara, for instance, is a generalized feeder on carrion (including fish) and a variety of live reptiles, birds, and mammals. Three species are bird-feeding specialists (peregrine, merlin, aplomado falcon). The owl is a generalist nocturnal feeder on a variety of mammals and birds, and some reptiles; the white-tailed kite, harrier, and white-tailed hawk are basically rodent eaters but also feed on insects and occasional reptiles and birds. Three are rare or threatened (white-tailed kite, aplomado falcon, white-tailed hawk) and require special attention to their long-term populations, while three others (owl, peregrine, and caracara) have expansive, even invasive, characteristics.

Strategies:

- Establish permanent, standardized transects using existing roads and trails throughout the Refuge Complex for counting focal raptors twice during each survey year (April–June and October–December). Include nighttime periods for horned owls. **2012**
- Utilize highly qualified volunteers (bird-watchers, students) in cooperation with local Audubon Societies, universities, and other organizations to collect data for the seasonal surveys. **Ongoing**

- Record opportunistically or systematically the locations (GPS) of all discovered raptor nests and any other pertinent data on occupancy, eggs, young, etc. **Ongoing**
- Organize volunteer efforts to monitor fall migration of raptors on the Refuge. Once volunteers are organized, monitoring efforts will be conducted as needed. **Ongoing**
- Consult with Service and USGS experts and other cooperating organizations (Audubon Society, Cornell Laboratory of Ornithology, The Peregrine Fund, HawkWatch International, or Hawk Mountain Sanctuary Association) to establish reliable monitoring protocols and garner volunteer help. **Ongoing**
- Follow other relevant strategies itemized in Wildlife Objective 3. **Ongoing**

Wildlife Objective 7–Aplomado Falcon Conservation

Over the 15-year period of this CCP, the Refuge will meet the recovery objectives by maintaining suitable habitat on Matagorda Island for a minimum of 15 breeding territories and corresponding wintering areas for aplomado falcons.

Rationale: The aplomado falcon requires wide open expanses of grassland with scattered trees and shrubs and numerous small birds for its food. Historically, it especially favored tree yucca savannas. It was once fairly common and widespread in the “Wild Horse Prairie” of coastal Texas, possibly as far north as Calhoun County; but conversion to agriculture, urban industrialization, suburbanization, and invasive intrusion of shrub and tree cover into grasslands reduced or degraded its suitable living space, and the species virtually disappeared from Texas in the 1940s.

Today, remnants of suitable habitat (as demonstrated by the reestablishment of breeding falcons) can be found in the Brownsville and Laguna Atascosa NWR environs, mostly in patches adjacent to coastal marshes. Brush encroachment into these grassy areas is a constant problem requiring control because brush supports breeding populations of great horned owls. Continued anthropogenic development is another major problem. At inland locations, restored or re-created prairies are becoming more extensive, but they are usually too close to woodlands where the great horned owl is common. Re-occupancy of these areas by falcons is problematic unless they become much larger than they currently are or the owls become diminished in numbers.

Thus, the overall strategy for the recovery of a viable population of aplomado falcons in coastal Texas depends upon discovering and testing areas of habitat that can support nesting falcons, as was done on Matagorda Island, rather than attempting to repopulate the historically known range, most of which no longer exists in its original state and no longer has suitable habitat. So far, two such areas are known, the Laguna Atascosa NWR and environs, and Matagorda Island and its close neighbor, San Jose Island. With skillful management, these two core areas should be able to support “source populations” that can produce surplus birds that will disperse up and down the coast and eventually establish connecting pairs on other barrier islands, such as Mustang, North and South Padre Islands, and possibly at some mainland locations as well. Falcons from Matagorda Island may also disperse up the coast to occupy other refuges in the Galveston Bay region and on the Chenier Plain. In the distant future, if prairie habitat becomes restored on a large scale in inland areas, falcons from the coast might

well disperse and establish breeding pairs there, too—that is, if small bird populations become abundant and owls become scarce because of habitat changes.

Strategies:

- Conduct, in cooperation with The Peregrine Fund, a pre-nesting season examination of all known nest sites (especially artificial nest structures), and make any needed repairs or replacements of old stick nests. Check for potential occupancy by caracaras and white-tailed hawks. **Ongoing**
- Partner with The Peregrine Fund to count annually all breeding aplomado falcons on Matagorda Island, including a description and location (GPS) of their nests during the period of incubation. Carry out a second survey at the time young are fledging to determine productivity. **Ongoing**
- Conduct, in cooperation with The Peregrine Fund, every two to three years in April and November, transect or point count surveys of small bird abundance in representative areas of the aplomado falcons' foraging range. **2011**
- Identify and rank, as part of the larger strategy to preserve and restore open grassland ecosystems along the Texas coast and in cooperation with The Peregrine Fund and others, potential habitat for aplomado falcons outside the Refuge Complex for protection through arrangements such as landowner incentives, conservation easements, and purchases. **Ongoing**
- Protect all known nest sites of aplomado falcons and other raptors from damage by fire during controlled burns (or natural fires as much as possible) by mowing, plowing, and back-firing around nests when necessary. **Ongoing**
- Emphasize outreach on the need to preserve and restore grassland habitats that can support aplomado falcons. It should be directed toward land developers, city planners, industries that require large landholdings, and private landowners to increase awareness of and appreciation for the aplomado falcon as a unique symbol of the Texas coastal prairie country. **Ongoing**

Wildlife Objective 8—Whooping Crane Conservation

Over the term of this Plan, the Refuge will meet recovery objectives and whooping crane wintering needs by increasing the number of overwintering territories from approximately 72 to 130 by 2024.

Rationale: Whooping crane conservation is specifically part of Refuge purposes, and much of the Refuge is designated critical wintering habitat for the whooping crane (43 FR 20938). According to the Texas Parks and Wildlife Department (TPWD) Strategic Plan (2003–2007), human population growth is expected to increase approximately 1.4 percent annually in the coming years and will “...place increasing pressure on the state’s water and other natural resources...” In addition, “...there will be less open space and fish, wildlife, and their natural habitats will suffer.” Consistent with this trend, rapid development activities in the Texas Coastal Bend in and near the Refuge threaten the extent and availability of suitable whooping crane wintering habitat. To address the needs of the expanding whooping crane population, additional habitat must be protected through a variety of conservation methods and through

public awareness and support. There are currently 72 winter territories (72 winter territories with 144 adult birds, amounting to 266 total current population). Based on past history, the whooping crane population is expected to double in size every 20 years, so by 2024, it is estimated that up to 130 territories may be present (130 territories with 260 adults, amounting to 520 total population). *Note: Normally, the number of territories is multiplied by four to give a rough estimate of total flock size.*

Strategies:

- Annually monitor whooping crane use patterns on and near the Refuge and map, using GIS by 2010, all occupied and potential use areas for the cranes. **Ongoing**
- Continue to maintain a Wildlife Biologist position specializing in whooping cranes at Aransas NWRC. *Note: This is a key position that is essential to the field, near the crane's critical wintering habitat, to more effectively address pertinent issues and to respond more rapidly to potential impacts.* **Ongoing**
- Continue to work with the Guadalupe-Blanco River Authority and State partners (e.g., TPWD and TCEQ) to ensure adequate fresh water inflows into San Antonio Bay for the benefit of whooping cranes and their food supply. **Ongoing**
- Continue to monitor the status of whooping cranes and revise aerial census protocol to determine population expansion into new areas that may need additional protection (e.g., through land protection measures or partnerships). **Ongoing**
- Identify and prioritize whooping crane habitat outside of the Refuge for protection through appropriate mechanisms such as landowner incentives, conservation easements, and acquisition from willing sellers. Any future acquisitions outside the Refuge boundaries would be accomplished under an approved Land Protection Plan, which will be developed as a Comprehensive Conservation Plan step-down plan within five years of Plan implementation (*see Figures 3-8 and Figure 5-1*). *Note: The pace of coastal development has made urgent the need to identify and prioritize remaining whooping crane habitat for protection in order to support important recovery objectives.* **Ongoing**
- Revise critical habitat area boundaries necessary to support whooping crane recovery objectives (See Figure 5-1). **2015**
- Continue to monitor and repair, or manage for erosion of, whooping crane habitat resulting from Gulf Intracoastal Waterway (GIWW) commercial barge and boat traffic. Continue to partner with the U.S. Army Corps of Engineers to accomplish this strategy. Work closely with the Corps to implement their 50-year Dredge Material Placement Plan that includes beneficial use of dredged material (marsh creation) projects to benefit the whooping crane. *Note: Reticulated matting, as used in the past, should be an ongoing habitat protection mechanism to address erosion of any additional banks that are adjacent to whooping crane use areas.* **Ongoing**
- Continue to work with oil and gas companies to limit or eliminate potential adverse impacts or disturbance to wintering cranes during the course of their activities. *Note: Currently, limiting activities to April 15–October 15 has been successful and acceptable to most oil and gas companies.* **Ongoing**

- Coordinate with the Corpus Christi Ecological Services Field Office on data collection, research, and monitoring of activities, projects, or developments (e.g., wind farms or other coastal developments, airboat use, boating access points) that may adversely affect whooping cranes. **Ongoing**
- Outreach efforts will emphasize the need to preserve existing habitat that can support whooping cranes. This would include an outreach plan geared toward real estate developers, city planners, and private landowners to increase awareness and consideration for whooping cranes. **Ongoing**
- Seasonally post signs and limit access to minimize or eliminate disturbance to whooping cranes at certain sites frequented by the cranes (e.g., airboat use and boating access points in sensitive areas). Over time, monitor changing levels of disturbance in key areas. *Note: Increased development of the Texas Coastal Bend has also resulted in an increase in recreational boating and use of the local bays and estuaries where whooping cranes occur.* **Ongoing**
- Work in partnership with agencies such as the TPWD and the Texas General Land Office (GLO) to address the issue of commercial crabbing on Refuge lands. Identify potential sites that may need to be designated off-limits to crabbing activities for the benefit of whooping cranes. This includes the development and installation of appropriate Refuge closure signs or other signs (as needed) to inform the public of Refuge regulations and posted areas that may be closed to certain uses (e.g., commercial crabbing) to protect whooping cranes. Initiate new Refuge crab transect monitoring protocol by 2011. **Rationale:** Currently, crabbing is specifically prohibited in any Refuge marshes, including Matagorda Island (50 CFR, Part 32.63). However, additional areas along or near Refuge boundaries within State waters may need to be seasonally or temporarily closed to commercial crabbing to protect whooping cranes. **Ongoing**
- Continue existing efforts with the Law Enforcement Division of TPWD to clean up crab traps during the annual winter closure (usually each February–early March) for the benefit of Federal trust species such as whooping cranes. **Ongoing**
- Work with GLO and TPWD to utilize more effectively cross-easement management options in maintaining and managing State lands open to hunting on Matagorda Island, including the bayside sloughs, marshes, and flats utilized by whooping cranes. **Rationale:** The 1994 MOA and Coastal Public Lands Lease (see Appendix F) provided cross-jurisdictional management of State and Federal lands on Matagorda Island, consistent with Paragraphs 6 and 14. This involves utilizing these documents to their fullest potential in meeting important wildlife resource needs. **Ongoing**
- Continue to meet whooping crane wintering needs through appropriate management activities. These management activities may include 1) strategic, prescribed burns to help meet whooping crane nutritional requirements; 2) providing supplemental feeding; 3) providing access to freshwater for drinking (e.g., clearing vegetation in and/or around “dugouts” or windmill ponds, or renovating or creating additional dugouts or ponds); and 4) informing and providing technical assistance to landowners or other interested groups regarding whooping crane conservation. **Rationale:** During times of winter stress (e.g., droughts, low availability of natural foods, or lack of

freshwater inflows) while on wintering grounds, management activities may include providing supplemental feeding, additional prescribed burns, or meeting other needs.

Ongoing

- Explore and consult with the Service's Division of Law Enforcement, DOI Solicitor's Office, and State partners to provide additional protection and minimize disturbance to whooping cranes through revision of waterfowl hunting and fishing opportunities within whooping crane use areas. Any revisions should be reflected in regulations found at 50 CFR, Part 32.63 (Refuge-specific regulations for hunting and fishing), or 50 CFR, Part 32.8 (Areas closed to hunting). **2013. *Rationale:*** The hunting and fishing regulations for Aransas NWRC need to be clarified further to reflect goals and objectives of the Plan.



Whooping crane in flight. Photo: Steve Sykes

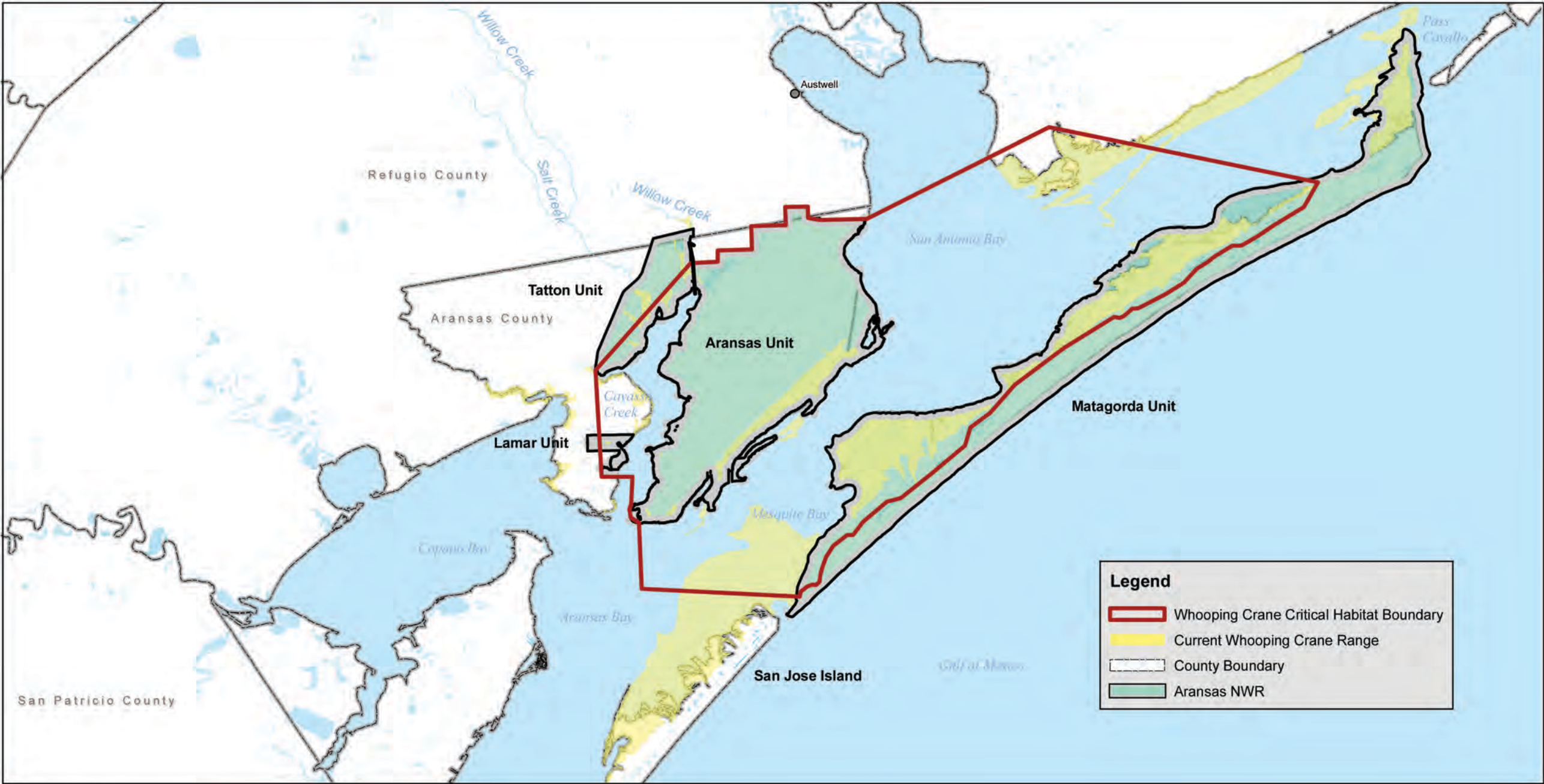


U.S. Fish & Wildlife Service

Aransas National Wildlife Refuge

Aransas, Calhoun, & Refugio Counties, Texas

Figure 5-1. Whooping Crane Critical Habitat Boundary



PRODUCED IN THE DIVISION OF REFUGE PLANNING
ALBUQUERQUE, NEW MEXICO
LAND STATUS CURRENT TO: 8/17/09
MAP DATE: 5/25/10
BASEMAP: N/A
MERIDIAN: N/A
FILE: lit_maptitle

Figure 5-1. Whooping Crane Critical Habitat Boundary

5.3 *Habitat Goal, Objectives, and Strategies*

Habitat Goal:

To protect, restore, and maintain the prominent features within the Texas Gulf Coast Ecosystem, which include blackland coastal prairie, wetlands, coastal woodlands, barrier island, and tidal and estuary habitats on and near the Refuge while controlling the spread of invasive or exotic plants. The following habitat objectives were determined by the blending of Service and Refuge System policy, Refuge purposes, experience, professional judgment, available science, and management principles. This is better defined and summarized by the following list of prevailing professional judgment, information, and principles:

Policy and Purposes

- Keeping at the forefront, the Refuge is managed according to the intent and aspirations of the U.S. Fish and Wildlife Service mission, Refuge System mission, Refuge System goals, Refuge purposes, and relevant policy and legal mandates.
- The Refuge considers strategies and information contained in the Texas Comprehensive Wildlife Conservation Strategy (2005–2010).

Guiding Management Principles and Professional Judgment

The Refuge:

- Considers Refuge lands in context with adjacent lands and wetlands (private and State) together at the ecosystem level, as parts of the whole and not as disjunct independent units existing unto themselves.
- Uses sound professional judgment, adaptive resource management principles, and applied ecology.
- Considers its land management practices, knowing that a variety of landscape activities and uses have occurred since the early 1900s that have caused the Aransas Unit to become more overgrown with running live oak, a native plant with invasive characteristics. In the process, a new steady vegetative state was created; one that shifted from a mix of oak motte/woodland and grassland to that of more woodland (in various stages of growth) and less grassland.
- Realizes that the pre-Plan objective to restore “original habitats” by reducing the amount of running live oak is still a valid starting point from which to begin habitat management but with different strategies in mind and recognizing additional valid habitat objectives.
- Moves away from attempts to restore or manage habitat based on personal opinions or ideas and moves toward an emphasis on sound science and accepted, applied ecological principles to determine the appropriate course of action and sticking with it, making only needed changes.
- Adjusts habitat management acreage (quantity) and expectations (quality) to practical levels, at suitable locations, based on geology, soil types, and capabilities (range site), physiography, topography, and cost-effectiveness, while considering past land use and practices that created the current vegetative steady states.

- Works to preserve and maintain natural habitats (vegetative communities) that benefit the greatest natural variety of Federal trust and the ecoregional resource priority species and concerns of the Service and State Partners.
- Manages at the ecosystem level through protection, restoration, and good habitat management practices that allow species to take care of themselves rather than emphasize active wildlife management or single species management. This includes a shift to a broader management focus to take into account important species groups such as pollinators, which play an important role in sustainable ecosystems.
- Considers Refuge unit capabilities and logistics in devising habitat management objectives with an eye to the future, as coastal lands become increasingly developed and Refuge lands become more valuable as real estate and as wildlife habitat.
- Describes a level of habitat management in this Plan that requires the capability of coordinating various Refuge programs to accomplish the entire suite of habitat management objectives.
- Realizes that habitat management excellence is not a destination but a continuous process requiring commitment, discipline, and knowledge of the resource.

Experience, Science, and Applied Ecology

- Experience has shown us that roller-chopping and burning is a short-term treatment in managing running live oak, as it only “top kills” live oak brush. Although areas roller-chopped and then burned have shown an interim dramatic increase in grasses and forbs, overall ecological impacts have not been well documented. For example, is the Refuge losing naturally associated woody species variety and thereby promoting monocultures of live oak over the long run? This has been the documented response with other woody associations in south Texas and the apparent recurrent theme locally. The running live oak soon returns and is the dominant vegetative community. In rangeland ecology, this is an indication of a steady state—that state to which the vegetative community returns regardless of all but the most drastic treatments.
- Plant physiology tells us that the running live oak stage is a survival adaptation to the removal of the dominant apical meristem (growing point) that otherwise produces a tree with a single trunk if left undisturbed. However, if the apical meristem is removed or disturbed through grazing, mowing, seismic clearing, roller-chopping, or fire, auxiliary meristems are activated and growth and development of the characteristic multi-stemmed “running” live oak habitat results. This response is natural and can be seen locally.
- Repeated widespread activities on the landscape through time have produced more and more of this survival response (multi-stemmed growth) in live oak, keeping it in a perpetual state, and showing one characteristic for the name “running live oak.” For this reason, maintaining and promoting a natural mosaic of mature oak tree mottes/woodland and grassland on the Aransas Unit is a habitat objective that precludes running live oak habitat and will require employing different strategies to achieve.
- Running live oak and wildfire have the potential, due to fuel buildup, to take out large areas including currently desirable mature oak mottes/woodland. Hence, some management of running live oak is required.

- Strive to work in concert with natural processes. Fine-tune our approach to develop the proper timing for management activities. Without some management, particularly during dry periods, woody encroachment of the grassy swales does occur. On the other hand, during wet periods, the grassy swales hold water and keep woody encroachment at bay.
- It is apparent, in certain aged stands of running live oak, that they do continue to grow and in due time will become mature stands of live oak trees (e.g., oak mottes). This can be seen in the characteristic “dome-top” outline and a gradual reduction in stem density. This natural stand thinning and growth can be used in the right situation as a management option (e.g., the option of allowing natural stand development versus manipulation or treatment).
- Field experience and knowledge of the Refuge vegetative resources, and discussion of the seasonal and life requirements of various key groups of wildlife (e.g., migratory birds, resident wildlife, and threatened and endangered species) were instrumental in delineating natural habitats, determining sensible proportions to be managed, and habitat management objectives.
- It is very difficult to control prescribed fires in interior portions of the Aransas Unit. Escaped fires could potentially cause more harm than doing no management at all. Inherently, that is a risk one assumes in certain habitat management situations. It is generally believed that stand replacement fires were part of the original natural processes that shaped the area. These types of fires probably occurred in the past, and the oak woodlands undoubtedly returned. Thus, habitat management on the Refuge Complex should consist of a combination of treatments—or no treatment—depending upon the prevailing environmental conditions, experience, current knowledge, and wildlife needs.

Table 5-1. Aransas NWRC Habitat Management Designations

Habitat Management	Acreage	% of Complex	% of Peninsula
Coastal Prairie	40,792	35.3	2.6
Savannah	15,746	13.6	33.3
Woodland (No treatment)	13,019	11.3	27.3
Upland Mosaic (Reserved treatment)	10,319	8.9	21.8
MFW Impoundments (Moist Soils)	1,440	1.2	--
Marsh, low-lying area, and spoil islands	24,253	20.9	--
Gulf Beach and Dunes	2,881	2.5	--
Water bodies and open marsh	7,220	6.2	4.9
<i>Totals</i>	115,670	100.0	85.0

Habitat management designations and acreages are listed in Table 5-1. Prior to this planning process, some of the habitat land management designations were not clearly defined nor written—and thus shifted over time. The redesigned Habitat Management Plan simply designates the given areas more clearly and provides supporting rationales. The general habitat plan outlined in the table considers the entire land area of the Aransas NWRC and attempts to achieve a realistic mix of habitat types based on historic

information, soils, range sites, past management experience and decisions, current wildlife needs, and future needs.

Often, historic descriptions of the Texas coastal prairie are descriptive of this larger ecological region. This larger area, comprised mostly of the dark rich soils that once supported the true prairie, is today under cultivation or other development. Few descriptions are specific to the sandy peninsulas, and those offered for the Blackjack Peninsula have a noteworthy woody component. On the other hand, the Refuge supports key species of the Texas coastal prairie such as big bluestem, switchgrass, seacoast bluestem, and indiangrass, with the exception of eastern gamma grass. It follows logically that the original mix of woodland to grassland in the larger Texas coastal prairie ecological region may not be duplicated again. Locally, on Refuge lands, the original mosaic of woodland to grassland may not be necessarily duplicated either, but a sensible mix of habitats meeting current and future wildlife needs can be achieved.

Currently, the whooping crane management units on the Blackjack Peninsula and the open country found on the remainder of the Refuge Complex (Matagorda Island, Tatton, and Myrtle Foester Whitmire Units) and the many non-wooded swales throughout the Peninsula (about three-quarters of the Refuge Complex) could be managed as savannah and coastal prairie habitat. This area allows for the natural expression of native grasses and forbs while providing ample mast (acorns and wolfberries) for whooping cranes. This mix of vegetation is generally considered indicative of very good habitat management, and this area as a whole will continue to provide current and future wildlife needs of endangered species, grassland species of concern, waterfowl, shorebirds, and other wildlife.

The remainder of the Refuge (approximately one-fourth), influenced by range site, past management practices, public uses, and currently unidentified future wildlife habitat needs, will remain mostly unmanaged to provide habitat for woodland species. Some of the woodlands will be administered with a research and/or species-specific emphasis, while other portions will not be actively managed at all. This area is to meet the current and future habitat requirements for Neotropical migrants, woodland species of concern, and other wildlife.

Using GIS technology, soil types were mapped and combined into similar soil types, and Refuge units were generally divided into their respective range sites. In those areas where past land use and practices have created new vegetative steady states, the best land management practices available were recommended given the considerations above. For the most part, in those areas where habitat conditions are near optimal, a continuation of current habitat management practices was recommended. GIS technology will continue to be used to map and monitor habitat restoration and management activities (see Table 5-2 and Figure 5-2).

Table 5-2. *Habitat Types for Migratory Program and Focal Bird Species*

Migratory Bird Program and Focal Species	Coastal Prairie	Savannah	Woodland (No Treatment)	Upland Mosaic (Reserved Treatment)	MFW Impoundments (Moist Soils)	Salt Marshes/ Tidal Flats	Gulf Beach/ Dunes
Whooping Crane		X				X	
Aplomado Falcon	X	X					
Mottled Duck	X				X		
Piping Plover						X	X
Loggerhead Shrike	X	X					
Painted Bunting		X		X			
Yellow-billed Cuckoo			X	X			
Swainson's Warbler			X	X			
Seaside Sparrow	X					X	

Habitat Objective 1—Coastal Savannah and Prairie Habitat

Over the term of this Plan, meet current and future wildlife habitat needs of the whooping crane, priority grassland bird species, and other prairie wildlife by using fire primarily to mimic natural processes. Preserve the only true remnant of low upland coastal prairie (Tatton Unit 7,548 acres), and maintain the only barrier island sandy prairie (Matagorda Island 30,000 acres) found on the Refuge. Maintain and/or restore degraded low upland prairie (1,244 acres) and sandy live oak savannah (15,746 acres) on the Blackjack Peninsula, and restore degraded low upland prairie habitat (approximately 2,000 acres) on Myrtle Foester Whitmire Unit, for the combined targeted total of 53,636 acres of coastal savannah and prairie habitat. This would provide approximately 48.9 percent of the Refuge Complex as a grassland type.

Rationale: Currently the Tatton and Matagorda Island Units are natural grasslands in relatively good shape and are in fire maintenance habitat management regimes. Collectively, they comprise 70 percent of the Refuge grasslands. On the Blackjack Peninsula and the Myrtle Foester Whitmire Unit, the combined 3,244 acres of low upland prairie are in need of restoration, and much of the 12,844 acres of sandy live oak savannah is currently under a fire management regime. This means that about 30 percent of the Refuge is (or should be) in an active grassland habitat management mode. However, of this 30 percent, about 6,422 acres is well underway and actively managed and maintained for the benefit of whooping cranes, which use the eastern shore of Blackjack Peninsula. Maintenance and restoration are

ongoing processes where restoration acres are gradually being added to maintenance acres, as ideal burning conditions and situations allow. In some years, high rainfall amounts, staffing constraints, or other distractions may slow the restoration process with some acreage reverting back to brush. Therefore, areas to be grasslands should be clearly defined from those that are not, and maintained accordingly. Secondly, there is a need to keep focused on maintaining continual restorative operations on designated areas to prevent acreages from reverting.

On Matagorda Island, there are many benefits to using larger burn units. The primary benefits of larger burn units include fewer, but strategically timed burns to maximize the control of smoke and the control of woody invasives over a wider area. This provides increased benefits to migratory birds, particularly whooping cranes, but most importantly, for the maintenance of coastal prairie. The creation and maintenance of fewer firebreaks, regularly maintained, can also be beneficial to other wildlife (e.g., Texas horned lizards, coachwhips, and prairie racerunners). Larger burn units increase cost effectiveness by reducing per acre management costs, given the logistics associated with accessing Matagorda Island. It costs about the same to burn a small unit as it does a larger unit. Ecologically, larger prescribed burns more closely mimic natural landscape processes, and fewer firebreaks means less disturbance and opportunity for the establishment of invasive plants. Fire damage to private property is not an issue on the Island.

In the case of unplanned fires, the Refuge will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions. Some unplanned fires would be allowed to burn if deemed beneficial and meeting prescription burn objectives. Environmental conditions and hazards would dictate the extent of control, if any. With larger units, the distance between firebreaks is more conducive to allowing fire crews adequate response time to get on site, assess the situation, and proceed with determined control measures.

Strategies:

- Fire, as a means of mimicking natural processes, will be the primary tool to restore and maintain grassland habitats. **Ongoing**
- Continue to use prescribed fire to enhance habitats for whooping cranes, which improves the availability of acorns and small vertebrates and invertebrates during the winter season. *Note: due to the importance of the Refuge as critical wintering habitat for the whooping crane, ongoing habitat management for these cranes will continue to be a major emphasis on Blackjack Peninsula and Matagorda Island.* **Ongoing**
- The reduction of live oak brush (defined as oak less than or equal to 10 feet in height with a diameter at breast height of six inches or less) should occur through a combination of mechanical roller-chopping and fire. Roller-chopping should be conducted in a manner to preserve biological and plant diversity wherever it may be found (e.g., unique associations or patches of anacua, mesquite, limeash, farkleberry, wax myrtle, persimmon, tickletongue, tanglewood, sweetbay, or palmetto). The primary exception to roller-chopping and fire in this area will be designated large trees, mottes, and woodlands, which will be preserved. **Ongoing**

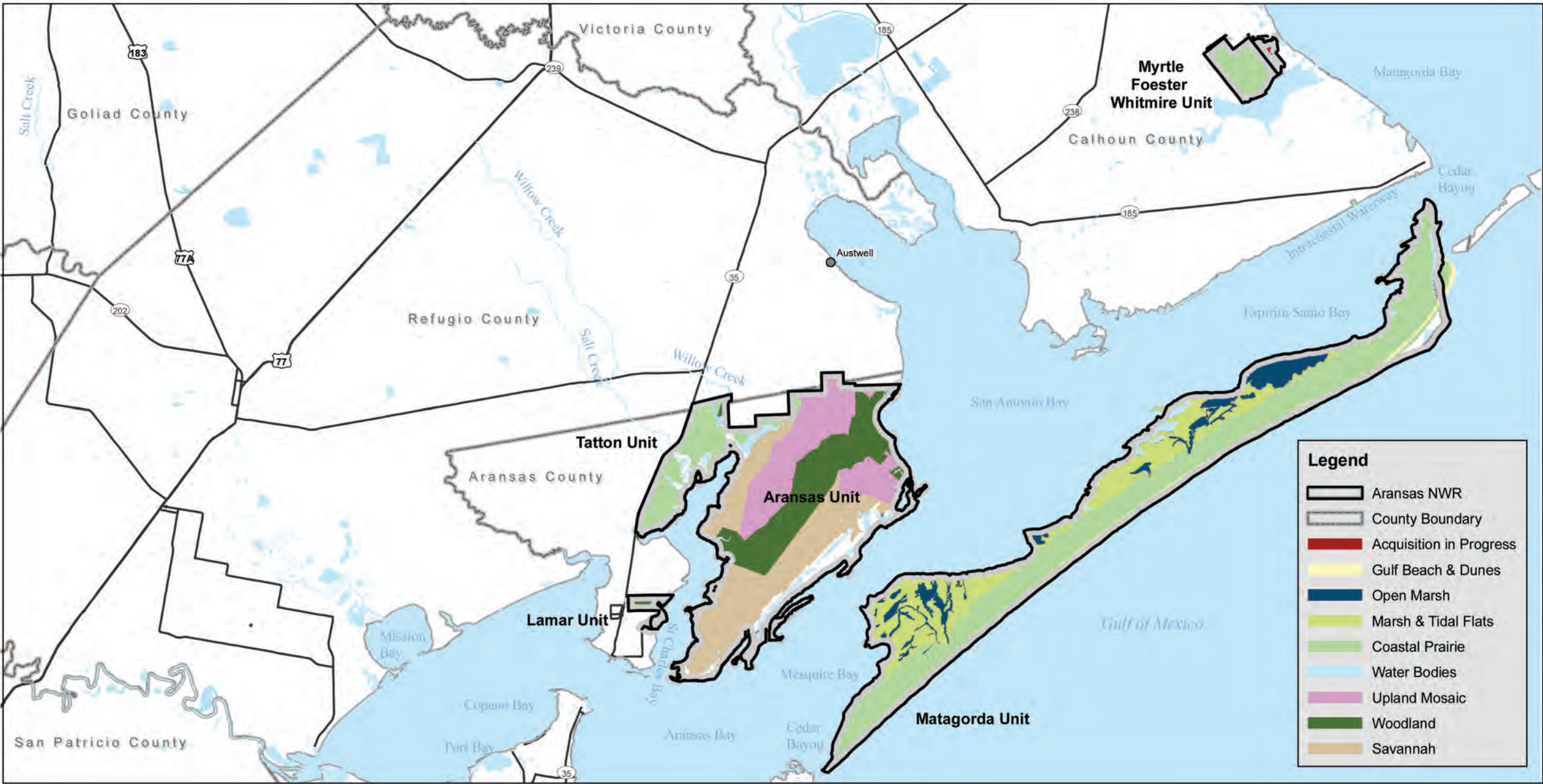


U.S. Fish & Wildlife Service

Aransas National Wildlife Refuge

Aransas, Calhoun, & Refugio Counties, Texas

Figure 5-2. Plan Habitat Management Areas



PRODUCED IN THE DIVISION OF REFUGE PLANNING
ALBUQUERQUE, NEW MEXICO
LAND STATUS CURRENT TO: 8/17/09
MAP DATE:
BASEMAP: N/A
MERIDIAN: N/A
FILE: lit_maptitle

Figure 5-2. Plan Habitat Management Areas

- Restoration efforts should be enhanced with the use of planting or sprigging native grasses where required. **Ongoing**
- Invasive species and native species with invasive characteristics (e.g., *Baccharis*, live oak, and mesquite) will be controlled through the use of approved herbicides. Spot treatment of running live oak would also be considered. **Ongoing**
- The habitats of Matagorda Island, containing the largest contiguous grassland of the Refuge Complex and most logistically taxing to access, are actually the easiest to manage. As part of the savannah and coastal prairie habitat designation, greater efficiency, cost effectiveness, and ecological benefits can be realized by creating larger burn units on the Island. A total of 14 units ranging in size from 2,500–5,000 acres and up, to approximately five miles in length, would create landscape size burns to better mimic natural processes without compromising habitat management goals and objectives. **Ongoing**
- Complete a Habitat Management Plan with an associated species-level GIS vegetation map, a step-down plan of the Comprehensive Conservation Plan by **2013**.

Habitat Objective 2–Woodland Habitat

Over the term of this Plan, meet current and future wildlife habitat needs of Neotropical migrants (fallout, foraging, and overwintering habitat), nesting passerines, priority species, pollinators, and other wildlife by preserving coastal woodland habitat on the Blackjack Peninsula (12,088 acres), Tatton (98 acres), Matagorda Island (approximately 100 acres), and Lamar Units (733 acres) with the intent of maintaining the biological integrity, natural diversity, woodland productivity, and environmental health of the Refuge—for a combined total of 12,919 acres or about 11.2 percent of the entire Complex.

Rationale: Designating areas that will not be mechanically treated is intended primarily to provide greater habitat diversity for all forms of migratory birds and other wildlife that are woodland-dependent. In addition, designating zones helps to focus already limited staffing and funding toward accomplishing other important Refuge objectives. Designated zones also help to reduce the confounding effect of habitat management decisions or directions inherent with each change in management staff to avoid impacts to this habitat or ecological setbacks. Ecologically, reducing active mechanical manipulations will help cut the vicious cycle of recurring shrubby growth and reduce the tendency toward ecosystem simplification (live oak monocultures) by maintaining and allowing natural floristic variety.

Strategies:

- Prescribed burns will occur as designated in the Fire Management Plan. **Ongoing**
- Control or eradication of invasive plants with approved herbicides will continue. **Ongoing**
- Firebreaks will be used along existing roads to contain and/or exclude wildfire. Firebreaks will also promote wildlife viewing within the visitor and/or public use area along roads and reduce fire hazards during road maintenance. **Ongoing**
- Complete a Habitat Management Plan with an associated species-level GIS vegetation map, a step-down plan of the Comprehensive Conservation Plan by **2013**.

Habitat Objective 3–Peninsular Upland Mosaic Habitat

The area designated as Peninsular Upland Mosaic habitat encompasses 10,319 acres or 21.8 percent of the Blackjack Peninsula and 8.9 percent of the Refuge Complex. During the next 15 years, brush management efforts will be focused on the entire Peninsular Upland Mosaic habitat acreage where running live oak exists to enhance existing natural prairie openings created by natural ridge and swale topography. The objective is to achieve a patchwork of prairie openings with interconnected woodlands that facilitate wildlife use and movement and provide as near optimal habitat as possible based on soils, plant and animal species mix, and historical evidence. With the exception of the immediate coastline (about ½ to ¾ mile from the water), this habitat mosaic is probably what the peninsula looked like, as described in the historical habitat descriptions of the area by early botanists, given all factors (biotic, abiotic, and physical).

Rationale: The composition of the vegetation before human settlement is irrelevant to current and future wildlife needs and management. The current stable state of the vegetation in the sandy soils of the peninsula is a mix of live oak woodland and grassy swales. Additionally, historic and background information do not describe a vast open prairie on the Blackjack Peninsula. Instead, the peninsula is described with a prominent woody component in the habitat mix. This area, with its higher rainfall regime, has always exhibited a transitional element between grassland and wooded communities. There are two options: 1) leave it alone; or 2), manipulate it (to which there are varying degrees).

Over time, various tools, techniques, and burning have been used in the area. These activities included livestock production, habitat management, and oil and gas exploration and production. The tools used by the Refuge have included roller-chopping, shredding/mowing, bulldozing, and fire to create openings. Increasingly, research has shown that the result of repeated mechanical manipulation is lower woody plant species diversity, reduced richness, lower beta species (co-dominant species) diversity, and ingress of invasive or exotic plants. Fire on the Blackjack Peninsula generally results in greater live oak sprout density before natural thinning to pre-burn levels occurs, and it kills larger trees, which in turn stimulates more running live oak if not properly managed. Mechanical manipulation increases live oak sprout densities by stimulating subdominant meristems to grow upon removal of the dominant apical meristem. The result is greater acreage in monocultures of running live oak thickets that are denser and less valuable for wildlife. These running live oak thickets, in time, will undergo repeat treatments to “maintain” the expected or perceived treatment effect. What results primarily is a cycle of simply and temporarily altering thicket height.

Modest and concentrated habitat manipulation appears to be the best approach. Designating manipulated areas and areas that will never be manipulated (non-manipulated) sets the bounds between what to manage and what not to manage. Brush management will then be focused on areas of running live oak to enhance existing natural prairie openings due to the ridge and swale topography. The result will be a patchwork of prairie openings with an interconnected woodland that facilitates wildlife use and movement; it would provide as near optimal habitat as possible. This is not to be confused with managing to achieve maximal “edge effect.” Rather, it is to mimic what once existed: a natural mosaic of prairie openings and woodland created by the ridge and swale topography. The size of the openings will vary according to the “lay of the land” and, in a few cases, to meet specific wildlife needs. The primary shift in habitat management emphasis is from whole-scale (quantity) to a finer-scale (quality). The mistake most prone to be made in the past was the treatment of more acreage than could be afforded to properly maintain.

Strategies:

- Shift habitat management emphasis from quantity to quality, and avoid treating more acreage than the Refuge can afford to properly maintain. **Ongoing**
- Strive to mimic and maintain the characteristic habitat pattern found on the landscape, which closely follows soil characteristics as influenced by the ridge and swale topography and moisture gradients. Achievement of this pattern will determine the natural extent of grassland and woodland. **Ongoing**
- Determine the optimal size area for management treatment and the right assortment or combination of tools needed to maintain a natural mosaic of grass and woody vegetation. **Ongoing**
- Use fire as a primary tool to mimic natural processes in the manipulated areas to maintain and restore grassland habitats and reduce the encroachment of running live oak onto grassy swales. Employ the decision support process to unplanned ignition (wildfire) in the manipulated area per the Fire Management Plan. **Ongoing**
- Employ the decision support process to unplanned ignition (wildfire) in non-manipulated areas. Fire suppression tactics, provided it is safe to do so, will be initiated in case of wildfire. **Ongoing**
- Use a combination of herbicide spot treatments, prescribed fire, and mechanical removal to reduce or eliminate running live oak brush thickets, as needed. **Ongoing**
- Spot or area treatments of running live oak, regardless of the tools, should be the norm as opposed to whole scale unit treatment. **Ongoing**
- Mechanical and herbicide treatments should be conducted in a manner as to preserve biological and plant diversity wherever it occurs (e.g., unique associations or patches of anacua, mesquite, limeash, farkleberry, wax myrtle, persimmon, tickletongue, tanglewood, sweetbay, or palmetto). **Ongoing**
- Minimize or discontinue activities or actions, including well-intentioned habitat management actions, that tend to create more running live oak thickets. Commercial activities such as oil and gas exploratory activities should be more carefully monitored for vegetation impacts and modified if needed through special use permitting. **Ongoing**
- Restoration efforts should be enhanced with the use of planting or sprigging native grasses where required. **Ongoing**
- Control and eradicate invasive plants with approved herbicides. **Ongoing**
- Complete a Habitat Management Plan with an associated species-level GIS vegetation map, a step-down plan of the Comprehensive Conservation Plan by 2013.

Habitat Objective 4–Moist Soil/Secondary Rice Crop Habitat

Annually over the next 15 years, primary emphasis is to be placed on developing and maintaining suitable production, feeding, loafing, roosting, and overwintering habitat (100 acres

approximately) for migrating and wintering waterfowl, shorebirds, marsh birds, wading birds, and endangered species where appropriate.

Rationale: The intent is to provide nesting and rearing habitat for the mottled duck and other priority species, where appropriate. In addition, these habitats are suitable for use by whooping cranes as the population expands.

Strategies:

- Monitor Moist Soil/Secondary Rice Crop habitats during the winter season for whooping crane use and, if necessary, adjust habitat management practices accordingly. **Ongoing**
- Monitor mottled duck use of Moist Soil/Secondary Rice Crop habitats and adjust management practices accordingly to benefit this Refuge focal species. **Ongoing**
- Impoundments/moist soil management will include the use of prescribed fire, disking, mowing, and herbicides where applicable. Employ the decision support process to unplanned ignition (wildfire) per the Fire Management Plan. **Ongoing**
- Annual monitoring of impoundments will be conducted to determine vegetative and wildlife response to management decisions and for making required future adjustments. **Ongoing**
- Focus management concerns for shallow lake and natural freshwater marsh habitat on maintaining hydrology, controlling or preventing the spread of invasive plant species, prescribed burning, and monitoring overall health. **Ongoing**
- Set Foester Lake outlet structure at an established level to ensure minimum flow for the benefit of the nearby salt marsh. Representatives of the ALCOA Company are required to monitor the newly created marsh for the first five years, beginning in 2006, to ensure its success. The ALCOA marsh will be donated to the Refuge pending title clearances. The Refuge will work with the Company to ensure all management objectives are met for the marsh and Foester Lake (see Habitat Objective 6).
- Seasonally, wet prairie areas need to be further identified for size, vegetation, and management treatments to include water management, prescribed fire, mechanical or herbicide treatments (Prairie Section). **Ongoing**
- Restore remaining low upland prairie habitat on the Myrtle Foester Whitmire Unit (about 2,000 acres) by 2014. Reclaim the old rice farming infrastructure such as irrigation canals, rice levees, and ditches to establish natural drainage patterns and encourage the growth of native grasses over the next 15 years. **Ongoing**
- Use native seeds from other Refuge units to promote native grass establishment on the Myrtle Foester Whitmire Unit on about 50 acres per year. Additionally, control or manage invasive woody vegetation such as Macartney rose, and invader plants such as mesquite and eastern baccharis, to benefit prairie restoration (Prairie Section). **Ongoing**
- Locate a cooperator to bale and deliver native grass seed or purchase bulk seed for the Myrtle Foester Whitmire Unit. **Ongoing**

- Complete a Habitat Management Plan with an associated species-level GIS vegetation map, a step-down plan of the Comprehensive Conservation Plan by **2013**.
- Pursue the purchase of water rights as they become available and as the Refuge is able. **Ongoing**

Habitat Objective 5–Gulf Beach and Dune Habitat:

Over the term of this Plan, continue to protect and preserve the Gulf Beach and Dune habitat on the Refuge Complex (Matagorda Island) for the primary benefit of threatened and endangered species (e.g., sea turtles, piping plovers, brown pelican), migratory birds, and other wildlife, but also to serve as the primary buffer protecting the landward areas of the Island, bays, and the mainland from the full impact of storm surges and hurricanes.

Rationale: Little or no direct habitat management is needed of this habitat type. This habitat type is best left to the ebb and flow of nature. Management of public uses, damage by invasive and exotic species (e.g., feral hogs), and the accumulation of trash and debris is necessary to protect and preserve Gulf beach and dune habitats on Matagorda Island for the benefit of important fish and wildlife resources such as the Kemp's ridley and other sea turtles.

Strategies:

- Routine law enforcement patrols, monitoring, research, wildlife and visitor surveys, and invasive and/or exotic species management are necessary tools in achieving this objective. **Ongoing**
- Control invasive plants, such as the saltcedar groves on Matagorda Island, and exotic and invasive feral hogs, as described in Wildlife Objective 5. **Ongoing**
- Prevent unauthorized landing of aircraft on the beach and other unauthorized motorized uses by maintaining a presence and informing the public through outreach. **Ongoing**
- Cooperate and coordinate with appropriate agencies (e.g., TCEQ, EPA, and GLO) and volunteers to address the accumulation of debris and hazardous materials that wash up on the beaches of Matagorda Island through increased vigilance, enforcement, and industry compliance. **Ongoing**
- Remove hazardous waste and/or materials, oil spills, and illegal drugs washed up on the beach and dunes. Standard procedures for removal and disposal of these materials will be followed in cooperation with the U.S. Coast Guard, Texas General Land Office, TCEQ, EPA, and local officials. **Ongoing**
- Remove large artificial structures stranded near shore or washed ashore to restore and maintain the visual aesthetics and integrity of this habitat as necessary. **Ongoing**
- Develop and seek funding for quarterly (or as needed) Refuge beach cleanup to address the volume and types of trash, debris, and contaminants, primarily on Matagorda Island beaches. This may include two additional staff positions to support the Refuge beach cleanup. **Ongoing**

- Coordinate with EPA and TCEQ regarding follow-up studies and assessing potential hazards for making informed management decisions on radiation levels detected on Matagorda Island during a preliminary 2002 survey. **2013**
- Monitor and prevent losses due to barrier island erosion by maintaining an ongoing dialog with State partners and interested parties to determine recommended courses of action. **Ongoing**
- Ensure that public activities on the beach are in compliance with Refuge regulations and designated areas. Unauthorized activities in the dunes will be monitored and restricted. **Ongoing**
- Employ the decision support process for unplanned ignition (wildfire) per the Fire Management Plan. Natural or prescribed fires will be allowed to burn unless they threaten structures (e.g., Texas A&M Gulf Monitoring Station) or fragile vegetation areas. **Ongoing**
- Emphasize educating the public about the importance of maintaining and protecting this dynamic, important, and fragile community. **Ongoing**
- Monitor wetland losses and accretions through aerial imagery and GIS systems every 3–5 years to track coastline changes for consideration in Refuge management activities. **Ongoing**
- Coordinate with agencies such as the USGS, NOAA, and others regarding climate change or sea level rise and its potential effects at Aransas NWRC for consideration in Refuge management activities. **Ongoing**
- Incorporate applicable strategies or actions from the proposed Climate Change Strategic Plan and the associated 5-year Action Plan by updating the Refuge Habitat Management Plan. **2013**
- Complete a Habitat Management Plan with an associated species-level GIS vegetation map, a step-down plan of the Comprehensive Conservation Plan by **2013**.

Habitat Objective 6–Salt Marsh and Tidal Flats Habitat

Over the term of this Plan, continue to preserve the entire Salt Marsh and Tidal Flats habitat found on the Refuge for the primary benefit of threatened and endangered species (e.g., whooping crane), migratory birds, and other wildlife and to protect this habitat from potential adverse impacts of human activities.

Rationale: Little or no direct habitat management is needed of this habitat type. This habitat type is best left to the ebb and flow of nature. However, maintaining adequate freshwater inflows is an essential component of this habitat type. In addition, management of public uses, levee and culvert maintenance, and damage by invasive and exotic species is necessary to protect and preserve Salt Marsh and Tidal Flats habitat for the benefit of Federal trust species such as migratory birds and endangered species.

Strategies:

- Continue to work with the Guadalupe-Blanco River Authority and State partners (e.g., TPWD and TCEQ) to ensure adequate fresh water inflows into San Antonio Bay. **Ongoing**
- Continue to monitor whooping crane use of these habitats and for population expansion into new areas that may need additional protection (e.g., through land protection measures or partnerships). **Ongoing**
- Manage, to the extent practicable, public uses and other activities that may adversely affect this habitat type. **Ongoing**
- Perform routine law enforcement patrols, monitoring, research, wildlife and public use surveys, invasive and/or exotic species management, and occasional prescribed burns, all of which are necessary tools in achieving this objective. **Ongoing**
- Employ the decision support process to unplanned ignition (wildfire) per the Fire Management Plan. Unplanned fires will be allowed to burn unless they threaten structures or fragile vegetation areas. Prescribed fires will occasionally be used to burn vegetated tidal flats. **Ongoing**
- Prevent unauthorized motorized uses to the extent of the law. **Ongoing**
- Remove hazardous waste, materials, and oil spills as soon as possible. Standard procedures for removal and disposal of these materials will be followed in cooperation with the Coast Guard, General Land Office, Environmental Protection Agency, and local officials. **Ongoing**
- Monitor and prevent losses due to erosion from barge and boat traffic along the GIWW and other areas, as necessary. This includes working with the Army Corps of Engineers for the placement and maintenance of reticulated matting. Work closely with the Corps to implement their 50-year Dredge Material Placement Plan that includes beneficial use of dredged material (marsh creation) projects. **Annually**
- Ensure that public activities in the marshes and tidal flats are in compliance with Refuge regulations and designated areas. Unauthorized activities will be eliminated. **Ongoing**
- Partner with the Texas GLO to develop or implement mutually beneficial coastal conservation programs. **Ongoing**
- Remove artificial structures stranded near shore or washed ashore to restore and maintain the visual aesthetics and integrity of this habitat. **Ongoing**
- Emphasize educating the public about the importance of maintaining and protecting this dynamic, important, and fragile community. **Ongoing**
- Coordinate with agencies such as the USGS, NOAA, and others regarding climate change or sea level rise and its potential effects at Aransas NWRC for consideration in Refuge management activities. **Ongoing**
- Incorporate applicable strategies or actions from the proposed Climate Change Strategic Plan and the associated 5-year Action Plan by updating the Refuge Habitat Management Plan. **2013**

- Work with those entities (e.g., GLO, drainage districts) to maintain levees and culverts where they occur on the Refuge to ensure proper drainage and tidal flows. **Ongoing**
- Complete a Habitat Management Plan with an associated species-level GIS vegetation map, a step-down plan of the Comprehensive Conservation Plan by **2013**.

5.4 Public Use Goal, Objectives, and Strategies

Public Use Goal:

To provide high quality, wildlife-dependent recreational and environmental education opportunities to a diverse audience, and increase Refuge System support by promoting an understanding and appreciation for the unique wildlife, fish, habitats, and cultural history of the Aransas NWRC.

Public Use Objective 1–Visitation

Throughout the term of this Plan, maintain or increase annual visitation from 50,000 to 75,000. Through random surveys, strive to maintain positive visitor feedback and memorable experiences on the Refuge. The visitors' experience should be that they will desire to come to the Refuge Complex, recognizing it as a national treasure and a premier destination for wildlife-dependent recreational activities.

Rationale: Because the Refuge Complex is located in a remote part of Texas, it will likely not have problems of over-visitation during the life of this Plan. Although Refuge visitation has been on a slow downward slide in past years due in part to its rural location, the Refuge must continually garner public support by increasing outreach, programming, and advertising; and provide the highest quality experiences available.

Strategies:

- Develop a Visitor Services Plan that evaluates existing public use facilities, identifies additional facilities needed to provide high quality compatible wildlife-dependent recreation, and identifies sources of funding for development and maintenance of facilities. **2011**
- Publish news and/or magazine articles, and go on local radio and television shows with information about Refuge activities. **Ongoing**
- Assist FAMI with advertising and marketing of the Refuge Complex. Maintain and update Refuge website. **Ongoing**
- Provide improved signage on incoming highways (**2011**) to promote special events and programming and to provide directions to the Refuge Complex, which increases awareness (**Ongoing**) of the Refuge. Coordinate with TXDOT to get Refuge directional signs. **Ongoing**
- Publicize the Refuge as a National Estuary Research Reserve (NERR) and Marine Protected Area (MPA), which may open additional funding opportunities. **2012**

- Partner with local chambers of commerce to gain support for Refuge programs and promote the Refuge Complex as a Great Texas Coastal Birding Trail designated site. **Ongoing**
- Partner with TPWD, consistent with the 1994 MOA (see Appendix F), to promote and/or maintain visitation to Matagorda Island through programs such as guided tours and lighthouse or whooping crane tours. **Ongoing**
- Continue offering high quality public programs, including Aransas lecture series, and hosting special events. **Ongoing**
- Incorporate higher customer service standards by providing periodic training for staff and volunteers in overall compliance with Fish and Wildlife Service customer service standards. **Ongoing**
- Continue to collect visitor use data to track visitation trends, and submit for reporting to determine if visitor programs, facilities, and opportunities are meeting Refuge goals. **Ongoing**
- Increase Visitor Services personnel over the term of this Plan to accomplish priority public use needs. Add one full-time staff member to assist with coverage of the visitor center front desk, which is open seven days a week. Add one Law Enforcement Officer (LEO) by **2013** to assist the current LEO with coverage of the 115,000-acre Complex. For additional staffing needs, explore innovative volunteer options such as recruitment through the Refuge Volunteer Program, SCA, Texas Travel Industry Association (TTIA) interns, grants, and State university intern and work study programs (**Ongoing**).

Rationale: Currently, Visitor Services staffing consists of a Supervisory Outdoor Recreation Planner (GS-11), an Environmental Education Specialist (GS-7/9), an LEO (GS-7/9), a part-time (20 hours per week) Clerk (GS-2), and help from FAMI and Refuge volunteers. In recent history, more positions were held in the Visitor Services Program. In the late 1990s, the Refuge employed a Supervisory Outdoor Recreation Planner (ORP) (GS-11), Assistant ORP (GS-5/7/9), Public Use Assistant (GS-5), Park Ranger (GS-4), Environmental Education Specialist (GS-9), several collateral duty LEOs, and one Maintenance Worker position dedicated to public use, as well as receiving help from the bookstore operator, Refuge volunteers, and emergency hires. To accomplish Visitor Service's needs (dependent on funding), some key Visitor Services positions need to be re-gained.

Explore the feasibility of establishing a Visitor Contact Station at the Tatton Unit along the rest area on Highway 35 by **2011**. Provide Aransas NWRC information and maps, interpretive exhibits, all-accessible bathrooms, and FAMI store items at this location. **2012 Note:** *This location lends itself to widespread exposure of the Refuge and would facilitate increased awareness and understanding of the Refuge Complex and Refuge System. This more easily accessed locale would likely attract volunteers from local communities.*

Public Use Objective 2–Wildlife Observation and Photography

Over the term of this Plan, provide visitors with optimal wildlife observation and photography opportunities by maintaining existing viewing areas and infrastructure; within two years of Plan approval, develop two additional photo blinds within the designated public use area and improve wildlife observation and photography opportunities at Aransas, Tatton, Lamar, and Myrtle Foester Whitmire Units by adding additional viewing areas and transportation infrastructure.

Rationale: Most visitors come to the Refuge Complex to view wildlife, enjoy nature, and take photos. The vast majority of annual visitation is for wildlife observation and photography, and the Refuge has received requests to expand these opportunities.

Strategies:

- Maintain all viewing areas on the Refuge, including the 16-mile auto tour loop, walking trails, viewing areas, decks, photo blinds, boardwalk, and observation tower for scenic vista and wildlife-viewing opportunities. Matagorda Island Lighthouse will also be maintained as a scenic attraction on the Island. **Ongoing**
- Evaluate existing facilities for accessibility requirements, and make necessary improvements to these facilities by **2014**.
- Transition a second existing trail to hard surface. Install benches on trails and along the boardwalk and observation tower by **2012**.
- Shorten the old walking trail, and relocate the Tatton observation deck nearer the parking area to improve visitor use. **2011**
- Develop Frog Pond and its perimeter trail adjacent to the visitor center as an interpretive area that facilitates wildlife viewing, photography, environmental education, and interpretative activities. Complete it with an all-accessible surface, benches, and a viewing deck with photo blind. Establish state-of-the-art bird feeding stations at this site and at the visitor center. Manage these stations as dynamic exhibits that promote wildlife observation and environmental educational opportunities to the public. **2015**
- Maintain and repair the existing 35-mile long Main Island Road (Matagorda Island Unit) by bringing in road base and re-grading the road to support existing public uses per the 1994 MOA. **2012**
- Facilitate nature photography on the Refuge, in partnership with local schools or other organizations, for children and adults by making portable photo blinds available to the visiting public. **Ongoing**
- Continue popular, established programs for wildlife viewing and photography such as the interpretive van tours and guided bird and wildflower walks. **Ongoing**
- Add up to 25 binoculars to the Binocular Loan Programs on Aransas and Matagorda Island Units. **2010**
- Conduct limited tours by appointment of the Lamar and Myrtle Foester Whitmire Units. **Ongoing**

- Host an annual Refuge photography contest, and display winning photos in the Refuge visitor center for six months. **Ongoing**
- Maintain the Refuge website and update it every six months or as needed to ensure the site has the latest information on wildlife observation and photography opportunities such as bird sightings, optimal viewing times, and links to other important wildlife observation websites. **Ongoing**
- Work in partnership with local nature-related businesses and organizations such as the whooping crane tour boat operators, Fennessey Ranch, chambers of commerce, Texas State Aquarium, Corpus Christi Museum of Science and History, Rockport Center for the Arts, and San Antonio Zoo, and participate in selected nature-related community events. **Ongoing**

Public Use Objective 3–Interpretation

Ensure all visitors receive high quality, accessible, interpretive experiences at the Refuge. Over the term of this Plan, increase the effectiveness of the interpretive program above current levels to ensure that all visitors gain a better understanding of three primary concepts: 1) the value and unique purposes of Aransas NWRC; 2) the Refuge Complex as a component of a national network of refuges, and; 3) the significance and mission of the Refuge System. The effectiveness of the program will be measured through visitor feedback, response cards, and periodic surveys to determine if the visitor has increased appreciation of the Refuge, the Refuge System, and the U.S. Fish and Wildlife Service and its mission.

Rationale: Many visitors do not realize the distinction between a national wildlife refuge and a park or Federal or State agency lands that are managed for different purposes. Increased efforts are needed to help people better understand the role of national wildlife refuges and the Service mission, and to provide a heightened awareness of conservation and stewardship concepts.

Strategies:

- Develop and revise a “Staff and Volunteer Orientation Handbook” to include the Service mission, Refuge System message, Refuge purposes, and difference between State and Federal areas for all staff and volunteers to ensure consistency in our message to the public. **2011**
- Enlist and train naturalists for interpretation along the trails. **Ongoing**
- Improve existing kiosks, and add at least two new informational kiosks at Matagorda Island. **2011**
- Maintain and update or replace damaged and obsolete interpretive and informational panels on Refuge entrance signs, roadways, wayside exhibits, trails, and viewing areas. **2011**
- Install identification markers for native plants at the visitor center, at trail entrances landscaped with native plants, and along the length of the trails. **2011**
- Redesign Rail Trail to begin at the Tomas Slough Observation Area. At the new trailhead, utilize a new interpretive kiosk, and construct a new viewing deck and

bridge, crossing the slough and connecting to the re-routed trail. Look into the feasibility of installing a Plexiglas deck on the bridge for viewing and an interpretive animal track lane. **2013** *Note: Rail Trail is often overlooked by visitors because the current trailhead is near the Refuge entrance gate and is often missed as they come in to the visitor center area. Also, on several occasions, the trail has been closed to the public due to alligator nesting activities. Relocating this entrance and closing a portion of the trail would mean easier access for visitors.*

- Construct a separate multipurpose room, which will accommodate seating for 150 persons, to function primarily as an auditorium and increase the seating available in the existing visitor center by **2015**. *Note: The current facility does not meet the needs of the public use program, as it is not a true auditorium. Currently, a portion of an exhibit room is utilized as the auditorium. Only small groups of fewer than 50 can be seated and, when in use, half of the exhibit area in the building has to be closed off to other visitors. A separate room with seating for large school groups of 150 persons is needed.*
- Update existing and develop new brochures (in cooperation with the Visitor Services Division) that emphasize the Service mission, Refuge System mission, Refuge purposes, and the distinction between Federally and State-managed areas and place at all kiosks. **2014**
- Meet all requests, in cooperation with Refuge volunteers, for high quality interpretive group programs annually. Continue to conduct welcome programs for visiting groups, large or small. **Ongoing**
- Continue to offer popular, audience-specific, established interpretive programs on- and off-site and at special events such as the Aransas Lecture Series, “Migration Day,” and “Kids Fishing Clinic.” This includes interpretive van tours, guided bird and wildflower walks, and programs for school groups, libraries (e.g., Refuge Readings), and scouts. **Ongoing**
- Develop and offer an interpretive audio tape for the driving tour loop. **2011**
- Update all informational and interpretive materials to improve accuracy, consistency, quality, and availability and to meet universal accessibility. Revise and make brochures available to local visitors in Spanish. **2011**
- Install a Refuge information low-wattage (localized range) radio station on the Refuge Complex at the headquarters and tour loop and on Texas State Highway 35. **2012**
- Coordinate radio-broadcast interpretive messages with interpretive panels. Investigate other technologies to distribute Refuge interpretive information (e.g., cell phone tours and MP3 downloads). **2012**
- Upgrade current van used for guided tours to all-accessible, alternative fuel bus for daily guided tours of the Refuge during the busy season from January 1 through April 30. **2013**
- Develop a partnership with local whooping crane boat operators to ensure Refuge information they present to visitors is accurate and up to date. **Ongoing**
- Develop portable interpretive displays that highlight the Refuge System mission, Refuge purposes, management, themes, and natural resources that can be used on-site

as needed for programs or special events and for off-site displays at festivals or special events. **2013**

- Expand, upgrade, and refine, in cooperation with Friends of Aransas and Matagorda Island (FAMI), interpretive and educational materials offered for sale at the FAMI Nature Store. **Ongoing** Design a separate sales area in the visitor center by **2010**.
Note: Currently, Refuge orientation and FAMI Nature Store sales take place at the visitor center front desk. Usually, one person handles phones, orientation, and sales. To better accommodate the visiting public and offer high quality Refuge orientation with emphasis on the Refuge Complex purposes and System message, a separate area and attendant are needed to operate the nature store.
- Incorporate and update the 2002 Interpretive Concept Plans as part of the Visitor Services Plan for Aransas NWRC by **2011**.

Public Use Objective 4–Hunting

In cooperation with TPWD, continue to provide a compatible, safe, accessible, quality recreational hunting experience for approximately, but no more than, 1,200 visitors on the Refuge Complex; and minimize the potential for conflicts with other non-hunting visitors and Federal trust species.

Rationale: Although the Refuge provides recreational hunting opportunities, there are important habitat management benefits from hunting. Recreational hunting is a tool to help maintain or control exotic animal populations such as feral hogs, which are very destructive to many of the Refuge habitats. Recreational hunting also helps maintain a healthy deer herd by keeping deer populations within the carrying capacity of the land. Waterfowl hunting is administered on Matagorda Island by TPWD. Annual trend surveys by TPWD estimate the deer herd on the Aransas Unit to be approximately 1,600 animals and about 600 animals on the Matagorda Island Unit. Hunting is a priority public use on the Refuge when compatible with Refuge purposes.

Strategies:

- Update the Refuge Hunt Management Plan (for Aransas, Tatton, and Matagorda Island Units) that specifies hunting opportunities, methods, locations, and adaptive management according to species and habitat needs. **2012**
- Conduct all hunting activities in close coordination with TPWD per State game hunting regulations for Aransas and Calhoun counties. The Refuge will continue to offer archery and firearms hunting for white-tailed deer and feral hogs, and firearms hunting for waterfowl on the Refuge Complex. *Note: Approximately 69,000 acres are open to hunting, which includes about 33,000 acres for archery hunting on the Aransas Unit; 19,000 acres for rifle hunting on the Aransas Unit; 30,000 acres for firearms hunting on Matagorda Island, including 19,000 acres of State bay marshes; and 7,000 acres for youth rifle hunting on the Tatton Unit.* **Ongoing**
- Maintain a viable white-tailed deer herd for recreational hunting based on trend and harvest data and State game surveys for Aransas and Calhoun counties. **Ongoing**

- Offer opportunities, in partnership with TPWD and Texas Wildlife Association for youth deer and feral hog hunting. Study the feasibility of offering a waterfowl hunt for youth on the Refuge. **Ongoing**
- Work with GLO and TPWD to utilize more effectively, cross-easement management options in maintaining and managing State lands open to hunting on Matagorda Island, including the bayside sloughs, marshes, and flats utilized by whooping cranes. **Rationale:** The 1994 MOA and Coastal Public Lands Lease (see Appendix F) provided cross-jurisdictional management of State and Federal lands on Matagorda Island, consistent with Paragraphs 6 and 14. This involves utilizing these documents to their fullest potential in meeting important wildlife resource needs. **Ongoing**
- Encourage hunting participation of under-represented segments of the public, such as disadvantaged youth, persons with disabilities, and women, through various outreach efforts, service organizations, or by installing accessible blinds. **Ongoing**
- Promote hunter compliance with Federal and State regulations and encourage good sportsmanship, ethical hunting behavior, and understanding of the Refuge and its purposes through law enforcement visibility, in effectively worded informational brochures with high quality maps and signs, and on the Refuge website. Continue to provide the International Bowhunters Educational Program course and lecture programs about hunting. **Ongoing**
- Update the hunter check station area with new equipment, including replacement of the bathroom, cold storage locker, and hoist. Offer an improved welcome area for hunters with interpretive wayside exhibits, brochures, and information. **2012**
- Explore and consult with the Service's Division of Law Enforcement, DOI Solicitor's Office, and State partners to improve upon hunting opportunities and manage hunting activities without additional disturbance to Federal trust species. Any revisions should be reflected in regulations found at 50 CFR, Part 32.63 (refuge-specific regulations for hunting), or 50 CFR, Part 32.8 (areas closed to hunting). **2013. Rationale:** The hunting regulations for Aransas NWRC need to be clarified further to reflect goals and objectives of the Plan.

Public Use Objective 5–Fishing

Over the term of this Plan, provide a compatible, safe, accessible, and quality recreational saltwater fishing experience at the five fishing access points for all users; and minimize the potential for conflicts with other non-fishing visitors and Federal trust species.

Rationale: Fishing is a traditional activity of the area and, in certain areas on the Refuge, is a compatible priority public use that connects many people with nature.

Strategies:

- Develop a Refuge Fishing Plan that specifies fishing opportunities, facilities, locations, and adaptive management in terms of impacts and compatibility with other public uses. **2011**

- Maintain existing saltwater fishing access points on the Refuge as needed. Aransas Unit fishing access points, and sloughs and waterways on Blackjack peninsula, open each season from April 15 through October 15. **Ongoing**
- Allow canoe and/or kayak use at fishing access points from April 15 through October 15. **Ongoing**
- Work with GLO and TPWD to utilize more effectively cross-easement management options in maintaining and managing State lands open to fishing on Matagorda Island, including Cedar Bayou, bay sloughs, Pass Cavallo, and the Gulf beach. **Rationale:** The 1994 MOA and Coastal Public Lands Lease (see Appendix F) provided cross-jurisdictional management of State and Federal lands on Matagorda Island consistent with Paragraphs 6 and 14 of the MOA. This involves utilizing these documents to their fullest potential in meeting resource needs. **Ongoing**
- Maintain the accessible fishing pier at the Picnic Area, and allow pier access for fishing year round. **Ongoing**
- Establish two informational kiosks (one at Cedar Bayou and at Pass Cavallo) and signs by 2011 with Refuge regulations and policy. Additionally, establish regular law enforcement patrols on Matagorda Island for the benefit of Federal trust species. **Ongoing**
- Encourage fishing participation by under-represented segments of the public, such as disadvantaged youth, persons with disabilities, and women, through various organizations and outreach during special events. **Ongoing**
- Continue to host educational fishing events for local students and special events such as the National Fishing and Boating Week. **Ongoing**
- Promote angler compliance with Federal and State regulations and encourage good sportsmanship, conservation practices, and understanding of the Refuge and its purposes through law enforcement visibility, in effectively worded informational brochures with high quality maps and signs, and on the Refuge website. **Ongoing**
- Work with State partners to manage traditional uses (e.g., crabbing, airboat use, boating access points) in bayside marshes along the Refuge shoreline for the benefit of Federal trust species. **Ongoing**
- Conduct all fishing activities in close coordination with TPWD per State fishing regulations. **Ongoing**
- Explore and consult with the Service's Division of Law Enforcement, DOI Solicitor's Office, and State partners to improve upon fishing opportunities and manage fishing activities without additional disturbance to Federal trust species. Any revisions should be reflected in regulations found at 50 CFR, Part 32.63 (refuge-specific regulations for fishing). **2013 Rationale:** The fishing regulations for Aransas NWRC need to be clarified further to reflect goals and objectives of the Plan.

Public Use Objective 6–Environmental Education

Over the term of the Plan, provide structured, curriculum-based environmental educational activities, per Service policy (605 FW 6), which are aligned with State and national environmental educational criteria for at least 1,000 students per year.

Rationale: Environmental education is a critical first step in providing visitors with an awareness and ultimately support for the Refuge and the Refuge System mission. This is a way for people to connect with nature through a “hands on” approach, and it provides educational experiences that are not easily gained in a classroom.

Strategies:

- Develop the environmental education portion of the Visitor Services Plan. **2011**
- Offer environmental education programs both on- and off-site, such as special educational events, group camp programs, and special interest group programs. **Ongoing**
- Develop five site-specific learning trunks and resource materials for the Environmental Education Program to use on-site and take off-site for programs. These would include such topics as ornithology, marine ecology, the Refuge role in conservation, endangered species, and cultural resources. **2011**
- Offer, at least once per month, scheduled publicized educational and interpretive opportunities at the Refuge for the public (e.g., Seining the Bay, Birding 101). **Ongoing**
- Develop and maintain a multi-faceted environmental education resource library comprised of books, videos, posters, audio tapes, environmental education kits, specific topic packets, and pertinent written materials available for use in Refuge educational programs and by educators. **Ongoing**
- Annually review and maintain the “Educator’s Guide to Aransas National Wildlife Refuge Complex” that provides orientation, guidelines, grade-level and State learning standards information, maps, and site-specific activities that focus on one or more Refuge themes. **Ongoing**
- Conduct, in cooperation with local teachers, biannual on-site environmental education workshops that orient educators to the Refuge resources and, in turn, encourage them to incorporate this into their curriculum both in the classroom and during field trips. **Ongoing**
- Maintain and build excellent partnerships with local, State, and Federal agencies (e.g., TPWD, FWS-Ecological Services), nonprofit organizations, businesses, and individuals to improve the Refuge Environmental Education (EE) Program. **Ongoing**
- Explore, in cooperation with partners, the development and refurbishment of existing environmental education areas at Refuge Headquarters, Youth Environmental Training Area (YETA), and the Matagorda Island EE Center. At Headquarters, construct an environmental education laboratory addition to the visitor center that will accommodate seating and study or lab equipment for up to 50 students and teachers. At the YETA, remodel the Assembly Area screened building to accommodate seating and lab or study

equipment for up to 50 students and teachers. At Matagorda Island, refurbish the EE Center to accommodate seating, lab or study equipment, and overnight facilities for up to 30 students and teachers. **Within the 15-year term of this Plan.**

Rationale: Designated environmental education areas are needed to accommodate school groups visiting the Refuge Complex. At the Headquarters, there is a need for a laboratory room addition at the visitor center. This area would incorporate the visitor center, Tomas Slough Observation Area, and Headquarters Pond and trail. The existing YETA building needs to be closed in and air-conditioned, and the bathrooms need to be remodeled. This area includes the building, amphitheater, bay, and trails. The Matagorda Island EE Center area needs updating and includes the building, bunkhouse, beach, and trails.

- Seek funding sources such as grants for Refuge environmental education programs that promote understanding and appreciation of the Refuge natural and cultural resources and their management. Grants should be consistent with Service policy described at 605 FW 6, be determined by need and Refuge management approval, and maintain fiscal accountability. **Ongoing**

Public Use Objective 7–Outreach

Increase Refuge awareness in the local community by annually providing opportunities for approximately 1,500 people to participate in off-Refuge programs and exhibits, recruiting 200 people to volunteer for the Refuge, and building membership of the FAMI group to a minimum of 100. This includes outreach efforts on the Refuge to invite public participation or support of important resource issues on the Refuge.

Rationale: It is critical to the mission of the Refuge that the neighbors and citizens in the surrounding landscape know about the Refuge and support it as a valuable and contributing part of the community.

Strategies:

- Continue, in coordination with partners, to promote and support off-site nature related events such as the Celebration of Whooping Cranes and Other Birds and the Hummer/Bird Celebration. Sponsor special on-site annual events such as International Migratory Bird Day and National Fishing and Boating Week that engage the public in wildlife-dependent activities and increase people's knowledge and understanding of wildlife conservation and related issues. **Ongoing**
- Support an active Volunteer Program, such as FAMI or Golden Crescent Nature Club, which includes recruitment and training of volunteers for assistance in Refuge programs. **Ongoing**
- Develop at least two outreach tools such as posters or brochures to prompt public involvement or participation in support of the Refuge purposes, vision, and overall Refuge System mission. *Note: These tools will be developed for specific issues, as determined by Refuge staff based on necessity. Examples include feral hog population control, exotic vegetation control and awareness, freshwater inflows, or beach debris.* **2013**

- Include, in outreach efforts, local schools, organizations, agencies, neighbors, and the public to enhance awareness, understanding, and support for the Refuge Complex and Refuge System. **Ongoing**
- Gain State coordination of the Junior Duck Stamp Program. **2011**
- Promote the Junior Duck Stamp Program in local schools, with winning artwork featured on a Refuge billboard. *Note: Ensure the two Refuge billboards along State Highway 35 are compliant with current TXDOT and other applicable regulations on the design and placement of these facilities to preserve the scenic qualities of the area.* **Ongoing**
- Coordinate with local chambers of commerce, birding boat tour guides, local attractions, and other public venues, such as airports and hotels, to display and provide Refuge information to the public. **Ongoing**
- Ensure consistency of media and public communication information among staff and volunteers during all outreach functions, as an important element of the Visitor Services Plan. This involves maintaining and regularly updating the Refuge website as a “single source” for this outreach information. **2011**
- Promote the Refuge Complex as an international wildlife-viewing destination. **2011**
- Continue to collaborate with the FAMI to foster understanding of Refuge priorities. **Ongoing**
- Develop outreach plans for important resource issues in the local area for distribution in the visitor center. One urgent outreach plan necessity involves the need to protect whooping crane habitat, as development of this species’ wintering area has been increasing, and the whooping crane population is expanding. **2011**

Public Use Objective 8–Law Enforcement and Visitor Safety

Increase law enforcement area coverage by 50 percent over current levels to adequately protect natural resources, facilities, and people; and improve visitor safety and emergency response by adding an additional law enforcement officer by 2010 and by building and maintaining partnerships with local law enforcement agencies over the term of this Plan.

Rationale: Currently, the Refuge is limited to one full-time law enforcement officer to cover over 115,000 acres spread out over five management units in three counties. There is currently inadequate law enforcement coverage of many parts of the Refuge, including Matagorda Island, which is only accessible by boat. Building strong partnerships and liaisons with Federal, State, and local law enforcement agencies goes a long way toward providing a 24/7 presence or access to all parts of the Refuge, but complete Refuge coverage at all times is currently not possible without the addition of staff and equipment.

Strategies:

- Add one additional full time LE officer by **2013**.
- Continue to build strong partnerships to increase law enforcement coverage, and enhance visitor safety and emergency response. Continue to work cooperatively, developing good relations and radio communications with local law enforcement offices

of TPWD Law Enforcement; Aransas, Calhoun and Refugio County sheriff's departments; Texas Department of Public Safety; and Victoria, Corpus Christi, and Houston Fish and Wildlife Service Law Enforcement, to enforce Federal, State, and Refuge-specific hunting and fishing regulations. **Ongoing**

- Provide visitor safety, protect resources, and ensure compliance with Federal, State, and Refuge-specific regulations through law enforcement. **Ongoing**
- Maintain a good working relationship with Emergency Medical Services of Aransas, Calhoun, and Refugio counties to provide immediate emergency response as needed. **Ongoing**
- Annually or as needed, provide Visitor Services staff with first aid and CPR training, as specified by the American Red Cross. **Ongoing**
- Develop a Law Enforcement and Emergency Services Management Plan for the Refuge Complex by 2011.
- Annually review and revise Refuge-specific visitor regulations for consistency and compatibility. **Ongoing**
- Maintain current law enforcement and emergency equipment and/or provide law enforcement and emergency equipment as necessary, including any patrol vehicles to meet applicable Federal and State emergency vehicle standards. **Ongoing**
- Continue to increase the public's knowledge of Refuge regulations and the boundaries of Refuge lands. Improve Refuge Complex signs, kiosks, and facilities to better advise the public on Refuge regulations, boundaries, and safety issues. **Ongoing**
- Update and revise the Safety Plan by 2010 to include visitor center emergency protocol, semi-annual safety inspections of public use areas, and monitoring of the suggestion/comment box and station website e-mail. **Update as needed.**

Public Use Objective 9–Partnerships

Over the term of this Plan, continually promote and maintain excellent partnerships with agencies, groups, neighboring landowners, and other interested parties to help achieve Plan vision, goals, objectives, and strategies. The overall level of success of Refuge goals and objectives outlined in the Plan is evident in monitoring, which provides the indication of effective partnerships.

Rationale: Partnerships are an essential element in fulfilling the Plan vision requiring support from many.

Strategies:

- Continue to honor and support the 1994 MOA between Texas Parks and Wildlife Department, Texas General Land Office, and the Refuge. *Note: On the Matagorda Island Unit, this agreement exists where TPWD has agreed to administer and manage public use, and the Refuge will manage the wildlife and habitat management aspects of the Island (see Appendix F for the 1994 MOA and Coastal Public Lands*

Lease). This involves utilizing these documents to their fullest potential in meeting resource needs. Ongoing

- Establish an MOU between the Service and TPWD-Coastal Fisheries Division at Port O' Connor Dock Annex. **2011**
- Work toward maintaining adequate freshwater inflows by working with Guadalupe-Blanco River Authority, Texas Commission on Environmental Quality (TCEQ), and others on a continuing basis. **Ongoing**
- Partner with others, including adjacent landowners, TPWD, and USDA-Wildlife Services, to more effectively control exotic and invasive wildlife for the mutual benefit of the Refuge, stakeholders, and partners (see also: Wildlife Objective 5). **Ongoing**
- Strengthen landowner relations and agreements for conducting prescribed burns on and off the Refuge, feral hog control, and invasive plant control. **Ongoing**
- Seek conservation easements and agreements protecting whooping crane habitat. **Ongoing**
- Continue to coordinate with FAMI, a major Refuge partner, to facilitate implementation of Plan goals, objectives, and strategies. **Ongoing**
- Continue to work with volunteers and volunteer organizations to facilitate implementation of Plan goals, objectives, and strategies. **Ongoing**
- Coordinate and partner with agencies such as the U.S. Army Corps of Engineers, TXDOT, and county Drainage Districts or their contractors on projects or activities that may affect the Refuge. **Ongoing**

Public Use Objective 10–Cultural Resources

Within five years of Plan approval, complete a Cultural Resources Management Plan to improve protection and interpretation of the cultural, historical, and archeological sites on the Refuge.

Rationale: The Service is required to protect all cultural resources on Refuge lands as mandated by Federal law and Service policies and mandates. Interpretation of the history of the area is an important aspect of highlighting the Refuge resources and people's connections with the land. Although people are more removed from the environment today than in times past, they are nonetheless a part of it.

Strategies:

- Complete a step-down Cultural Resources Management Plan to fulfill requirements of the Archaeological Resources Protection Act for surveying lands and the National Historic Preservation Act for a preservation program. *Note: The previous overview study identified a number of research questions to guide future investigations on the Refuge. 2015*
- Preserve known cultural resources in place through non-disturbance. The most abundant type of cultural resource on the Refuge is the numerous "shell middens" left by Karankawa Indians. *Note: Several habitat management strategies with non-*

manipulative approaches such as designated “no treatment zones” also help implement this strategy. Ongoing

- Consult with the Regional Historic Preservation Officer prior to all proposed construction actions and upon receiving requests for archeological investigations on Refuge lands. **Ongoing**
- Continue to work with the community to document more of the Refuge history, collect historic photographs, and integrate this information into the Refuge programs. **Ongoing**
- Maintain partnership agreement with TPWD and Matagorda Island Foundation on the maintenance and public use of the Matagorda Island Lighthouse. **Ongoing**
- Develop exhibits to inform and interpret the history of the area and its connection to wildlife and people. **2016**

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6. Plan Implementation

6.1 *New and Existing Projects*

This Comprehensive Conservation Plan (Plan) outlines an important course of action for the future management of the Aransas NWRC. The ability to manage water impoundments, woodlands, grasslands, and marshes—encompassing 115,000 acres and spread over three counties—to benefit Federal trust species such as migratory birds, threatened and endangered species, and other wildlife is relatively expensive. The Service will need to retain supplemental funding to implement many of the objectives in this Plan. The following section presents a brief description of some of the highest priority Refuge projects, as listed in the Refuge Operating Needs (RONS) system or as chosen by the Refuge staff. These include requests for equipment and construction materials, as well as new staff and visitor facilities (see Table 6-1).



Construction Projects on the Refuge.

Photo: Tonya Nix

Improve Ability to Survey Whooping Cranes

This project proposes to obtain funding for an airplane and pilot throughout the winter on a bi-weekly basis to determine the size of the whooping crane populations and the locations of winter territories, measure survival of color-banded cranes, and document any mortality that occurs. Past aerial surveys have been funded by the other Service divisions but may not be available in the future. The project costs are estimated at \$50,000 per year. This project will help to accomplish Wildlife Objectives 2 and 8, as well as Habitat Objective 6.

Invasive Plant Control (Control Invasive Species)

This project will protect biodiversity and maintain productivity of Refuge lands by reducing invasive plants like Chinese tallow, Macartney rose, saltcedar, camphor tree, and others. Treatment efforts focus mainly on woody plants, and methods may include mechanical clearing, chemical applications, or prescribed burning, depending on the target species. This Plan will dovetail with the national Invasive Species Management Plan, per EO 13112. Control will be achieved by purchasing herbicide and equipment and by hiring spray crews. This is an ongoing or increasing control effort, requiring the addition of a biologist position. Estimated startup costs are \$30,000, and a recurring base of \$94,588 is needed for one full-time biologist position, for a total of \$124,588. The other estimated costs of this project include a one-time cost of \$25,000 and a recurring base of \$132,833. The total for this project is estimated at \$282,421 for the first year and \$227,421 per year thereafter. This RONS project is among the top 50 of regionally-ranked projects. This project will help to accomplish Habitat Objectives 1, 2, 3, 4, and 5.

Exotic Animal Control (Feral Hog Control)

This RONS project will protect biodiversity and maintain productivity of Refuge lands by reducing exotic pest species, primarily feral hogs, and other exotic species as needed. Control will be achieved by purchasing supplies and equipment and by hiring control crews (e.g., USDA-Wildlife Services). This is an ongoing or increasing control effort. Estimated costs of

this RONS project includes a one-time cost of \$50,000 and a recurring base of \$10,000, amounting to \$60,000 for the first year and \$10,000 annually. This project will help to accomplish Wildlife Objective 5 and Habitat Objectives 5 and 6.

Habitat Protection and/or Restoration on Acquired Lands

Currently, 245 acres have been added to the Refuge, and another 729 acres are expected to be added within the next few years. Newly acquired parcels will require habitat restorations, baseline biological surveys, monitoring, and boundary posting. Wetlands will be restored where possible, and upland areas will be restored to habitat types as outlined in the Plan. This project will dovetail with a proposed Land Protection Plan, as part of the Plan. Estimated costs: \$267,000. This project will help to accomplish Wildlife Objectives 7 and 8, along with Habitat Objective 6.

Wildlife and Habitat Monitoring Program

This RONS project entails monitoring on the Refuge by conducting essential wildlife and habitat surveys. The surveys will be used to develop information needed to determine the correlation between habitat management and its use by wildlife on the Refuge. This data is needed for the evaluation of Refuge habitat management practices such as prescribed burning and water management. This will require the addition of one full-time biological technician with a \$30,000 one-time startup cost and a recurring base of \$77,321, totaling \$107,321 the first year and \$77,321 per year thereafter. This project will help to accomplish all of the Wildlife Objectives described in Chapter 5.

Running Live Oak Habitat Restoration (Conduct Habitat Management Activities and Improve Wildlife and Habitat Management Projects)

These projects will accomplish several habitat management strategies outlined in the Plan which include controlling the spread of running live oak and maintaining coastal prairie. Running live oak has increased on the Refuge during the past decades from past habitat management activities (refer to the Habitat Goal Section). These long-term projects are estimated to cost approximately \$50,000 annually. In addition, these RONS projects will require three additional staff positions (two wildlife refuge specialists and a maintenance worker), for an estimated \$30,000 startup cost each and a recurring base of \$298,576; this totals \$438,576 for the first year and \$348,576 each year thereafter. This project will help to accomplish Habitat Objectives 1 and 3.

Restore Coastal Prairie (Myrtle Foester Whitmire Unit)

The project involves the restoration of 250 acres of old rice fields to native coastal prairie. Since the settlement of the area, prairie habitat has declined to around one percent of pre-settlement levels, making the native prairie ecosystem one of the most endangered in the world. Restored coastal prairie will provide habitat for mottled ducks, LeConte's and Botteri's sparrows, aplomado and peregrine falcons, white-tailed hawks, and a host of other important plants and animals. There is a one-time startup cost of \$124,320 and a recurring base of \$34,677, for a total of \$158,997 the first year and \$34,677 annually thereafter. This project will help to accomplish Habitat Objectives 1, 3, and 4.

Levee Restoration (Enhance Marsh Management)

This project will repair the levee by installing rip-rap and culverts on the levee of the Matagorda Island Unit to allow better water management, marsh restoration, and natural

tidal flow. The levee is currently severely eroded. Water movement is impeded in certain areas, and has caused damage to the existing levee in others. The desired effective water management, wildlife use, and endangered species management can be greatly improved without causing any damage to these trust resources. Matagorda Island Unit is an important foraging area for whooping cranes, as well as a feeding, resting, and staging area for migrating waterfowl. This RONS project will require an additional staff position (maintenance worker), for an estimated \$30,000 startup cost and a recurring base of \$82,967; this totals \$112,967 for the first year. Additionally, the project calls for an estimated \$200,000 per year for a five-year project. The total needed for the first year is \$312,967 and \$282,967 per year thereafter. This project will help to accomplish Habitat Objective 6.

Beach Debris and Contaminants Facilities and Annual Program (Hazardous Waste Cleanup on Matagorda Island)

The beaches and shorelines of Aransas NWRC, particularly Matagorda Island, continually receive high volumes of trash, debris, hazardous materials, and other contaminants that typically wash ashore. To protect habitats and Federal trust species—such as the impact of this debris on sea turtles (e.g., they become entangled on the debris or the debris acts as a barrier preventing sea turtles from nesting on the beach and/or returning to the water)—funding is needed to develop facilities and an annual program to address this major issue. This project will help to accomplish Habitat Objectives 5 and 6.

Wetland Management on Myrtle Foester Whitmire

The purpose of the project is to improve the ability to conduct water management on this unit by acquiring additional water to help preserve habitat for migrating and wintering waterfowl and to provide nesting and rearing habitat for the mottled duck, a species of concern. The costs of this RONS project are estimated at \$50,000 per year. The project also calls for one full-time maintenance worker, with a one-time startup cost of \$30,000 and a recurring base cost of \$77,650. This totals \$157,650 for the first year and \$127,650 each year thereafter. Two staff positions will be required for this project. Estimated startup costs are \$30,000 and a recurring base of \$85,635 is needed for one full-time (maintenance worker) position, for a total of \$115,635. Estimated startup costs are \$30,000 and a recurring base of \$94,588 is needed for one full-time contaminants biologist, for a total of \$124,588 and a combined total of \$240,223. Equipment startup costs are estimated at \$300,000, and dedicated containment and processing facilities are estimated at \$250,000. Therefore, the total estimated startup costs for equipment and facilities are expected to be approximately \$550,000. Annual operation costs, which include logistical needs and waste contract disposal, are estimated at \$206,000 per year. The total for this project is estimated at \$1,096,223 for the first year and \$386,223 per year thereafter. This RONS project is among the top 50 of regionally-ranked projects. This project will help to accomplish Habitat Objectives 1 and 4.

Vegetation Monitoring and Mapping Program

This RONS project calls for long-term monitoring of Refuge vegetation and assisting in threatened and endangered species recovery efforts for such species as the whooping crane. This project will also benefit overwintering waterfowl and habitats utilized by many other migratory birds. The project also involves the use of Geographic Information Systems (GIS) to aid in vegetation mapping, species use patterns, water management trends, and adjacent land uses. This will help provide Refuge managers with better information in managing natural resources. New GIS hardware and software will enable Refuge staff to provide and access

planning and scientific information to achieve station goals and objectives. Estimated cost for the GIS equipment is \$30,000, and this project will require the addition of two temporary positions (biological technicians), with a total first year cost of \$208,708, and a full time biotech position with a one-time startup cost of \$30,000 and a recurring base of \$77,321; this totals \$137,321 initially and \$77,321 each year thereafter. This project will help to accomplish Wildlife Objective 5 and all of the Habitat Objectives described in Chapter 5.

Visitor Education Center and Administer and Provide Support for the Visitor Services Program

Over 1.5 million people reside within a three-hour drive from Aransas NWRC. Renovation of the visitor center and construction of support facilities will allow increased opportunities for environmental education, interpretation, and recreation for visitors, schools, and organizations. Programs and displays will focus on the importance of Texas Coastal Bend habitats as well as the Service message. An improved education and visitor center infrastructure will help further define the identity of the Refuge and increase public visibility and support. Estimated cost: \$2,500,000. In addition, under RONS, this project may require two additional staff positions (a visitor services specialist and a visitor services technician), with a one-time startup cost of \$30,000 each and a recurring base of \$199,584. These positions (under RONS) will provide additional supervision and support for the Visitor Services Program. This project will help to accomplish Public Use Objectives 1 through 6.

Tour Loop Maintenance and Road Pullouts

Refuge visitation currently exceeds 60,000, with the majority during November through March; and at times, the tour loop road can become congested, especially when whooping cranes are present.

Currently, there are few areas for cars to pull off the road to observe the wildlife. Construction of additional pullout areas on the tour loop road would relieve some congestion and reduce the chance of accidents. Additionally, continued maintenance of the road, roadside, and culverts is an ongoing need. This project requires the addition of two new staff positions (a custodian and a tractor operator), with a one-time startup cost of \$30,000 each and a recurring base of \$128,981 under RONS. The estimated cost of the road maintenance is \$75,000 per year (Service Asset Maintenance Management System or SAMMS Project). This project will help to accomplish Public Use Objectives 1 through 6.

Visitor Trail Improvements

This project will improve the Refuge trails and wildlife observation opportunities by developing and maintaining three ¼-mile to ½-mile trail sections, adding new accessible observation decks with spotting scopes, and replacing and upgrading interpretive signs along the trails on Matagorda Island. Estimated cost: \$250,000. This project will help to accomplish Public Use Objectives 2 and 3.

Road Improvements

The roads on Matagorda Island need to be graded and graveled, and culverts need to be installed to allow for law enforcement, biological surveys, and maintenance activities during all times of the year and to protect from erosion and rutting. Estimated cost: \$300,000. This project will help to accomplish Public Use Objective 2 directly, but well-maintained roads on the Island will also contribute to accomplishing all of strategies related to Matagorda Island.

Enhance Visitor Services – Audio Tour

This RONS project involves the installation of a radio broadcast, Web cam, audio tour, and other technology to increase outreach to a diverse population, offering the opportunity to reach persons with disabilities as well. This broadcast will be available in the established Public Use Management Area. The project is estimated at \$50,000. This project will help to accomplish Public Use Objective 3.

Heavy Equipment

A long-reach and wide-tracked dragline/excavator machine is needed to better maintain the levees and habitats on the Refuge. This is to accomplish several habitat management strategies outlined in this Plan. The estimated cost is \$750,000. Purchasing this equipment will help to accomplish all of the Habitat Objectives outlined in Chapter 5.

Other Maintenance Projects

In addition to the previous list, the Refuge has backlogged maintenance projects currently totaling more than eight million dollars. Major projects (e.g., boundary fencing and posting, water facilities and impoundments maintenance, Burgentine Lake and dam maintenance, and road and culvert system maintenance), equipment, and building replacements (Youth Environmental Training Area and the Environmental Educational Center on Matagorda Island) make up the majority of the maintenance projects.

Table 6-1. Additional projects listed under RONS and SAMMS databases

Project Title	Cost (one-time)	Cost (recurring)	Total Needed (first year)
Refuge Support Refuge Clerk (RONS)	\$30,000	\$69,584	\$99,584
Whooping Crane Foraging Habitat on Uplands Study (RONS)	\$140,000	\$0	\$140,000
Conduct Recovery Effort for the Kemp's Ridley Sea Turtle (0.5 FTE) (RONS)	\$0	\$35,020	\$35,020

6.2 Partnerships

6.2.1 Existing Partnerships

The Friends of Aransas and Matagorda Island is a non-profit group made up of Refuge supporters that will become an increasingly important partner in the future. Although FAMI is a relatively new organization, it has already demonstrated its ability to reach out to the community for support and assistance for Refuge projects. Refuge staff will continue to work with FAMI to provide guidance and direction.

6.2.2 Potential Partnership Opportunities

Partnerships have become an essential element for the successful accomplishment of Refuge goals and objectives. Future partnerships can include advocacy for the Refuge, grant proposal assistance, public outreach, volunteer coordination, special event planning and staffing, and visitor center sales. The objectives and strategies outlined in this Plan need the support and partnership of Federal, State, and local agencies, non-governmental organizations, and

individuals. The ecosystem approach to managing fish and wildlife resources extends beyond social and political boundaries and requires a broad base of support and diverse stakeholder strengths and interests. As outlined in Chapter 5, the Aransas NWRC will seek creative partnership opportunities to ultimately achieve its vision.

6.3 Appropriate Refuge Uses and Compatibility

6.3.1 Appropriate Refuge Uses

All uses of a national wildlife refuge over which the Service has jurisdiction must be determined to be appropriate under the Appropriate Refuge Uses policy (603 FW 1). If an existing use is not appropriate, the refuge manager will deny the use without determining compatibility. An appropriate use of a national wildlife refuge is a proposed or existing use that meets at least one of the four following conditions:

- 1) The use is a wildlife-dependent recreational use as identified in the Refuge Improvement Act (i.e., hunting, fishing, wildlife observation and photography, and environmental education and interpretation);
- 2) The use contributes to fulfilling the refuge purposes, the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Refuge Improvement Act was signed into law;
- 3) The use involves the take of fish and wildlife under State regulations;
- 4) The Refuge manager has evaluated the use following guidelines in the Service Manual 603 FW 1.11 and found it appropriate.

6.3.2 Compatibility

In accordance with the Refuge Improvement Act of 1997, no uses for which the Service has authority to regulate may be allowed on a unit of the National Wildlife Refuge System unless it is determined to be compatible. A compatible use is a proposed or existing wildlife-dependent recreation use, or any other use of a national wildlife refuge that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge.

Compatibility determinations are not required for refuge management activities (e.g., conducting bird surveys) except economic activities (e.g., farming). Economic uses of a natural resource must contribute to achieving refuge purposes and the Refuge System mission. They are also not required where statute directs mandatory approval of the activity, as in the case of facilities for national defense. If a use is found to be incompatible, the Refuge will follow normal administrative procedures for stopping the action.

Compatibility determinations for existing hunting, fishing, wildlife observation and photography, and environmental education and interpretation must be re-evaluated with the preparation or revision of a comprehensive conservation plan or at least every 15 years. Compatibility determinations for all other uses must be re-evaluated every 10 years or earlier if conditions change or significant new information relative to the use and its effects becomes available. Refuge managers must complete a written compatibility determination for each use, or collection of like-uses, that is signed by the manager and the Regional Refuge Chief.

6.3.2.1 *Final Compatibility Determinations*

The following compatibility determinations have been completed as part of this planning effort:

- Agriculture – Farming
- Bicycling
- Camping
- Commercial Photography and Filming
- Environmental Education
- Fishing
- Hiking
- Hunting
- Interpretation
- Livestock Grazing
- Non-Motorized Boating (Kayaking and Canoeing)
- Photography
- Picnicking
- Redbay Harvest
- Scientific Research
- Wildlife Observation

6.4 *Step-down Management Plans*

Step-down management plans describe specific actions required for the accomplishment of Refuge objectives. The management plans identified in Table 6-2 will be reviewed and revised as necessary to achieve the results anticipated in this Comprehensive Conservation Plan.

Table 6-2. Step down Management Plans

Plan	Date Revised	Timeline and Program Area
Biological Inventory and Monitoring Plan	In Progress	Complete by end of FY 2011; Biological Program
Habitat Management Plan with species-level GIS vegetation map	In Progress	Complete in FY 2013; create annual work plan; Management, Fire, and Biological Programs
Integrated Pest and Invasive Species Management Plan	2009	Review annually and revise as needed
Visitor Services Plan	In Progress	Complete by end of FY 2010; Visitor Services
Law Enforcement Plan	In Progress	Complete by end of FY 2010; review annually; Law Enforcement and Visitor Services Programs

Plan	Date Revised	Timeline and Program Area
Cultural Resource Management Plan	-----	Complete in FY 2016; Visitor Services Program
Water Management Plan	2003	Review annually, create annual work plan; Management and Biological Programs
Hunt Management Plan (Including Matagorda Island)	1995	Revise by FY 2012; after revision, review and revise annually; Visitor Services and Law Enforcement Programs
Fishing Plan	-----	Complete in FY 2011; Visitor Services and Law Enforcement Programs
Fire Management Plan	2005	Review annually; revise in FY 2009; Fire Management Program
Fire Monitoring Plan	In Progress	Complete by end of FY 2010; Fire Management Program
Cropland Management Plan	In Progress	Complete by end of FY 2010; Management Program
Wilderness Management Plan	-----	Not applicable
Hurricane Preparedness Plan	2006	Review annually and revise as needed; revised in FY 2010; Management Program
Oil Spill Prevention Plan	2005	Review annually and revise as needed; revised in FY 2010; Biological Program
Oil and Gas Exploration and Production Plan	-----	Complete in FY 2010; Biological and Management Programs
Safety Plan	2010	Review annually and revise as needed; revised in FY 2010; Refuge Safety Officer
Vital Records Plan (380 DM 6)	In Progress	Complete by FY 2011; Administrative Staff
File Plan	In Progress	Complete by FY 2010; Administrative Staff
Land Protection Plan	In Progress	Complete within 5 years of Plan implementation; Management Program and Whooping Crane Coordinator
Matagorda Island Adaptive Management Plan	May 2008	Revise as needed; revised in FY 2009; Management Program

6.5 Monitoring and Evaluation

The effectiveness of proposed management actions will be monitored throughout the life of this Plan. Where possible, the Plan identifies and incorporates monitoring and evaluation activities as objectives or strategies. Some specific wildlife and habitat monitoring strategies were described in Chapter 5. However, more details are available in the step-down biological inventory and monitoring Plan. Specific guidelines for monitoring and evaluation will vary by program and will be included in the appropriate step-down plan. As new information becomes available through baseline data, research, or outcomes of management projects, the appropriate Refuge program would be adjusted accordingly. Step-down plans, including the monitoring and evaluation sections, would require periodic review, program evaluation, and adjustments, as necessary.

The Aransas NWRC Plan is intended to be a useful working document for present and future managers. Periodic review, evaluation, and the addition of information will be required to achieve effective implementation of the Plan, even as Refuge programs change over time. Typically, every three to five years, a Station Review Team should visit the Aransas NWRC and evaluate the current programs. The team will consist of Refuge supervisors, program specialists, and biologists from the Regional Office and other field stations. The team will review all aspects of Refuge management, including direction, accomplishments, and funding. The goals and objectives presented in this Plan will provide the evaluation measure for the team.

6.6 Staffing, Budget, and Facilities Needed to Fully Implement the Comprehensive Conservation Plan

Fully implementing the goals, objectives, and strategies described in this Plan by 2024 will require additional staffing, as well as changes in the job duties of existing staff positions (see Chapter 4, Staffing and Budget).

Staffing

Visitor Services staffing currently consists of a Supervisory Outdoor Recreation Planner, an Environmental Education Specialist, a Law Enforcement Officer, a part-time Clerk, and help from FAMI and Refuge volunteers. An additional Visitor Services Specialist, Public Use Assistant, and Law Enforcement Officer are needed to implement the Visitation, Outreach, Environmental Education, Law Enforcement, and Visitor Safety objectives. The Complex has an active Volunteer Program managed as collateral duty by the Supervisory Outdoor Recreation Planner. In recent years, refuges have become more dependent on volunteers to help accomplish needed work projects. To help improve the Volunteer Program, operational funding amounting to approximately \$75,000 a year is needed to employ a Wildlife Refuge Specialist as a Volunteer Coordinator/Friends Liaison/Grants Coordinator for the Refuge. This employee will develop, train, and manage a dynamic volunteer workforce of stewardship partners and advocates of the Refuge Complex and the Refuge System. In addition, this job would entail seeking grant monies as deemed appropriate by need and Refuge management approval, and maintaining fiscal accountability (i.e., ensuring that any funding is spent appropriately).

Currently, one full-time Law Enforcement Officer is unable to patrol the boundaries of the five Refuge units, much of which is only accessible by boat, on as frequent a basis as is needed. Consequently, management may be unaware of illegal activity occurring on the units. There has been some illegal drug activity on the Complex. A second officer would not only provide increased law enforcement presence, but also would improve officer safety and emergency response. Operational funding amounting to approximately \$75,000 per year is needed to employ a second full-time Law Enforcement Officer to enhance the Refuge law enforcement and public use programs.

Three existing positions (Biological Aide and two Laborer positions) will be replaced by the proposed additional Biological Technicians described here. Six additional maintenance positions are needed to accomplish all aspects of Refuge operations and management, including beach and shoreline debris and contaminant cleanup. A fully staffed maintenance program is essential in accomplishing many of the tasks described in this Plan. With the recent increase in computer-based timekeeping, training, travel, communication, and reporting requirements, there is a need to have a full-time information technology (IT) specialist and administrative technician to handle these issues. There is a need to have at least one position dedicated to maintaining computer infrastructure, assisting the staff in IT issues,

and keeping the Complex's computer systems operational. The IT and administrative technician positions assist in all program areas. Therefore, to fully implement the goals, objectives, and strategies described in the Plan, the following additional positions would be needed (Table 6-3):

Table 6-3. Additional Permanent Full-Time Staffing Needed to Fully Implement the Aransas NWRC Comprehensive Conservation Plan

Supervisory Wildlife Refuge Specialist	GS-0485 (11/12)	Management
Wildlife Refuge Specialist	GS-0485 (07/09)	Management
Wildlife Refuge Specialist	GS-0485 (07/09)	Management
Information Technology Spec.	GS-2210 (07/09)	Administration
Administrative Technician	GS-0303 (06)	Administration
Visitor Services Specialist	GS (05/07/09)	Visitor Services
Public Use Assistant	GS-05	Visitor Services
Law Enforcement Officer	GS-0025 (07/09)	Law Enforcement
Refuge Biologist	GS-486 (07/09)	Biology
Refuge Biologist	GS-486 (07/09)	Biology
Biological Technician	GS-0404-05/07	Biology
Biological Technician	GS-0404-05/07	Biology
Biological Technician	GS-0404-05/07	Biology
Maintenance Worker	WG-4749-08/09	Maintenance
Maintenance Worker	WG-4749-08/09	Maintenance
Maintenance Worker	WG-4749-08/09	Maintenance
Maintenance Worker	WG-4749-08/09	Maintenance
Laborer (Custodial)	WG-04/05	Maintenance
Tractor Operator	WG-05/06	Maintenance

Budget

During the past three years, the total annual costs have risen approximately 16 percent per year, currently amounting to approximately \$2.96 million on average. This includes staff salaries, benefits, fixed costs, and operations and maintenance. Including the additional staffing already described, to fully implement the goals, objectives, and strategies in this Plan, approximately \$4.02 million is needed each year. This estimate is based on starting pay grades for each pay series (i.e., GS-General Schedule, LE-Law Enforcement, and WG-Wage Grade) using the 2007–2008 OPM (Office of Personnel Management) salary tables. The estimate does not include 1) one-time startup costs of about \$30,000 associated with each new permanent employee (\$570,000 for 19 new staff positions); 2) any funding for specifically targeted projects; or 3) future grade and step increases, cost-of-living increases, and general inflation, which may further increase the level of funding needed in future years.

Facilities

Inherent in this Plan for additional staff and budget monies is the provision for the annual corrective and preventative maintenance of existing facilities. Facilities are more thoroughly explained in the *Refuge Facilities and Transportation Infrastructure* section in Chapter 4.

6.7 Plan Amendment and Revision

The Plan for the Aransas Refuge Complex is meant to be a guide for Refuge managers and staff to use during the next 10–15 years. The Refuge Manager will refer to the Plan regularly to ensure station priorities and work guidance are on track with plans. Appropriate staff members will be assigned tasks and projects identified in the Plan to accomplish the objectives stated in the Plan. However, the Plan is also a dynamic and flexible document. Some of the management strategies discussed within the Plan have never before been used on the Refuge. Weather events, such as droughts, periodic freezes, hurricanes and tropical storms, can drastically impact specific habitat management applications, timing, and public use functions. Funding and personnel changes can also influence the amount and types of work that can be accomplished. Because of all these factors, the recommendations in the Plan will be reviewed periodically and, if necessary, adjusted to meet circumstances. Refuge Managers will review the Plan at least every five years to determine if revisions are needed. Any necessary revisions will be incorporated into the Plan, with proper public participation. The Aransas Refuge Complex Plan will be revised no later than 2014. Whenever possible, specific objectives and strategies have built-in time frames that allow for these uncertain conditions. The public will be notified through newsletters, media announcements, or public meetings if a substantial shift in a particular management strategy is recommended after a periodic review of this Plan.

6.8 Intra-Service Section 7 (Endangered Species Act Consultation)

An Intra-Service Section 7 consultation was conducted for the implementation of Plan objectives and strategies with the Corpus Christi Ecological Services Field Office (see Appendix H).

6.9 Refuge Contact Information

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*Texas sunset over the bay waters of the Refuge.
Photo: Tonya Nix*

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References

- Allen, J.A. 1894. On the mammals of Aransas County, Texas with descriptions of new forms of *Lepus* and *Oryzomys*. *Am. Mus. Nat. Hist. Bull.* No. 6, pp. 165-198.
- Berlandier, J.L. 1834. *Journey to Mexico During the Years 1826-1834*. Translated by S. M. Ohlendorf, J.M. Bigelow and M. M. Standifer. University of Texas, Austin.
- Blankinship, D.R. 1976. Studies of whooping cranes on the wintering grounds. *Proceedings of the International Crane Workshop* 1:197-206.
- Boul, S.W., F.D. Hole, and R.J. McCracken. 1980. *Soil Genesis and Classification, Second Edition*. Iowa State University Press, Ames. 406pp.
- Collins, S.L. and L.L. Wallace. 1990. *Fire in North American Tallgrass Prairie*. University of Oklahoma Press, Norman. 175pp.
- Donahue, R.L., R.W. Miller, and J.C. Shickluna. 1983. *Soils: An Introduction to Soils and Plant Growth*, 5th Edition. Prentice-Hall, Inc., New Jersey. 667pp.
- Dodd, J.D. 1968. Grassland Associations of North America. In F. W. Gould, *Grass Systematics*. McGraw Hill, New York. 382pp.
- Economic Pulse 2003. Texas A&M University-Corpus Christi College of Business and Center for Business Research newsletter. Dr. Moustafa H. Abdelsamad, Dean, College of Business & Director of Center for Business Research at <http://pulse.cob.tamucc.edu>.
- Esslinger, C.G. and B.C. Wilson. 2001. North American Waterfowl Management Plan, Gulf Coast Joint Venture: Chenier Plain Initiative. North American Waterfowl Management Plan, Albuquerque, New Mexico, USA. 28pp. + appendix.
- Godfrey, C.L., G.S. McKee, and H. Oaks. 1973. General Soil Map of Texas. *Tex. Agr. Exp. Sta., Tex.* A&M University, Texas.
- Gosselink, J.G., C.L. Cordes, and J.W. Parsons. 1979. An Ecological Characterization Study of the Chenier Plain Coastal Ecosystem of Louisiana and Texas. 3rd. Volume. U.S. Dept. of Interior, U.S. Fish and Wildlife Service, Office of Biological Sciences, Slidell, Louisiana. USFWS/OBS: 78/9 – 78/11.
- Gould, F.W. 1975a. Texas Plants: A Checklist and Ecological Summary. *Texas Agr. Exp. Sta. MP* 585(Rev.). 121pp.
- Gould, F.W. 1975b. *The Grasses of Texas*. Texas A&M University Press, College Station. 653pp.
- Gould, F.W. and T.W. Box. 1965. *Grasses of the Texas Coastal Bend (Calhoun, Refugio, Aransas, San Patricio, and northern Kleberg Counties)*. Texas A&M University Press, College Station, Texas. 186pp.
- Gould, F.W., G.D. Hoffman, and C.A. Rechenthin. 1960. *Vegetational Areas of Texas*. Texas A&M University Press. Texas Agricultural Experiment Station, Leaflet No. 492
- Guckian, W.J. and R.N. Garcia. 1979. Soil Survey of San Patricio and Aransas Counties, Texas. U.S. Department of Agriculture – Soil Conservation Service Publication.
- Haig, S.M. and L.W. Oring. 1988. Distribution and dispersal in the Piping Plover. *Auk* 105:268-277.
- Haig, S.M. 1992. Piping Plover. in *The Birds of North America, No. 2* (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union.
- Halloran, A.F. 1943. Management of deer and cattle on the Aransas National Wildlife Refuge, Texas. *J. Wildl. Mgt.* 7(2):203-216.

References

- Hatch, L.S., J.L. Schuster, and D.L. Drawe. 1999. *Grasses of the Texas Gulf Prairies and Gulf Marshes*. Texas A&M University Press, College Station, Texas. 355pp.
- Hoese, H.D. and R.H. Moore. 1998. *Fishes of the Gulf of Mexico: Texas, Louisiana, and Adjacent Water*. W.I. Moody, Jr., Natural History Series, No. 22. 547 pp.
- Hunt, H. E., and R. D. Slack. 1989. Winter Diets of Whooping and Sandhill Cranes in South Texas. *J. Wildl. Mgt.* 53(4):1150-1154.
- Labuda, S. E. 1975. A Land Use History of the Blackjack Peninsula of the Texas Coastal Bend. Aransas NWR - U.S. Fish and Wildlife Service. Austwell, Texas. 12pp.
- McAlister, W. H. and M. K. McAlister. 1995. *A Naturalist's Guide - Aransas*. University of Texas Press, Austin. 392pp.
- Mowery, I. C. and J. E. Bower. 1978. Soil Survey of Calhoun County, Texas. U.S. Dept. of Agri. Soil Cons. Serv. Pub.
- National Agricultural Statistics Service 2002. USDA Agricultural Census at <http://www.agcensus.usda.gov/Publications/2002/index.asp>.
- Pulich, W. M., Jr., and Leland Roberts. 1996. Seagrass Conservation Plan for Texas, Conceptual Draft. Prepared for discussion at the Symposium on Texas Seagrasses, Corpus Christi, Texas. 13pp.
- Quammen, M. L. and C.P. Onuf. 1993. Laguna Madre: seagrass changes continue decades after salinity reduction. 16:302-310.
- Rechenthin C.A., H.M. Bell, R.J. Pederson, and D.B. Polk. 1964. Grassland restoration: brush control. U.S. Dept. of Agriculture - Soil Conservation Service Publication. Temple, Texas. 39pp.
- Scifres, C. J. 1980. *Brush Management – Principles and Practices for Texas and the Southwest*. Tex. A&M Univ. Press, College Station. 360pp.
- Spaight, A. W. 1882. *The Resources, Soil and Climate of Texas*. A.H. Belo and Co., Galveston, Texas 352pp.
- Texas Parks and Wildlife Department (TPWD). 2005. Texas Comprehensive Wildlife Conservation Strategy 2005-2010. Austin, Texas. 1131pp.
- Tharp, B. C. 1952. *Texas Range Grasses*. University of Texas Press, Austin. 125pp.
- U.S. General Accounting Office. 2001. GAO-02-64R. U.S. Fish and Wildlife Information on Oil and Gas Activities in the National Wildlife Refuge System. Washington, D.C.
- U.S. Fish and Wildlife Service 2006. Banking on Nature 2006: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation. 372pp.
- U.S. Fish and Wildlife Service/U.S. Geological Survey. 2006. Strategic Habitat Conservation; Final Report of the National Ecological Assessment Team. 45pp.
- Vines, R. A. 1960. *Trees, Shrubs, and Woody Vines of the Southwest*. University of Texas Press, Austin. 1104pp.

Terminology

Glossary

Appropriate Use: A proposed or existing use on a refuge that is a wildlife-dependent recreational use as identified in the 1997 Refuge System Improvement Act (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) or the use contributes to the fulfillment of refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997.

Biological Diversity: The variety of life and its processes, including the variety of living organisms, the genetic differences among them and communities and ecosystems in which they occur.

Biological Integrity: Biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities.

Biotic Community: A set of plants, animals, and microorganisms occupying an area, interacting directly or indirectly with each other and their physical environment.

Chenier: A French word meaning “place of oaks.” Cheniers are ridges that represent ancient shorelines, generally aligned parallel to the current shoreline. The higher cheniers support woody vegetation. The Chenier Plain is a geographical region along the Gulf of Mexico ranging from southeastern Louisiana to southeastern Texas as described in Gosselink et al. 1979.

Compatible Use: A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge.

Comprehensive Conservation Plan: A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates.

Cultural Resources: The remains of sites, structures, or objects used by people in the past.

Ecological Integrity: The relative intactness of biotic and abiotic components and their interrelated structure and function within a given ecosystem.

Ecosystem: Dynamic and interrelating complex of plant and animal communities and their associated non-living environment.

Ecosystem Approach: A strategy or plan to protect and/or restore the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.

Ecosystem Management: Management of an ecosystem that includes all ecological, social, and economic components that make up and/or affect the whole of the system.

Ecotourism: Nature-based tourism or “responsible travel to natural areas that conserves the environment and improves the welfare of local people” (as defined by Conservation International).

Endangered Species: A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range.

Environmental Assessment: A systematic analysis to determine if proposed Federal actions would result in a “significant effect on the quality of the human environment” requiring either the preparation of an environmental impact statement (EIS) or a determination of a “Finding of No Significant Impact” (FONSI).

Environmental Stochasticity: Refers to variability in populations (e.g., birth and death rates) in response to weather, disease, predation, competition, or other factors that are external to the given population.

Exotic: A non-native plant or animal species to the ecosystem under consideration; introduced intentionally or unintentionally.

Federal Trust Species: Important fish and wildlife resources that the U.S. Fish and Wildlife Service is specifically mandated to protect, including migratory birds, threatened species, endangered species, inter-jurisdictional fish, marine mammals, and other species of concern.

Focal Species: Wildlife species that are a subset of priority species and that represent larger guilds of species that use habitats in a similar way.

Fluvial (as in fluvial deposits): of or relating to a stream or river such as the effects caused by the action of flowing water.

Guild or Species Guild: An aggregation or group of species that tend to use the same kinds of resources for feeding or reproduction (e.g., feeding sites, nesting sites) in a similar manner. Species guilds are useful in helping to focus wildlife and habitat management efforts or in environmental impact studies.

Holistic (management approach): Treatment or consideration of whole systems, as in ecosystem management, rather than managing habitats as separate entities. The holistic management approach involves an emphasis on the importance of whole systems and the interdependence of its parts.

Invasive Plant Species: A non-native plant to the ecosystem under consideration that lacks natural controls and tends to aggressively dominate the plant community, often forming extensive monocultures. Occasionally, native species can be invasive under certain conditions. Invasive species generally reduce the diversity and health of ecosystems when they become dominant.

National Wildlife Refuge: A designated area of land or water or an interest in land or water within the Refuge System, such as refuges, wildlife management areas, waterfowl production areas and other areas under Service jurisdiction for the protection and conservation of fish and wildlife and plant resources. A complete listing of all units of the Refuge System may be found in the current “Annual Report of Lands under Control of the U.S. Fish and Wildlife Service.”

National Wildlife Refuge System (Refuge System): All lands, waters, and interests therein administered by the U.S. Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish, wildlife, and plant resources.

Priority Public Use: Wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation are the priority general public uses of the Refuge System and shall receive priority consideration in refuge planning and management.

Priority Species: Wildlife or plants that may be federally listed species but also include rare, declining, or species of management concern that are on lists maintained by natural heritage programs, landscape-level plans, State wildlife agencies, other Federal agencies, or professional academic and/or scientific societies. Further research and field study are needed to resolve the conservation status of these species.

Public Uses: Normally refers to the six priority public uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) but may include other permitted special uses.

Riparian: Of or relating to land lying immediately adjacent to a water body and having specific characteristics of that area, such as riparian vegetation. A stream bank is an example of a riparian area.

Scoping: A process for identifying the “scope of issues” to be addressed by a Comprehensive Conservation Plan. Involved in the scoping process are Federal, State, and local agencies; private organizations; and individuals.

Stakeholders: Those agencies, organizations, groups, and individuals of the public having an interest or stake in an organization’s program and that may be affected by its implementation.

Threatened Species: A plant or animal species listed under the Endangered Species Act that is likely to become endangered within the foreseeable future.

Trust Species: *See Federal Trust Species*

Watershed: The entire land area that collects and drains water into a stream or stream system.

Wetland: Areas such as lakes, marshes, ponds, swamps, or streams that are inundated by enough surface or groundwater to support plants and animals that require saturated or seasonally saturated soils.

Wildlife-dependent Recreational Use: A use of a refuge that involves hunting, fishing, wildlife observation and photography, or environmental education and interpretation, as identified in the National Wildlife Refuge System Improvement Act of 1997.

Winter Texan: Travelers who migrate to Texas for the winter, usually for several months at a time. For some, Texas is an established winter home. The Lower Rio Grande Valley is the top destination for Winter Texans (*Source: Texas Department of Economic Development and Tourism Division*).

Abbreviations and Acronyms

APC – Attwater's Prairie Chicken
ARPA – Archaeological Resources Protection Act
ATV – All-terrain Vehicle
AWBP – Aransas-Wood Buffalo Population (Whooping Cranes)
BCR – Bird Conservation Region
CBRA – Coastal Barrier Resources Act
CCP – Comprehensive Conservation Plan
CEA – Conservation Easement Amendment
CFR – Code of Federal Regulations
CMP – Comprehensive Management Plan
CPR – Cardio-pulmonary Resuscitation
Corps – U.S. Army Corps of Engineers
CRADA – Cooperative Research and Development Agreement
CWCS – Comprehensive Wildlife Conservation Strategy
dbh – Diameter-at-breast height
DM – Departmental Manual
DOI – U.S. Department of the Interior
EA – Environmental Assessment
EE/P – Environmental Education/Plan
EIS – Environmental Impact Statement
EO – Executive Order
EPA – Environmental Protection Agency
ESFO – Ecological Services Field Office
FACA – Federal Advisory Committee Act
FIFRA – Federal Insecticide, Fungicide, and Rodenticide Act
FM – Farm Road
FmHA – Farmer's Home Administration
FR – Federal Register
FAMI – Friends of Aransas and Matagorda Island
FONSI – Finding of No Significant Impact
FWS – U.S. Fish and Wildlife Service

FY – Fiscal Year
GBRA – Guadalupe-Blanco River Authority
GIS – Geographic Information System
GIWW – Gulf Intracoastal Waterway
GS – General Schedule (Federal pay series)
GLO – Texas General Land Office
HMP – Habitat Management Plan
IBA – Important Bird Area
ISD – Independent School District
IT – Information technology
Km – Kilometer
LCC – Landscape Conservation Cooperative
LE/O – Law Enforcement /Officer
LPP – Land Protection Plan
MBTA – Migratory Bird Treaty Act
MFW – Myrtle Foester Whitmire Unit
MINWR & SNA – Matagorda Island National Wildlife Refuge and State Natural Area
MOA – Memorandum of Agreement
MMPA – Marine Mammal Protection Act
MPA – Marine Protected Area
NAAQS – National Ambient Air Quality Standards
NABCI – North American Bird Conservation Initiative
NAWCP – North American Waterbird Conservation Plan
NAWMP – North American Waterfowl Management Plan
NEPA – National Environmental Policy Act
NERR – National Estuarine Research Reserve
NOAA – National Oceanic and Atmospheric Administration
NPS – National Park Service
NRCS – National Resources Conservation Service
NWRC – National Wildlife Refuge Complex
OPM – Office of Personnel Management
PIF – Partners in Flight
POA –Port O'Connor Offshore Association

Terminology

ppt – Parts per thousand
PUMA – Public Use Management Area
RONS – Refuge Operating Needs System
RRP – Refuge Roads Program
SAMMS – Service Asset Maintenance Management System
Service – U.S. Fish and Wildlife Service
STEP – Senior Texan Employment Program
SCA – Student Conservation Association
SHC – Strategic Habitat Conservation
SUP – Special Use Permit
TAILS – Tracking and Integrated Logging System
TCEQ – Texas Commission on Environmental Quality
TEKS – Texas Essential Knowledge and Skills
TFS – Texas Forest Service
TNC – The Nature Conservancy of Texas
TTIA – Texas Travel Industry Association
TPWD – Texas Parks and Wildlife Department
TWDB – Texas Water Development Board
TWA – Texas Wildlife Association
TXDOT – Texas Department of Transportation
USDA – U.S. Department of Agriculture
USGS – U.S. Geological Survey
USFWS – U.S. Fish and Wildlife Service
WRP – Wetlands Reserve Program
WUI – Wildland Urban Interface
YETA – Youth Environmental Training Area

A. Key Legislation and Service Policies

Management of the Aransas NWRC is dictated, in large part, by the legislation that created the Refuge and the purposes and goals described in Chapter 1 of this Plan. However, other laws, regulations, and policies also guide the management of the Refuge. This appendix identifies the acts and policy guidance that are integral in the development of this Comprehensive Conservation Plan (Plan).

Administrative Procedure Act (1966; 5 U.S.C. 551-559, 701-706 and 801-808), as amended: Contains procedures that Federal agencies must follow, including public information, open meetings, and privacy of information requirements, and provisions for hearings, adjudications, rule-making, and judicial and congressional review of Federal agency actions.

Agricultural Credit Act of 1987 (7 U.S.C. 5104; P.L. 100-233): Authorizes the Farmer's Home Administration (FmHA) to transfer land to any Federal or State agency for conservation purposes (e.g., the FmHA can transfer fee-title or assign interests in real estate to the U.S. Fish and Wildlife Service for the protection of floodplains, wetlands, and surrounding uplands).

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Americans with Disabilities Act (1992): The Americans with Disabilities Act is the most comprehensive Federal civil rights statute that prohibits discrimination on the basis of disability in employment, State and local government, public accommodations, commercial facilities, transportation, and telecommunications.

Antiquities Act of 1906 (16 U.S.C. 431-433): First U.S. law to provide general protection of cultural or natural resources. This act authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Archaeological and Historic Preservation Act (1974): Requires that Federal agencies provide for *"...the preservation of historical and archeological data (including relics and specimens) which might otherwise be irreparably lost or destroyed as the result of...any alteration of the terrain caused as a result of any Federal construction project of Federally-licensed activity or program."*

Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-470mm), as amended: The Archaeological Resources Protection Act (ARPA) was enacted *"...to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals."* The main focus of ARPA is on regulation of legitimate archeological investigation on public lands and the enforcement of penalties against looting or vandalism of these resources. Protects materials of archeological interest from unauthorized

removal or destruction and requires Federal managers to develop plans and schedules to locate archeological resources.

Appropriate Uses Policy (2006) 603 FW 1: Describes procedures for refuge managers to follow when deciding if uses are appropriate on a refuge. Appropriate uses are either proposed or existing uses on a refuge that meet at least one of the following four conditions: 1) the use is a wildlife-dependent recreational use as identified in the 1997 Improvement Act; 2) the use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law; 3) the use involves the take of fish and wildlife under State regulations; or 4) the use has been found to be appropriate as described further in the Appropriate Refuge Uses policy. This policy applies to all proposed and existing uses in the Refuge System only where the Service has jurisdiction over the use. The policy does not apply in 1) situations where reserved rights or legal mandates provide that the Service must allow the use; and 2) refuge management activities (e.g., fish and wildlife population or habitat management actions, including but not limited to prescribed burns, water level management, invasive species control, routine scientific monitoring, law enforcement activities, and maintenance of existing refuge facilities).

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

Bald and Golden Eagles Protection of 1940 (16 U.S.C. 668-668d; 54 Statute 250), as amended: Provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds.

Biological Integrity, Diversity, and Environmental Health (2001) 601 FW 3: As part of the comprehensive conservation planning process, this policy provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated ecosystems. It provides refuge managers with an evaluation process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions and, where appropriate and in concert with refuge purposes and Refuge System mission, restore lost or severely degraded components.

Clean Air Act (1970; 42 U.S.C. 7401 et seq.), as amended: A comprehensive Federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes the U.S. Environmental Protection Agency to establish National Ambient Air Quality Standards to protect public health and the environment.

Clean Water Act (1977); Federal Water Pollution Control Act: This is the principal law that governs pollution of the Nation's surface waters. The Clean Water Act employs several regulatory and non-regulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. Section 404 of the Clean Water Act requires permits (issued by the U.S. Army Corps of Engineers) for the discharge of dredged or fill material into waters of the U.S., including wetlands.

Coastal Barrier Resources Act (1982; 16 U.S.C. 3501 et seq.), as amended: This act (CBRA) designated various undeveloped coastal barrier islands, depicted by specific maps, for inclusion in the Coastal Barrier Resources System. Areas so designated were made ineligible for direct or indirect Federal financial assistance that might support development, including flood insurance, except for emergency life-saving activities. Exceptions for certain activities, such as fish and wildlife research, are provided, and National Wildlife Refuges and other, otherwise protected areas are excluded from the System.

Compatibility Policy (2000) 603 FW 2: Incorporates the compatibility provisions of the National Wildlife Refuge System Improvement Act of 1997, which amends the National Wildlife Refuge System Administration Act of 1966. The Compatibility Policy is for determining whether proposed and existing uses, which the Service has jurisdiction over and are occurring on national wildlife refuges, are compatible (i.e., will not detract from or materially interfere) with the purpose(s) of the Refuge or with the Refuge System's mission. The policy is to ensure that the Service administers proposed and existing national wildlife refuge uses according to laws, regulations, and policies concerning compatibility; and it provides procedures for documentation and periodic review of existing refuge uses.

Comprehensive Conservation Plans (2000) 602 FW 3: As required by the National Wildlife Refuge System Improvement Act of 1997, Comprehensive Conservation Plans (Plans) describe the desired future conditions of a refuge and provide long-range guidance and management direction to achieve refuge purposes; help fulfill the Refuge System mission; maintain and, where appropriate, restore the ecological integrity; as well as to meet other mandates. The purpose of developing the Comprehensive Conservation Plans is to provide the refuge manager with a 15-year management plan for the conservation of fish, wildlife, and plant resources and their related habitats, while providing opportunities for compatible wildlife-dependent recreational uses.

Convention Between the United States of America and the Mexican States for the Protection of Migratory Birds and Game Mammals, 1936 (50 Statute 1311).

Convention of Nature Protection and Wildlife Preservation in the Western Hemisphere, 1940 (56 Statute 1354).

Convention Between the United States and Great Britain (for Canada for the Protection of Migratory Birds). (39 Statute 1702; TS 628), as amended.

Convention on Wetlands of International Importance, Especially as Waterfowl Habitats (I.L.M. 11:963-976, September 1972, Ramsar Convention).

Cooperative Research and Training Units Act (1960; 16 U.S.C. 753a-753b), as amended: Authorizes the Secretary of the Interior to enter into cooperative agreements with colleges and universities, State fish and game agencies, and nonprofit organizations for the purpose of developing adequate, coordinated, cooperative research and training programs for fish and wildlife resources.

Criminal Code Provisions of 1940 (18 U.S.C. 41), as amended: Provides for fines and penalties for the unlawful taking, disturbing, hunting, trapping, or capturing of "*...any bird, fish, or wild animal of any kind whatever, or takes or destroys the eggs or nest of any such*

bird or fish, on any lands or waters which are set apart or reserved as sanctuaries, refuges or breeding grounds for such birds, fish, or animals under any law of the United States or willfully injures, molests, or destroys any property of the United States on any such lands or waters...”

Disaster Relief Act of 1974 (42 U.S.C. 5121 et seq.), as amended: Provides authority for Federal agencies to assist State and local governments during Presidentially declared emergencies.

Economy Act (1932; 31 U.S.C. 1535): Provides authority for Federal agencies to order goods and services from other Federal agencies and to pay the actual costs of those goods and services. The act was passed to obtain economies of scale and eliminate overlapping activities of the Federal government.

Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901-3932), as amended: The purpose of this act is to promote wetlands conservation for the public benefit and to help fulfill international obligations in various migratory bird treaties and conventions. The act authorizes the purchase of wetlands from Land and Water Conservation Fund monies. The act also requires the Secretary of the Interior to establish a National Wetlands Priority Conservation Plan, requires the states to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers funds from import duties on arms and ammunition to the Migratory Bird Conservation Fund.

Endangered Species Act of 1973, as amended: The main purposes of the Endangered Species Act are to 1) provide a means whereby ecosystems of threatened and endangered species may be conserved, and 2) provide a program for the conservation of threatened and endangered species. The provisions of the Endangered Species Act include, but are not limited to, land acquisition, cooperative programs with the states, and interagency cooperation (Section 7). Section 7(a)(1) directs Federal agencies to carry out programs for the conservation of threatened and endangered species.

Environmental Education Act of 1990 (20 U.S.C. 5501-5510): Established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a Federal environmental education program. The Office is required to develop and support environmental programs in consultation with other Federal natural resource management agencies, including the U.S. Fish and Wildlife Service.

Environmental Education Policy (2006) 605 FW 6: Provides the Service’s policy governing the management of environmental education programs on units of the Refuge System. Environmental education is a priority appropriate use of the Refuge System when compatible. The policy encourages refuge managers to provide quality environmental education programs that can promote understanding and appreciation of natural and cultural resources and their management on all lands and waters in the Refuge System. The policy also emphasizes that refuge staff develop and take full advantage of opportunities to work with volunteers and partners who have an interest in conducting quality environmental education programs on refuges.

Executive Order 11514; Protection and Enhancement of Environmental Quality (1970): This directs that the “...*Federal Government shall provide leadership in protecting and enhancing the quality of the Nation's environment to sustain and enrich human life. Federal*

agencies shall initiate measures needed to direct their policies, plans, and programs so as to meet national environmental goals...

Executive Order 11644; Use of off-road vehicles on the public lands (1972): Requires that the Service designate areas as open or closed to off-highway vehicles in order to protect refuge resources, promote safety, and minimize conflict among the various refuge users; monitor the effects of these uses once they are allowed; and amend or rescind any area designation as necessary based on the information gathered.

Executive Order 11987; Exotic organisms (1977): Executive agencies shall, to the extent permitted by law, restrict the introduction of exotic species into the natural ecosystems on lands and waters that they own, lease, or hold for purposes of administration; and, shall encourage the states, local governments, and private citizens to prevent the introduction of exotic species into natural ecosystems of the United States.

Executive Order 11988; Floodplain Management (1977): This directs that each Federal agency “...shall provide leadership and take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains...” in carrying out its responsibilities.

Executive Order 11989; Off-Road Vehicles on Public Lands (1977): Requires the Service to close areas to off-highway vehicles when it is determined that the use causes or will cause considerable adverse effects on the soil, vegetation, wildlife, habitat, or cultural or historic resources.

Executive Order 11990; Protection of Wetlands (1977): This directs that each Federal agency “...shall provide leadership and shall take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency’s responsibilities...”

Executive Order 12996; Management and General Public Use of the National Wildlife Refuge System (1996): This spells out the mission of the Refuge System and establishes guiding principles to help insure the long-term enjoyment of the Refuge System for present and future generations. The order directs the Secretary of the Interior to recognize compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation as priority general public uses on the Refuge System (i.e., the ‘big six’).

Executive Order 13007; Indian Sacred Sites (1996): Directs Federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

Executive Order 13112; Invasive Species (1999): This order was established to address the growing ecological and economic damage caused by invasive species. Executive Order 13112 requires Federal agencies to 1) identify actions that might impact the status of invasive species and prevent introductions of invasive species; 2) not authorize, fund, or carry out actions likely to cause the introduction or spread of invasive species; 3) detect and respond rapidly to control invasive species populations; 4) monitor and conduct research on invasive

species; 5) restore native species and habitat conditions in ecosystems that have been invaded; and 6) promote public education on invasive species.

Executive Order 13158; Marine Protected Areas (2000): directs protection of the significant natural and cultural resources within the marine environment for the benefit of present and future generations by strengthening and expanding the Nation's system of marine protected areas (MPAs). An MPA is any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein. The EO directs Federal agencies to work together with states, territories, tribes, and non-governmental partners to develop and maintain an effective national system of MPAs in the U.S. and to accomplish a variety of related tasks working with public and private partners. The "marine environment" is defined as those areas of ocean and coastal waters, the Great Lakes and their connecting waters, and submerged lands thereunder, over which the U.S. exercises jurisdiction, consistent with international law.

Executive Order 13186; Responsibilities of Federal agencies to protect migratory birds (2001): Provides guidance for Service programs relative to the management and conservation of migratory birds. Its purpose is to minimize the potential adverse effects of migratory bird take, with the goal of striving to eliminate take, while implementing our mission. This guidance includes but is not limited to: integrating migratory bird conservation measures into our activities; 2) restoring and enhancing the habitat of migratory birds; 3) ensuring our actions and/or plans promote migratory bird conservation; 4) promoting inventory, and monitoring, research, management studies, and information exchange related to migratory birds; 5) promoting education and outreach related to migratory birds; 6) identifying special migratory bird habitats; and 7) strengthening non-Federal partnerships to further bird conservation.

Executive Order 13443; Facilitation of Hunting Heritage and Wildlife Conservation (2007): Directs Federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management, including the Department of the Interior and the Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

Executive Order 13514; Federal Leadership in Environmental, Energy, and Economic Performance (2009): Provides guidance for Federal agencies to increase energy efficiency; reduce greenhouse gas emissions; design, construct, maintain, and operate high performance sustainable buildings, etc.

Farmland Protection Policy Act (7 U.S.C. 4201 et seq.): Requires Federal agencies to identify and take into account the adverse effects of their programs on the preservation of farmlands.

Federal Aid in Sport Fish Restoration Act (1950; 16 U.S.C. 777-777k), as amended: Commonly called the Dingell-Johnson Act or Wallop-Breaux Act, this provides Federal aid to the states for management and restoration of fish having "...material value in connection with sport or recreation in the marine and/or fresh waters of the United States." In addition, amendments to the act provide funds to the states for aquatic education, wetlands restoration, boat safety, and clean vessel sanitation devices (pumpouts), and a non-trailerable boat program. Funds are derived from a 10 percent excise tax on certain items of sport fishing

tackle; a 3 percent excise tax on fish finders and electric trolling motors; import duties on fishing tackle, yachts, and pleasure craft; interest on the account; and a portion of motorboat fuel tax revenues and small engine fuel taxes. To participate in the Federal Aid in Sport Fish Restoration program, states are required to agree to this law and pass laws for the conservation of fish, which include a prohibition against the diversion of license fees for any other purpose than the administration of the State fish department.

Federal Aid in Wildlife Restoration Act (1937; 16 U.S.C. 669-669i), as amended: Commonly called the “Pittman-Robertson Act,” this provides Federal aid to states for management and restoration of wildlife. Funds from an 11 percent excise tax on sporting arms and ammunition are appropriated to the Secretary of the Interior and apportioned to states on a formula basis for paying up to 75 percent of the cost-approved projects. Project activities include acquisition and improvement of wildlife habitat, introduction of wildlife into suitable habitat, research into wildlife problems, surveys and inventories of wildlife problems, acquisition and development of access facilities for public use, and hunter education programs, including construction and operation of public target ranges.

Federal Environmental Pesticide Control Act of 1972 (7 USC 136-136y), as amended: This established, under the Administrator of the EPA, a program for controlling the sale, distribution, and application of pesticides through an administrative registration process. The amendments provided for classifying pesticides for “general” or “restricted” use. “Restricted” pesticides may only be applied by or under the direct supervision of a certified applicator. Amendments to this act also authorized experimental use permits and provided for administrative review of registered pesticides and for penalties for violations of the statute. States were authorized to regulate the sale or use of any pesticide within a State, provided such regulation does not permit any sale or use prohibited by the act. The Federal Environmental Pesticide Control Act of 1972 amended the **1947 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)**. The 1947 statute (FIFRA) prohibited the sale or distribution of “*economic poisons*,” provided for the registration of such materials, and authorized penalties for violation of the act. The Endangered Species Act later amended FIFRA to define imminent hazard to include situations involving unreasonable hazard to the survival of a species declared by the Secretary of the Interior to be endangered or threatened.

Federal Fire Prevention and Control Act of 1974 (15 U.S.C. 2201 et seq.), as amended: This authorizes reimbursement to State and local fire services for costs incurred in firefighting on Federal property.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other Federal and State agencies.

Federal Property and Administrative Services Act of 1949 (40 U.S.C. 471-535), as amended: Sets forth requirements for the management and disposal of government property, including excess property (property under the control of any Federal agency but which it no longer needs) and surplus property (excess property not required for the needs of any Federal agency).

Fish and Wildlife Act of 1956 (16 U.S.C. 742a-742j, not including 742 d-l), as amended: This established a comprehensive national fish and wildlife policy and broadened the authority for

acquisition and development of refuges. The policy emphasizes the commercial fishing industry but also with a direction to administer the act with regard to the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment, and to maintain and increase public opportunities for recreational use of fish and wildlife resources. Among other things, the act directs a program of continuing research, extension, and information services on fish and wildlife matters, both domestically and internationally. A 1974 amendment to the Fish and Wildlife Act of 1956 abolished the “Bureau of Sport Fisheries and Wildlife” and re-designated it as the “United States Fish and Wildlife Service” (Public Law 93-271). In 1978, the Fish and Wildlife Act was amended to allow the Service to accept donations of both real and personal property. In 1998, the Fish and Wildlife Act of 1956 was further amended to promote volunteer programs and community partnerships for the benefit of national wildlife refuges. This also required the Secretary of the Interior to develop refuge education programs to provide outdoor classroom opportunities for students to promote understanding of the Refuge System and to improve scientific literacy in conjunction with both formal and informal education programs.

Fish and Wildlife Conservation Act of 1980 (“Nongame Act”) (16 U.S.C. 2901-2911), as amended: Authorizes financial and technical assistance to the states for the development, revision, and implementation of conservation plans and programs for nongame fish and wildlife. A 1988 amendment requires the Service to monitor and assess migratory nongame birds, determine the effects of environmental changes and human activities, identify those likely to be candidates for endangered species listing, identify appropriate actions, and report to Congress one year from enactment. It also requires the Service to report at five-year intervals on actions taken.

Fish and Wildlife Coordination Act (1934), as amended: Authorizes the Secretary of the Interior to assist Federal, State, and other agencies in development, protection, rearing, and stocking fish and wildlife on Federal lands and to study effects of pollution on fish and wildlife. The act also requires consultation with the U.S. Fish and Wildlife Service and the wildlife agency of any State wherein the waters of any stream or other water body are proposed to be impounded, diverted, channelized, or otherwise controlled or modified by any Federal agency or any private agency under Federal permit or license; with a view to preventing loss of, or damage to, wildlife resources in connection with such water resource projects. The act further authorizes Federal water resource agencies to acquire lands or interests in connection with water use projects specifically for mitigation and enhancement of fish and wildlife.

Fish and Wildlife Improvement Act of 1978 (16 U.S.C. 7421; 92 Stat. 3110), as amended: Authorizes the Secretaries of the Interior and Commerce to establish, conduct, and assist with national training programs for State fish and wildlife law enforcement personnel. It also authorized funding for research and development of new or improved methods to support fish and wildlife law enforcement. The law provides authority to the Secretaries to enter into law enforcement cooperative agreements with State or other Federal agencies, and it authorizes the disposal of abandoned or forfeited items under the fish, wildlife, and plant jurisdictions of these Secretaries. It strengthens the law enforcement operational capability of the Service by authorizing the disbursement and use of funds to facilitate various types of investigative efforts.

Flood Control Act of 1944, as amended: This act, supplemented by other flood control acts and river and harbor acts, authorizes various Corps of Engineers water development projects.

The Flood Control Act expressed congressional intent to limit the authorization and construction of navigation, flood control, and other water projects to those having significant benefits for navigation and that could be operated consistent with other river uses. This authorized the construction of numerous dams and modifications to previously existing dams. Several provisions of this act affect the responsibilities of the Service under the **Fish and Wildlife Coordination Act**.

Food Security Act of 1985 “Farm Bill” (99 Stat. 1354), as amended by the Food, Agriculture, Conservation, and Trade Act of 1990: This contains several provisions that contribute to wetland conservation. The “Swampbuster” provisions stated that farmers who produce an agricultural commodity on wetlands converted after enactment are ineligible for most farmer program subsidies. Administration of the program is in the U.S. Department of Agriculture (USDA), which is required to consult with the U.S. Fish and Wildlife Service on matters relating to wetland identification, determination of exemptions to the wetland conservation provisions, issuance of implementing regulations, mitigation, and restoration of values and functions on converted wetlands. This act also authorized the Secretary of Agriculture to grant or sell conservation easements, which may include wetlands, to State or local governments or private non-profit organizations for conservation purposes. In addition, the 1985 act also established a Conservation Reserve program, providing incentives to private landowners (e.g., farmers) for returning farmland to permanent vegetative cover and for applying soil conservation prescriptions such as wildlife habitat development. The program was expanded in 1988 by regulation to make cropped wetlands eligible for the program, with the intended result of wetland restoration (i.e., The Wetland Reserve Program).

Freedom of Information Act (1966; 5 U.S.C. 552): Requires all Federal agencies to make available to the public, for inspection and copying, administrative staff manuals and staff instructions, official, published and unpublished policy statements, final orders deciding case adjudication, and other documents. Special exemptions have been reserved for nine categories of privileged material, including but not limited to confidential matters relating to national defense or foreign policy, law enforcement records, and trade or commercial secrets. The act requires the party seeking the information to pay reasonable search and duplication costs.

Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461-462, 464-467), as amended: Also known as the Historic Sites Act, this declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration, and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this act. As of January 1989, 31 national wildlife refuges contained such sites.

Lacey Act of 1900 (16 U.S.C. 701), as amended: Makes it unlawful to import, export, sell, acquire, or purchase fish, wildlife, or plants taken, possessed, transported, or sold: 1) in violation of U.S. or Indian law; or 2) in interstate or foreign commerce involving any fish, wildlife, or plants taken, possessed, or sold in violation of State or foreign law. The Lacey Act covers all fish and wildlife and their parts or products, and plants protected by the Convention on International Trade in Endangered Species and those protected by State law. Commercial guiding and outfitting are considered to be a sale under the provisions of the act. The act also includes prohibitions on the importation of wild vertebrates and other animals listed in the act or declared by the Secretary of the Interior to be injurious to man or agriculture, wildlife resources, or otherwise, except under certain circumstances and pursuant to regulations. The

Lacey Act includes penalties and fines for violations involving imports or exports or violations of a commercial nature.

Land and Water Conservation Fund Act (1965): Authorizes the use of the receipts from the sale of surplus Federal land, outer continental shelf oil and gas sales, and other sources for land acquisition. Section 7(a)(1) of this act provides authority to use Land and Water Conservation Fund money for acquisition of refuge areas under paragraph (5) of section 7(a) of the Fish and Wildlife Act of 1956.

Marine Mammal Protection Act (1972): The Marine Mammal Protection Act (MMPA) was enacted on October 21, 1972. All marine mammals are protected under the MMPA. The MMPA prohibits, with certain exceptions, the “take” of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S.

Migratory Bird Conservation Act (1929; 16 U.S.C. 715-715d, 715e, 715f-715r), as amended: This established a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712), as amended: The Migratory Bird Treaty Act (MBTA) is one of the earliest Federal wildlife management laws enacted to protect migratory birds, which were rapidly declining from unregulated sport and commercial hunting. Specific provisions in the MBTA include the establishment of a Federal prohibition, unless permitted by regulations, to “...*pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention ...for the protection of migratory birds...or any part, nest, or egg of any such bird.*”

Migratory Bird Hunting and Conservation Stamp Act (1934; 16 U.S.C. 718-718j), as amended: Known as the “Duck Stamp Act,” this requires each waterfowl hunter 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations. Funds appropriated under the Wetlands Loan Act (16 U.S.C. 715k-3 - 715k-5), as amended, are merged with duck stamp receipts and provided to the Secretary of the Interior for the acquisition of migratory bird refuges under provisions of the Migratory Bird Conservation Act (16 U.S.C. 715 et seq), as amended, and since August 1, 1958, for acquisition of “Waterfowl Production Areas.”

National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), as amended: The National Environmental Policy Act (NEPA) requires that all Federal agencies prepare detailed environmental impact statements for “...*every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment*”. NEPA stipulates factors to be considered in environmental impact statements and requires that Federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations.

National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n), as amended:

Provides for preservation of significant historical features (buildings, objects, and sites) through a grant-in-aid program to the states. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468-468d). The act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in 1976. That act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register. As of January 1989, 91 historic sites on national wildlife refuges have been placed on the National Register, including Aransas NWRC (Matagorda Island Lighthouse).

National Wilderness Preservation System (1964): Also known as the “Wilderness Act of 1964”; the purpose was to preserve and protect wild lands in their natural condition “...to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.” This act directed Federal agencies such as the U.S. Fish and Wildlife Service to survey their roadless lands for possible wilderness designation. Wilderness areas are protected from development and the operation of motorized equipment. A Wilderness Area is defined as an area with at least 5,000 acres of undisturbed, undeveloped land affected by the forces of nature that may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee. (Refuge Administration Act): Defines the National Wildlife Refuge System and authorizes the Secretary to permit any use of a refuge, provided such use is compatible with the purposes for which the refuge was established. The Refuge Improvement Act clearly defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation); establishes a formal process for determining compatibility; establishes the responsibilities of the Secretary of Interior for managing and protecting the System; and requires a comprehensive conservation plan for each refuge by 2012. This act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

Native American Graves Protection and Repatriation Act (1990): Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

North American Wetlands Conservation Act (1989; 16 U.S.C. 4401-4412), as amended:

Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, the U.S., and Mexico.

Protection Act (1922; 16 U.S.C. 594): Provides for the Secretary of the Interior to protect and preserve—from fire, disease, or the ravages of beetles or other insects—timber on the public lands owned by the United States.

Reciprocal Fire Protection Act of 1955 (42 U.S.C. 1856), as amended by the Wildfire Suppression Assistance Act of 1989 (102 Stat. 1615): Provides authority for Federal agencies to enter into mutual assistance agreements with foreign, State, and local governments for combating wildfires, and to provide emergency assistance when no agreement exists.

Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4), as amended: Authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. The act provides for public use fees and permits and for penalties for violation of regulations. It also authorizes the acceptance of donations of funds and real and personal property to assist in carrying out its purposes. Amendments to the act authorize acquisition of lands and interests suitable for 1) fish and wildlife-oriented recreation, 2) protection of natural resources, 3) conservation of endangered or threatened species, or 4) carrying out two or more of these purposes. Such lands were required to be adjacent to or within an existing conservation area. Acquisition was not permitted with "duck stamp" receipts for these purposes.

Refuge Revenue Sharing Act of 1935 (16 U.S.C. 715s), as amended: Provides for payments to county governments in lieu of taxes, using revenues derived from the sale of products from refuges. Revenues received from refuge products, such as animals, timber, and minerals, or from leases or other privileges, are required to be deposited in a special Treasury account and net receipts distributed to counties. Remaining monies are required to be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act. The act was later amended to expand the revenue sharing system to include National Fish Hatcheries and Service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as 1) on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land; and 2) on land withdrawn from the public domain, 25 percent of net receipts and basic payment, in lieu of taxes on public lands. Amendments to the act authorized appropriations to make up any difference between the amount in the Refuge Revenue Sharing Fund and the amount scheduled for payment in any year. Counties are also required to pass payments along to other units of local government within the county that suffer losses in revenues due to the establishment of Service areas.

Refuge Trespass Act of 1948 (18 U.S.C. 41): This consolidated penalty provisions of various acts from 1905 through 1934, establishing and protecting fish and wildlife areas, and restated the intent of Congress to protect all wildlife within Federal sanctuaries, refuges, fish hatcheries, and breeding grounds.

Rehabilitation Act (1973): Requires programmatic accessibility in addition to physical accessibility for all facilities and programs funded by the Federal government to ensure that anybody can participate in any program.

Rivers and Harbors Act (1899; 33 U.S.C. 403): Section 10 of this act requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States.

Secretarial Order No. 3226; Evaluating Climate Change Impacts in Management

Planning (2001): Directs each Department of Interior bureau to consider and analyze potential climate change impacts when undertaking long-range planning efforts or multi-year management plans.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948 (16

U.S.C. 667b-d), as amended: This act provides that, upon a determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred without reimbursement to the Secretary of the Interior if the land has particular value for migratory birds or to a State agency for other wildlife conservation purposes.

Transportation Equity Act for the 21st Century (TEA-21); 23 U.S.C., as amended: In part, this established the Refuge Roads Program and requires that all projects funded under the Refuge Roads Program be consistent with the Service's CCP plans and step-down management plans.

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42

U.S.C. 4601 et seq.), as amended: Establishes uniform land acquisition policies for all Federal agencies and establishes requirements for the uniform and equitable treatment of persons displaced from their homes, businesses, or farms by Federal or federally assisted programs, including land acquisition.

Volunteer and Partnership Enhancement Act (1998): This amended the Fish and Wildlife Act of 1956 to promote volunteer programs and community partnerships for the benefit of national wildlife refuges, and for other purposes.

Waterfowl Depredations Prevention Act (1956; 7 U.S.C. 442-445), as amended: This act authorizes the Secretary of the Interior to use surplus grain owned by Commodity Credit Corporation in feeding waterfowl to prevent crop damage. Findings regarding possible crop damage are to be made by the Secretary of the Interior, and grain is to be used to lure waterfowl away from crops while not exposing them to shooting over areas to which they have been lured. Such grain may be made available to Federal, State, or local governments or private organizations or individuals. Appropriations are authorized to reimburse the Commodity Credit Corporation for packaging and transporting such grain.

Water Resources Planning Act (1965), as amended: This established a Water Resources Council to be composed of Cabinet representatives, including the Secretary of the Interior. The Council was empowered to maintain a continuing assessment of the adequacy of water supplies in each region of the U.S. In addition, the Council was mandated to establish principles and standards for Federal participants in the preparation of river basin plans and in evaluating Federal water projects. Upon receipt of a river basin plan, the Council was required to review the plan with respect to agricultural, urban, energy, industrial, recreational, and fish and wildlife needs. This also established a grant program to assist states in participating in the development of related comprehensive water and land use plans.

Wetlands Reserve Program: The Wetlands Reserve Program (WRP) is a voluntary program. It provides technical and financial assistance to eligible landowners to address wetland, wildlife habitat, soil, water, and related natural resource concerns on private lands in an

environmentally beneficial and cost-effective manner. The program provides an opportunity for landowners to receive financial incentives to restore, protect, and enhance wetlands in exchange for retiring marginal land from agriculture. There are three enrollment options for landowners: 1) permanent easement; 2) 30-year easement; and 3) a restoration cost-share agreement. The WRP was re-authorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill). The Natural Resources Conservation Service administers the program (See also: Food Security Act of 1985).

Wilderness Act of 1964 (16 U.S.C. 1131): This act directed the Secretary of the Interior to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems, and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made by Congress. The act provides criteria for determining suitability and establishes restrictions on activities that can be undertaken on a designated area. It authorizes the acceptance of gifts, bequests, and contributions in furtherance of the purposes of the act and requires an annual report at the opening of each session of Congress on the status of the wilderness system.

B. Aransas NWRC Species Lists

B.1 Birds

Note: All migration often begins in August, and wintering birds arrive from October through December. Therefore, seasonal designations for species, intended as general guidelines, are treated as follows on the list:

- (Sp) Spring: March – May
 (S) Summer: June – July
 (F) Fall: August – November
 (W) Winter: December – February

Legend:

Federally endangered or threatened species are listed in *italics*.

(I) after the species name denotes an introduced species.

* after the species name denotes a regularly nesting species on, or in close proximity to, the Refuge. It does not necessarily indicate that a certain species nests every year.

^ after the species name denotes a species which has nested at Aransas in past years, but is not currently believed to be nesting.

^{TxP} Texas Comprehensive Wildlife Conservation Strategy Priority Species (2005–2010)

Abundance:

- C: Common; suitable habitat is widespread; should not be missed during appropriate season
 U: Uncommon; present, but in moderate numbers; not seen on every visit during season
 O: Occasional; present, observed only a few times per season
 R: Rare; observed only every 3–5 years
 X: Accidental; a species considerably out of its regular range
 N: No record

Habitat: These codes are used to describe a species general habitat preference:

- Q: Found in aquatic areas – lakes, ponds, open bays, or open Gulf
 B: Found in brushland – areas of mixed brush and grasses
 F: Found in forest – woodlands, oak mottes
 G: Found in grasslands
 M: Found in marsh areas – freshwater and/or saltwater
 I: Gulf beach and dunes

Appendix B: Aransas NWRC Species List

	Sp	Su	F	W	Habitat
Loons					
Red-throated Loon	R	N	N	N	Q
Common Loon	U	N	R	U	Q
Grebes					
Least Grebe*	O	O	O	O	M,Q
Pied-billed Grebe*	C	O	U	C	M,Q
Horned Grebe ^{TxP}	N	N	R	O	M,Q
Red-necked Grebe	N	N	N	R	Q
Eared Grebe ^{TxP}	U	N	U	C	Q
Western Grebe	R	N	N	R	Q
Shearwaters					
Sooty Shearwater	R	N	N	N	Q
Tropicbirds					
White-tailed Tropicbird	N	R	R	N	Q
Boobies and Gannets					
Masked Booby	N	R	N	N	Q
Brown Booby	N	R	N	N	Q
Northern Gannet	R	R	N	R	Q
Pelicans					
American White Pelican ^{TxP}	C	O	C	C	Q
<i>Brown Pelican</i> * ^{TxP}	C	C	C	C	Q
Cormorants					
Neotropic Cormorant	U	U	U	U	M,Q
Double-crested Cormorant	C	O	C	C	M,Q
Darters					
Anhinga	U	O	O	O	M
Frigatebirds					
Magnificent Frigatebird	O	U	U	R	Q
Bitterns, Herons, and Egrets					
American Bittern ^{TxP}	U	R	U	U	M,Q

	Sp	Su	F	W	Habitat
Least Bittern ^ T _x P	U	U	U	R	M,Q
Great Blue Heron*	C	C	C	C	M,Q
Great Egret*	C	C	C	C	M,Q
Snowy Egret* T _x P	C	C	C	C	M,Q
Little Blue Heron* T _x P	C	U	C	U	M,Q
Tricolored Heron* T _x P	C	C	C	C	M,Q
Reddish Egret* T _x P	U	U	U	U	M,Q
Cattle Egret*	C	C	C	O	M,Q,G
Green Heron*	U	U	U	O	M,Q
Black-crowned Night-Heron*	U	U	U	U	M,Q
Yellow-crowned Night-Heron* T _x P	U	O	U	R	M,Q
Ibises and Spoonbills					
White Ibis*	C	C	C	C	M,Q
Glossy Ibis	U	U	N	R	M,Q
White-faced Ibis* T _x P	U	U	U	U	M,Q
Roseate Spoonbill* T _x P	C	U	C	C	M,Q
Storks					
Wood Stork T _x P	R	U	U	R	M,Q
New World Vultures					
Black Vulture*	C	C	C	C	F,G,B
Turkey Vulture*	C	C	C	C	F,G,B
Flamingos					
Greater Flamingo	R	N	R	R	M,Q
Ducks, Geese, and Swans					
Black-bellied Whistling Duck*	U	C	U	O	M,Q
Fulvous Whistling Duck* T _x P	O	O	O	R	M,Q
Greater White-fronted Goose	O	N	U	C	M,Q,G
Snow Goose	U	N	U	C	M,Q,G
Ross' Goose	O	N	R	O	M,Q,G
Canada Goose	O	R	C	C	M,Q,G
Tundra Swan	N	N	R	R	M,Q
Wood Duck ^	O	O	O	O	M,Q,G,F
Gadwall ^	C	R	U	C	M,Q
American Wigeon	C	R	C	C	M,Q

Appendix B: Aransas NWRC Species List

	Sp	Su	F	W	Habitat
American Black Duck	R	N	R	R	M,Q
Mallard ^	O	R	O	O	M,Q
Mottled Duck* ^{TxP}	C	C	C	C	M,Q
Blue-winged Teal ^	C	O	C	C	M,Q
Cinnamon Teal	O	N	O	O	M,Q
Northern Shoveler	C	R	U	C	M,Q
Northern Pintail ^{TxP}	C	O	C	C	M,Q
Green-winged Teal	U	R	U	C	M,Q
Canvasback ^{TxP}	U	R	O	U	M,Q
Redhead ^{TxP}	U	R	U	C	M,Q
Ring-necked Duck	O	R	O	O	M,Q
Greater Scaup	R	N	N	R	Q
Lesser Scaup ^{TxP}	C	R	U	C	M,Q
Harlequin Duck	N	N	N	R	Q
Surf Scoter	R	R	N	R	Q
White-winged Scoter	N	N	R	R	Q
Black Scoter	N	N	N	R	Q
Long-tailed Duck	N	N	R	R	Q
Bufflehead	C	N	O	C	Q
Common Goldeneye	O	R	O	U	Q
Hooded Merganser	O	N	O	U	M,Q
Common Merganser	R	N	R	R	Q
Red-breasted Merganser	U	N	O	C	Q
Masked Duck	R	N	R	R	M,Q
Ruddy Duck	C	R	O	C	Q
Hawks, Kites, and Eagles					
Osprey	U	R	C	C	M,Q
Swallow-tailed Kite ^{TxP}	O	N	N	N	F,G,B
White-tailed Kite* ^{TxP}	U	O	U	U	G,B
Snail Kite	R	N	N	N	Q
Mississippi Kite ^{TxP}	O	N	O	N	G,B
Bald Eagle ^ ^{TxP}	R	R	R	R	G,B,Q
Northern Harrier ^{TxP}	C	N	C	C	M,G,B
Sharp-shinned Hawk	U	R	U	U	F,B
Cooper's Hawk	O	R	U	U	F,B,G
Harris' Hawk ^{TxP}	R	N	R	R	G,B

	Sp	Su	F	W	Habitat
Red-shouldered Hawk ^{TxP}	U	R	U	C	F,B
Broad-winged Hawk	U	N	O	R	F,B
Swainson's Hawk ^{TxP}	U	N	O	R	G,B
White-tailed Hawk* ^{TxP}	C	C	C	C	G,B
<i>Zone-tailed Hawk</i>	N	N	N	R	G,B
Red-tailed Hawk	U	U	U	C	B,G,F
Ferruginous Hawk ^{TxP}	R	N	R	R	G,B
Rough-legged Hawk	R	N	R	R	G,B
Golden Eagle	R	N	R	R	G,B
Caracaras and Falcons					
Crested Caracara*	C	C	C	C	G,B
American Kestrel ^{TxP}	C	N	C	C	B,G
Merlin ^{TxP}	U	N	U	O	B,G
<i>Aplomado Falcon</i> * ^{TxP}	U	U	U	U	B,G
Peregrine Falcon ^{TxP}	O	R	O	O	G,Q,B
Prairie Falcon ^{TxP}	R	N	R	R	G
Grouse and Turkeys					
<i>Attwater's Greater Prairie Chicken</i> ^{TxP}					G
Wild Turkey*	O	O	O	O	F,B
New World Quail					
Northern Bobwhite* ^{TxP}	C	C	C	C	G,B
Rails, Gallinules, and Coots					
Yellow Rail ^{TxP}	R	N	R	R	M,G
Black Rail* ^{TxP}	R	R	R	R	M,G
Clapper Rail* ^{TxP}	U	U	U	U	M
King Rail* ^{TxP}	O	O	O	U	M
Virginia Rail ^{TxP}	O	R	O	O	M
Sora ^	C	R	O	U	M
Purple Gallinule* ^{TxP}	U	U	O	R	M,Q
Common Moorhen*	C	U	U	C	M,Q
American Coot	C	O	C	C	Q,M
Cranes					

Appendix B: Aransas NWRC Species List

	Sp	Su	F	W	Habitat
Sandhill Crane	U	R	C	C	G,M,Q
<i>Whooping Crane</i> ^{TxP}	U	R	U	U	M,G,Q
Plovers					
Black-bellied Plover	C	O	C	C	Q,M
American Golden-Plover ^{TxP}	O	N	R	N	G,Q
Snowy Plover ^{TxP}	U	O	U	U	Q
Wilson's Plover* ^{TxP}	U	U	U	R	M,G,Q
Semipalmated Plover	U	R	U	O	Q,M
<i>Piping Plover</i> ^{TxP}	U	R	U	U	Q,M
Killdeer*	C	C	C	C	M,Q
Mountain Plover	R	N	R	N	G
Oystercatchers					
American Oystercatcher* ^{TxP}	U	U	U	U	Q
Stilts and Avocets					
Black-necked Stilt* ^{TxP}	C	U	C	O	Q,M
American Avocet ^{TxP}	U	O	U	C	Q,M
Sandpipers, Phalaropes, and Allies					
Greater Yellowlegs ^{TxP}	C	U	C	C	Q,M
Lesser Yellowlegs ^{TxP}	C	U	C	C	Q,M
Solitary Sandpiper ^{TxP}	U	R	O	R	Q,M
Willet*	C	C	C	C	Q,M
Spotted Sandpiper	U	O	U	U	Q,M
Upland Sandpiper ^{TxP}	U	R	U	N	G
Whimbrel ^{TxP}	U	R	O	R	Q,M,G
Long-billed Curlew ^{TxP}	C	U	C	C	M,Q,G
Hudsonian Godwit ^{TxP}	O	R	R	N	Q,G
Marbled Godwit ^{TxP}	C	O	U	C	Q,M
Ruddy Turnstone ^{TxP}	U	O	U	U	Q
Red Knot ^{TxP}	R	R	R	R	Q,M
Sanderling ^{TxP}	C	O	C	C	Q,M
Semipalmated Sandpiper	U	N	C	R	Q,M

	Sp	Su	F	W	Habitat
Western Sandpiper ^{TxP}	C	O	C	C	Q,M
Least Sandpiper	C	O	C	C	Q,M
White-rumped Sandpiper	U	N	R	N	Q,M
Baird's Sandpiper	U	N	R	N	Q,M
Pectoral Sandpiper	U	R	U	R	Q,M
Dunlin	C	R	U	C	Q,M
Stilt Sandpiper ^{TxP}	U	R	U	R	Q,M
Buff-breasted Sandpiper ^{TxP}	O	R	O	N	G
Short-billed Dowitcher ^{TxP}	U	O	O	O	Q,M
Long-billed Dowitcher	U	O	C	C	Q,M
Wilson's (Common) Snipe ^{TxP}	U	R	U	U	Q,M
American Woodcock ^{TxP}	R	N	R	R	Q,M
Wilson's Phalarope ^{TxP}	U	R	O	N	F,B
Red-necked Phalarope	R	N	R	R	Q,M

Gulls, Terns, and Skimmers

Laughing Gull*	C	C	C	C	Q,M
Franklin's Gull	U	N	O	R	Q,M
Little Gull	R	N	N	N	Q,M
Bonaparte's Gull	U	N	R	C	Q,M
Ring-billed Gull	U	R	U	C	Q,M
Herring Gull	U	R	U	U	Q,M
Lesser Black-backed Gull	R	N	N	R	Q,M
Greater Black-backed Gull	N	N	N	R	Q,M
Glaucous Gull	R	N	N	N	Q,M
Gull-billed Tern* ^{TxP}	C	U	U	O	Q,M
Caspian Tern*	C	C	C	C	Q,M
Royal Tern*	U	U	U	U	Q,M
Sandwich Tern*	C	U	U	O	Q,M
Roseate Tern	R	N	N	N	Q
Common Tern	O	R	O	O	Q
Forster's Tern* ^{TxP}	C	C	C	C	Q,M
Least Tern*	U	U	U	N	Q,M
Sooty Tern	N	R	R	N	Q
Black Tern	U	U	U	N	Q,M
Black Skimmer* ^{TxP}	U	U	U	U	Q,M

Appendix B: Aransas NWRC Species List

	Sp	Su	F	W	Habitat
Jaegers					
Pomarine Jaeger	N	R	N	N	Q
Parasitic Jaeger	R	R	N	N	Q
Pigeons and Doves					
Rock Pigeon (I)	R	R	R	R	F,B
Band-tailed Pigeon	N	N	R	R	F
Eurasian Collared-Dove (I)	R	R	R	R	B,G
White-winged Dove	U	N	U	U	B,G
Mourning Dove* ^{TxP}	C	C	C	C	B,G,F
Inca Dove*	U	U	U	U	F,B
Common Ground-Dove ^	O	O	O	O	B,F,G
Cuckoos, Roadrunners, and Anis					
Black-billed Cuckoo	O	N	R	N	F,B
Yellow-billed Cuckoo* ^{TxP}	C	U	U	N	F,B
Greater Roadrunner ^	R	R	R	R	G,B
Groove-billed Ani	R	O	U	O	F,B
Barn Owls					
Barn Owl*	O	R	O	O	F,B,G
Typical Owls					
Eastern Screech-Owl	R	R	R	R	F,B
Great Horned Owl*	U	U	U	U	F,B
Burrowing Owl ^{TxP}	N	N	R	R	G
Barred Owl	N	N	R	R	F
Short-eared Owl ^{TxP}	O	N	O	U	G
Goatsuckers					
Lesser Nighthawk	R	R	N	R	G,B
Common Nighthawk* ^{TxP}	C	C	C	R	G,B
Common Pauraque*	U	U	O	U	F,B
Common Poorwill	R	N	R	N	B,G
Chuck-will's-widow ^{TxP}	U	N	O	N	F,B

	Sp	Su	F	W	Habitat
Whippoorwill	U	N	O	N	F,B
Swifts					
Chimney Swift ^{TxP}	C	R	U	N	B,G
White-throated Swift	R	N	N	N	B,G
Hummingbirds					
Green Violet-ear	R	N	N	N	F,B
Buff-bellied Hummingbird* ^{TxP}	U	U	U	R	F,B
Ruby-throated Hummingbird	C	R	C	R	F,B
Black-chinned Hummingbird	R	N	R	N	F,B
Broad-tailed Hummingbird	R	N	R	N	F,B
Rufous Hummingbird	N	R	O	N	F,B
Kingfishers					
Belted Kingfisher	C	O	C	C	Q,M
Green Kingfisher ^{TxP}	R	N	N	R	Q,M
Woodpeckers					
Red-headed Woodpecker ^{TxP}	R	N	R	R	F
Acorn Woodpecker	N	N	N	R	F
Golden-fronted Woodpecker* ^{TxP}	O	O	O	O	G,B
Red-bellied Woodpecker ^	U	U	U	U	F
Yellow-bellied Sapsucker	U	N	U	U	F
Red-naped Sapsucker	N	N	N	R	F
Ladder-backed Woodpecker* ^{TxP}	U	U	U	U	F,B
Downy Woodpecker	R	R	R	R	F
Northern Flicker	O	N	O	O	F,B
Pileated Woodpecker ^{TxP}	R	N	R	R	F
Tyrant Flycatchers					
Olive-sided Flycatcher	U	N	U	R	F,B
Eastern Wood-Pewee ^{TxP}	C	N	C	N	F,B
Yellow-bellied Flycatcher	O	N	O	N	F,B
Acadian Flycatcher ^{TxP}	U	N	O	N	F,B
Alder Flycatcher	O	N	O	N	F,B

Appendix B: Aransas NWRC Species List

	Sp	Su	F	W	Habitat
Willow Flycatcher	O	N	U	N	F,B
Least Flycatcher	U	N	O	R	F,B
Gray Flycatcher	N	N	N	R	B
Eastern Phoebe	U	N	C	C	F,B
Say's Phoebe	R	N	R	R	C,Q
Vermilion Flycatcher	R	R	R	R	B,Q
Ash-throated Flycatcher	R	O	R	N	B,G,F
Great Crested Flycatcher ^{TxP}	C	N	U	N	F,B
Brown-crested Flycatcher*	U	U	U	R	F,B
Great Kiskadee	O	O	O	O	B
Couch's Kingbird	O	N	O	O	B,G
Western Kingbird	O	N	O	N	B,G
Eastern Kingbird ^{TxP}	C	R	C	R	B,G
Scissor-tailed Flycatcher* ^{TxP}	C	C	C	R	B,G
Fork-tailed Flycatcher	N	R	N	R	B

Shrikes

Loggerhead Shrike* ^{TxP}	U	O	C	C	B,G,Q
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Vireos

White-eyed Vireo*	C	C	C	C	F,B
Bell's Vireo ^{TxP}	O	O	O	R	B
Yellow-throated Vireo ^{TxP}	U	N	R	N	F
Plumbeous Vireo	N	N	N	R	F
Blue-headed Vireo	U	N	U	U	F
Warbling Vireo ^{TxP}	U	N	R	N	F
Philadelphia Vireo	U	N	R	N	F
Red-eyed Vireo	C	R	U	N	F
Yellow-green Vireo	R	N	N	N	F

Crows and Jays

Blue Jay	R	R	R	R	F,B
Green Jay	N	N	N	R	F
American Crow	R	N	R	R	G,B
Chihuahuan Raven	N	R	N	N	G

Larks

	Sp	Su	F	W	Habitat
Horned Lark* ^{TxP}	U	U	U	U	G
Swallows					
Purple Martin ^	U	O	O	R	F,B
Tree Swallow	U	R	U	O	F,C,B
Northern Rough-winged Swallow	C	R	U	R	F,B,G
Bank Swallow	U	N	U	N	F,B,G
Cliff Swallow*	C	C	C	N	F,B,G
Cave Swallow ^	R	R	R	N	B,G
Barn Swallow*	C	U	C	R	F,B,G
Chickadees and Titmice					
Carolina Chickadee	R	R	R	R	F,B
Tufted Titmouse*	O	O	O	O	F,B
Black Crested Titmouse ^{TxP}	R	R	R	R	F,B
Verdins					
Verdin	R	R	R	R	B
Nuthatches					
Red-breasted Nuthatch	N	N	R	R	F
Creepers					
Brown Creeper	N	N	R	R	F
Wrens					
Cactus Wren	N	N	R	N	B
Rock Wren	N	N	R	N	B
Carolina Wren*	C	C	C	C	F,B
Bewick's Wren* ^{TxP}	O	O	O	O	B,F
House Wren	U	N	U	C	F,B
Winter Wren	O	N	R	O	F,B
Sedge Wren ^{TxP}	C	N	C	C	B,G,M
Marsh Wren*	C	N	U	U	M
Kinglets					

Appendix B: Aransas NWRC Species List

	Sp	Su	F	W	Habitat
Golden-crowned Kinglet	O	N	O	U	F,B
Ruby-crowned Kinglet	C	N	C	C	F,B
Gnatcatchers					
Blue-grey Gnatcatcher ^	U	R	U	U	F,B
Thrushes					
Eastern Bluebird	R	R	O	O	B,G,F
Mountain Bluebird	R	N	N	R	B,G
Veery	U	N	R	N	F
Gray-cheeked Thrush	O	N	R	N	F
Swainson's Thrush	U	N	O	N	F
Hermit Thrush	U	N	O	C	F,B
Wood Thrush ^{TxP}	U	N	R	R	F,B
Clay-colored Robin	N	N	N	R	F
American Robin	U	R	O	C	F,B
Pipits					
American Pipit	O	N	U	C	G,M,Q
Sprague's Pipit ^{TxP}	O	N	O	U	G
Mockingbirds and Thrashers					
Gray Catbird	C	N	C	U	F,B
Northern Mockingbird*	C	U	C	C	B,G
Sage Thrasher	N	N	R	R	B
Brown Thrasher ^{TxP}	C	N	C	C	F,B
Long-billed Thrasher* ^{TxP}	U	O	O	U	F,B
Curve-billed Thrasher ^{TxP}	O	O	O	O	B
Starlings					
European Starling (I)	O	N	R	O	F,B
Waxwings					
Cedar Waxwing	O	N	O	O	F,B
Silky-flycatchers					

	Sp	Su	F	W	Habitat
Phainopepla	N	N	N	R	B,F
Wood-Warblers					
Blue-winged Warbler ^{TxP}	U	N	R	N	F
Golden-winged Warbler ^{TxP}	U	N	R	N	F
Tennessee Warbler	C	N	O	R	F
Orange-crowned Warbler	U	N	U	C	F
Nashville Warbler	U	N	U	O	F
Northern Parula	C	N	U	R	F
Tropical Parula	R	R	R	R	F
Yellow Warbler	U	R	U	R	F
Chestnut-sided Warbler	C	N	O	N	F
Magnolia Warbler	C	N	O	R	F
Blue-throated Blue Warbler	R	N	R	N	F
Yellow-rumped Warbler	C	R	C	C	F,B
Black-throated Gray Warbler	R	N	R	R	F,B
<i>Golden-cheeked Warbler</i>	N	R	N	N	F
Black-throated Green Warbler	C	N	U	O	F
Townsend's Warbler	R	N	N	R	F
Blackburnian Warbler	C	N	R	R	F
Yellow-throated Warbler ^{TxP}	U	R	R	R	F
Pine Warbler	R	N	O	U	F
Prairie Warbler ^{TxP}	R	N	R	R	F,B
Palm Warbler	O	N	U	O	F,B
Bay-breasted Warbler	C	N	R	N	F
Blackpoll Warbler	R	N	N	N	F
Cerulean Warbler ^{TxP}	O	N	N	N	F
Black-and-white Warbler	C	O	C	O	F,B
American Redstart ^{TxP}	R	N	R	R	F
Prothonotary Warbler ^{TxP}	U	R	O	N	F
Worm-eating Warbler ^{TxP}	U	N	R	R	F
Swainson's Warbler* ^{TxP}	U	U	U	N	F,B
Ovenbird	U	N	O	R	F,B
Northern Waterthrush	U	N	O	O	F,M,Q
Louisiana Waterthrush ^{TxP}	U	N	O	R	F,M,Q
Kentucky Warbler ^{TxP}	U	N	R	N	F

Appendix B: Aransas NWRC Species List

	Sp	Su	F	W	Habitat
Connecticut Warbler	R	N	R	N	F
Mourning Warbler	O	N	R	N	F
Common Yellowthroat*	C	C	C	C	M,B
Hooded Warbler ^ TxP	C	O	U	N	F,B
Wilson's Warbler	U	N	U	O	F,B
Canada Warbler	U	N	O	N	F
Red-faced Warbler	R	N	N	N	F
Painted Redstart	R	N	R	N	F
Yellow-breasted Chat*	C	R	U	R	F,B
Tanagers					
Summer Tanager	R	R	U	R	F
Scarlet Tanager	U	N	R	N	F
Western Tanager	R	N	R	R	F
Old World Sparrows					
House Sparrow (I)	O	O	O	O	F,G
Sparrows, Towhees, and Allies					
Olive Sparrow	R	R	N	R	B
Green-tailed Towhee	N	N	N	R	B
Spotted Towhee	R	N	R	O	B,F
Eastern Towhee	U	N	O	U	B,F
Cassin's Sparrow* TxP	U	U	U	R	G
Botteri's Sparrow	R	N	N	N	G
American Tree Sparrow	R	N	N	R	G,B
Chipping Sparrow	U	N	U	C	B,F
Clay-colored Sparrow	R	N	R	R	B,G
Field Sparrow TxP	U	N	O	U	B,G
Vesper Sparrow	U	N	O	U	B,G
Lark Sparrow TxP	U	R	U	U	B,G
Black-throated Sparrow	N	N	N	R	G,B
Lark Bunting	R	N	N	R	G
Savannah Sparrow	C	R	C	C	G
Grasshopper Sparrow* TxP	U	O	O	U	G,B
Henslow's Sparrow TxP	N	N	N	R	G

	Sp	Su	F	W	Habitat
Le Conte's Sparrow ^{TxP}	O	N	R	O	G,B
Nelson's Sharp-tailed Sparrow ^{TxP}	R	N	N	R	M
Seaside Sparrow* ^{TxP}	O	O	O	O	M
Fox Sparrow	N	N	N	R	B,M
Song Sparrow	U	N	R	U	B
Lincoln's Sparrow	U	N	O	U	B,M
Swamp Sparrow	C	N	O	C	M,Q,B
White-throated Sparrow	C	N	O	C	B,F
Harris' Sparrow ^{TxP}	N	N	N	R	B
White-crowned Sparrow	R	N	R	O	B,G
Golden-crowned Sparrow	N	N	N	R	B
Dark-eyed Junco	R	N	R	R	B,F
Cardinals, Grosbeaks, and Buntings					
Crimson-collared Grosbeak	R	N	N	R	F,B
Northern Cardinal*	C	C	C	C	F,B
Pyrrhuloxia ^{TxP}	O	R	R	O	B
Rose-breasted Grosbeak	U	N	O	N	F
Black-headed Grosbeak	R	N	N	R	F,B
Blue Grosbeak*	C	U	U	N	B
Lazuli Bunting	R	N	N	N	B
Indigo Bunting	C	N	U	R	B
Painted Bunting* ^{TxP}	C	C	O	R	B
Dickcissel* ^{TxP}	U	U	O	R	G,B
Blackbirds and Orioles					
Bobolink	O	N	N	N	G
Red-winged Blackbird*	C	C	C	C	M,G,Q
Eastern Meadowlark* ^{TxP}	C	C	C	C	G,B
Western Meadowlark ^{TxP}	R	N	R	R	G
Yellow-headed Blackbird	O	R	R	N	G,M
Rusty Blackbird	N	N	R	R	G
Brewer's Blackbird	O	N	R	U	G,B
Common Grackle	O	N	N	O	G,B
Boat-tailed Grackle*	U	U	U	U	G,M

Appendix B: Aransas NWRC Species List

	Sp	Su	F	W	Habitat
Great-tailed Grackle*	U	U	U	U	G,M
Shiny Cowbird	R	N	N	N	G
Bronzed Cowbird*	U	U	O	O	G,B
Brown-headed Cowbird*	C	U	C	C	G,B
Orchard Oriole ^{TxP}	C	O	U	R	B,F
Bullock's Oriole	R	N	N	N	B,F
Baltimore Oriole	C	N	U	N	B,F
Finches and Allies					
Purple Finch	R	N	N	R	F,B
House Finch	R	N	N	R	F,B
Pine Siskin	R	N	N	R	F,B
Lesser Goldfinch	R	R	R	R	F,B
American Goldfinch	U	N	O	C	F,B

B.2 Mammals

Legend:

* - Introduced or non-native species

** - Hypothetical

† - These species need verification but may occur on Refuge lands

^{TxP} - Texas Comprehensive Wildlife Conservation Strategy Priority Species (2005-2010)

Marsupials

Virginia Opossum *Didelphis virginiana*

Armadillos

Nine-banded Armadillo *Dasypus novemcinctus*

Shrews and Moles

Elliot's Short-tailed Shrew ^{TxP} *Blarina hylophaga*

Least Shrew *Cryptotis parva*

Eastern Mole *Scalopus aquaticus*

Bats

Eastern Red Bat *Lasiurus borealis*

Silver-haired Bat *Lasionycteris noctivagans*

Brazilian Free-tailed Bat ^{TxP} *Tadarida brasiliensis mexicana*

Big Free-tailed Bat ^{TxP} *Nyctinomops macrotis*

Canines

Coyote *Canis latrans*

Common Gray Fox *Urocyon cinereoargenteus*

Raccoons and Relatives

Ringtail *Bassariscus astutus*

Northern Raccoon *Procyon lotor*

Weasels and Skunks

Long-tailed Weasel ^{TxP} *Mustela frenata*

American Mink *Mustela vison*

American Badger ^{TxP} *Taxidea taxus*

Eastern Spotted Skunk ^{TxP} *Spilogale putorius*

Striped Skunk	<i>Mephitis mephitis</i>
Hog-nosed Skunk ^{TxP}	<i>Conepatus leuconotus</i>

Felines

Mountain Lion ^{TxP}	<i>Puma concolor</i>
Bobcat	<i>Lynx rufus</i>

Whales, Porpoises, and Dolphins

The following species of whales, porpoises, and dolphins have been found on or near Matagorda Island:

Pygmy Sperm Whale	<i>Kogia breviceps</i>
Dwarf Sperm Whale	<i>Kogia sima</i>
Cuveier's Beaked Whale	<i>Ziphius cavirostris</i>
Pygmy Killer Whale	<i>Feresa attenuate</i>
Melon-headed Whale	<i>Peponocephala electra</i>
Risso's Dolphin	<i>Grampus griseus</i>
Bottlenose Dolphin	<i>Tursiops truncatus</i>
Clymene Dolphin	<i>Stenella clymene</i>

Hoofed Mammals

Feral Pig*	<i>Sus scrofa</i>
Collared Peccary	<i>Pecari tajacu</i>
White-tailed Deer	<i>Odocoileus virginianus</i>

Rodents

Mexican Ground Squirrel	<i>Spermophilus mexicanus</i>
Eastern Fox Squirrel	<i>Sciurus niger</i>
Attwater's Pocket Gopher ^{TxP}	<i>Geomys attwateri</i>
Hispid Pocket Mouse	<i>Chaetodiphus hispidus</i>
Marsh Rice Rat	<i>Oryzomys palustris</i>
Fulvous Harvest Mouse	<i>Reithrodontomys fulvescens</i>
White-footed Mouse	<i>Peromyscus leucopus</i>
Deer Mouse	<i>Peromyscus maniculatus</i>
Northern Pygmy Mouse	<i>Baiomys taylori</i>
Hispid Cotton Rat	<i>Sigmodon hispidus</i>
Southern Plains Woodrat	<i>Neotoma micropus</i>
Norway Rat*	<i>Rattus norvegicus</i>
Roof Rat*	<i>Rattus rattus</i>
House Mouse*	<i>Mus musculus</i>
Nutria*	<i>Myocaster coypus</i>

Rabbits and Hares

Swamp Rabbit ^{TxP}	<i>Sylvilagus aquaticus</i>
Eastern Cottontail	<i>Sylvilagus floridanus</i>
Black-tailed Jackrabbit	<i>Lepus californicus</i>

References:

Schmidly, D. J. 1994. The Mammals of Texas. Austin: University of Texas Press. 501pp.

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B.3 Reptiles and Amphibians

Index:

* - These species need verification but may occur on Refuge lands.

† - This species is poisonous.

^{TxP} - Texas Comprehensive Wildlife Conservation Strategy Priority Species (2005-2010)

REPTILES

Crocodylians

American Alligator^{TxP} *Alligator mississippiensis*

Turtles

Common Snapping Turtle	<i>Chelydra serpentina serpentina</i>
Yellow Mud Turtle	<i>Kinosternon flavescens flavescens</i>
Texas Diamondback Terrapin ^{TxP}	<i>Malaclemys terrapin littoralis</i>
Ornate Box Turtle ^{TxP}	<i>Terrapene ornata ornata</i>
Red-eared Slider	<i>Trachemys scripta elegans</i>
Guadalupe Spiny Soft-shell Turtle	<i>Apalone spiniferus guadalupensis</i>
Mississippi Mud Turtle*	<i>Kenosternon subrubrum hippocreps</i>
Three-toed Box Turtle* ^{TxP}	<i>Terrapene carolina triunguis</i>
Texas tortoise ^{TxP}	<i>Gopherus berlandieri</i>
Loggerhead ^{TxP}	<i>Caretta caretta</i>
Atlantic Green Turtle ^{TxP}	<i>Chelonia mydas mydas</i>
Atlantic Hawksbill ^{TxP}	<i>Eretmochelys imbricata imbricata</i>
Atlantic Ridley (Kemp's Ridley) ^{TxP}	<i>Lepidochelys kemp</i>
Leatherback ^{TxP}	<i>Dermochelys coriacea</i>

Lizards

Mediterranean Gecko	<i>Hemidactylus turcicus turcicus</i>
Texas Horned Lizard ^{TxP}	<i>Phrynosoma cornutum</i>
Northern Fence Lizard	<i>Sceloporus undulatus hyacinthinus</i>
Green Anole	<i>Anolis carolinensis</i>
Ground Skink	<i>Scincella lateralis</i>
Texas Spotted Whiptail	<i>Cnemidophorus gularis gularis</i>
Six-lined Racerunner	<i>Cnemidophorus sexlineatus sexlineatus</i>
Western Slender Glass Lizard ^{TxP}	<i>Ophisaurus attenuatus</i>
Keeled Earless Lizard*	<i>Holbrookia propinqua propinqua</i>
Five-lined Skink*	<i>Eumeces fasciatus</i>

Snakes

Texas Blind Snake	<i>Leptotyphlops dulcis</i>
Texas Scarlet Snake ^{TxP}	<i>Cemophora coccinea lineri</i>
Eastern Yellow-bellied Racer	<i>Coluber constrictor flaviventris</i>
Mexican Racer	<i>Coluber constrictor oaxaca</i>
Southwestern Rat Snake	<i>Elaphe guttata meahllmorum</i>
Texas Rat Snake	<i>Elaphe obsoleta lindheimeri</i>
Western Mud Snake	<i>Farancia abacura reinwardti</i>
Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>
Dusky Hog-nosed Snake	<i>Heterodon nasicus gloydi</i>
Prairie King Snake	<i>Lampropeltis calligaster calligaster</i>
Speckled King Snake	<i>Lampropeltis getula holbrooki</i>
Desert King Snake	<i>Lampropeltis getula splendida</i>
Louisiana Milk Snake	<i>Lampropeltis triangulum amaura</i>
Mexican Milk Snake	<i>Lampropeltis triangulum annulata</i>
Western Coachwhip	<i>Masticophis flagellum testaceus</i>
Gulf Salt Marsh Snake	<i>Nerodia clarki clarki</i>
Green Water Snake	<i>Nerodia cyclopion cyclopion</i>
Broad-banded Water Snake	<i>Nerodia fasciata confluens</i>
Diamondback Water Snake	<i>Nerodia rhombifer rhombifer</i>
Rough Green Snake	<i>Opheodrys aestivus</i>
Bull Snake	<i>Pituophis catenifer sayi</i>
Graham's Crayfish Snake	<i>Regina grahami</i>
Texas Brown Snake	<i>Storeria dekayi texana</i>
Texas Garter Snake	<i>Thamnophis sirtalis annectens</i>
Flatheaded Snake	<i>Tantilla gracilis</i>
Checkered Garter Snake	<i>Thamnophis marcianus marcianus</i>
Gulf Coast Ribbon Snake	<i>Thamnophis proximus orarius</i>
Red-sided Garter Snake	<i>Thamnophis sirtalis parietalis</i>
Eastern Garter Snake	<i>Thamnophis sirtalis sirtalis</i>
Rough Earth Snake	<i>Virginia striatula</i>

Venomous Snakes

Texas Coral Snake†	<i>Micrurus fulvius tenerx</i>
Broad-banded Copperhead†	<i>Agkistrodon contortix laticinctus</i>
Western Cottonmouth†	<i>Agkistrodon piscivorus leucostoma</i>
Western Massasauga†	<i>Sistrurus catenatus tergeminus</i>
Western Diamondback Rattlesnake†	<i>Crotalus atrox</i>

AMPHIBIANS**Salamanders**

Rio Grande Lesser Siren ^{TxP}	<i>Siren intermedia siren</i>
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Smallmouth Salamander	<i>Ambystoma texanum</i>
Eastern Tiger Salamander	<i>Ambystoma tigrinum tigrinum</i>

Frogs and Toads

Blanchard's Cricket Frog	<i>Acris crepitans blanchardi</i>
Green Tree Frog	<i>Hyla cinerea</i>
Squirrel Tree Frog	<i>Hyla squirella</i>
Spotted Chorus Frog	<i>Pseudacris clarki</i>
Strecker's Chorus Frog	<i>Pseudacris streckeri</i>
Couch's Spadefoot	<i>Scaphiopus couchi</i>
Hurter's Spadefoot ^{TXP}	<i>Scaphiopus hurteri</i>
Texas Toad	<i>Bufo speciosus</i>
Gulf Coast Toad	<i>Bufo valliceps valiceps</i>
Eastern Narrowmouth Toad	<i>Gastrophryne carolinensis</i>
Great Plains Narrowmouth Toad	<i>Gastrophryne olivacea</i>
Bullfrog	<i>Rana catesbeiana</i>
Southern Leopard Frog	<i>Rana utricularia</i>

Reference:

Dixon, James R. Amphibians and Reptiles of Texas. College Station: University Press, 2000.

Revised as of: March 2010

B.4 Fishes

Atlantic Stingray	<i>Dasyatis sabina</i>
Alligator Gar	<i>Atractosteus spatula</i>
Spotted Gar	<i>Lepisosteus oculatus</i>
Shortnose Gar	<i>Lepisosteus platostomus</i>
Bowfin	<i>Amia calva</i>
Ladyfish	<i>Elops saurus</i>
Tarpon	<i>Megalops atlanticus</i>
American Eel	<i>Anguilla rostrata</i>
Speckled Worm Eel	<i>Myrophis punctatus</i>
Bay Anchovy	<i>Anchoa mitchilli</i>
Skipjack Herring	<i>Alosa chrysochloris</i>
Finescale Menhaden	<i>Brevoortia gunteri</i>
Gulf Menhaden	<i>Brevoortia patronus</i>
Gizzard Shad	<i>Dorosoma cepedianum</i>
Threadfin Shad	<i>Dorosoma petenense</i>
Common Carp	<i>Cyprinus carpio</i>
Golden Shiner	<i>Notemigonus crysoleucas</i>
Black Bullhead	<i>Ictalurus melas</i>
Yellow Bullhead	<i>Ameiurus natalis</i>
Brown Bullhead	<i>Ameiurus nebulosus</i>
Channel Catfish	<i>Ictalurus punctatus</i>
Hardhead Catfish	<i>Ariopsis felis</i>
Gafftopsail Catfish	<i>Bagre marinus</i>
Inshore Lizardfish	<i>Synodus foetens</i>
Blackedge Cusk-eel	<i>Lepophidium graellsii</i>
Gulf Toadfish	<i>Opsanus beta</i>
Atlantic Midshipman	<i>Porichthys porosissimus</i>
Striped Mullet	<i>Mugil cephalus</i>
White Mullet	<i>Mugil curema</i>
Inland Silverside	<i>Menidia beryllina</i>
Atlantic Silverside	<i>Menidia menidia</i>
Tidewater Silverside	<i>Menidia beryllina</i>
Atlantic Needlefish	<i>Strongylura marina</i>
Atlantic Silverstripe Halfbeak	<i>Hyporhamphus unifasciatus</i>
Diamond Killifish	<i>Adinia xenica</i>
Golden Topminnow	<i>Fundulus chrysotus</i>
Gulf Killifish	<i>Fundulus grandis</i>
Bayou Killifish	<i>Fundulus pulvureus</i>
Longnose Killifish	<i>Fundulus similis</i>
Rainwater Killifish	<i>Luciana parva</i>
Western Mosquitofish	<i>Gambusia affinis</i>
Sailfin Molly	<i>Poecilia latipinna</i>
Sheepshead Minnow	<i>Cyprinodon variegatus</i>

Opossum Pipefish	<i>Microphis brachyurus</i>
Chain Pipefish	<i>Syngnathus louisianae</i>
Gulf Pipefish	<i>Syngnathus scovelli</i>
Redbreast Sunfish	<i>Lepomis auritus</i>
Warmouth	<i>Chaenobryttus gulosus</i>
Bluegill	<i>Lepomis macrochirus</i>
Green Sunfish	<i>Lepomis cyanellus</i>
Longear Sunfish	<i>Lepomis megalotis</i>
Redear Sunfish	<i>Lepomis microlophus</i>
Bantam Sunfish	<i>Lepomis symmetricus</i>
Largemouth Bass	<i>Micropterus salmoides</i>
Crevalle Jack	<i>Caranx hippos</i>
Spotfin Mojarra	<i>Eucinostomus argenteus</i>
Silver Jenny	<i>Eucinostomus gula</i>
Pigfish	<i>Orthopristis chrysoptera</i>
Sheepshead	<i>Archosargus probatocephalus</i>
Pinfish	<i>Lagodon rhomboides</i>
Silver Perch	<i>Bairdiella chrysura</i>
Sand Seatrout	<i>Cynoscion arenarius</i>
Spotted Seatrout	<i>Cynoscion nebulosus</i>
Spot	<i>Leiostomus xanthurus</i>
Atlantic Croaker	<i>Micropogon undulatus</i>
Black Drum	<i>Pogonia cromis</i>
Red Drum	<i>Sciaenops ocellata</i>
Fat Sleeper	<i>Dormitator maculatus</i>
Darter Goby	<i>Gobionellus boleosoma</i>
Naked Goby	<i>Gobiosoma boscii</i>
Clown Goby	<i>Microgobius golosus</i>
Bay Whiff	<i>Citharichthys spilopterus</i>
Fringed Flounder	<i>Etropus crossotus</i>
Gulf Flounder	<i>Paralichthys albigutta</i>
Southern Flounder	<i>Paralichthys lethostigma</i>
Dusky Flounder	<i>Syacium papillosum</i>
Lined Sole	<i>Achirus lineatus</i>
Hogchoker	<i>Trinectes maculatus</i>
Blackcheek Tonguefish	<i>Symphurus plagiusa</i>
Least Puffer	<i>Sphoeroides parvus</i>
Smalltooth Sawfish	<i>Pristis pectinata</i>

Reference:

This list is in the phylogenetic order as found in the book *Common and Scientific Names of Fishes from the United States, Canada, and Mexico*, Sixth Edition, 2004, American Fisheries Society Special Publication 29, Bethesda, Maryland.

B.5 Invertebrates

Legend:

A – Abundant
 S – Stray
 U – Uncommon
 C – Common
 R – Rare
 M – Migrant

Butterflies

Swallowtails

Eastern Tiger Swallowtail	<i>Papilio glaucus</i>	S
Pipevine Swallowtail	<i>Battus philenor</i>	A
Spicebush Swallowtail	<i>Papilio troilus</i>	S
Black Swallowtail	<i>Papilio polyxenes</i>	U
Palamedes Swallowtail	<i>Papilio palamedes</i>	A
Polydamas Swallowtail	<i>Battus polydamas</i>	S
Giant Swallowtail	<i>Papilio cresphontes</i>	A

Whites and Sulphurs

Cabbage White	<i>Pieris rapae</i>	R
Checkered White	<i>Pontia protodice</i>	C
Great Southern White	<i>Ascia monuste</i>	A
Giant White	<i>Ganyra josephina</i>	R
Falcate Orangetip	<i>Anthocharis midea</i>	U
Clouded Sulphur	<i>Colias philodice</i>	S
Orange Sulphur	<i>Colias eurytheme</i>	C
Southern Dogface	<i>Colias cesonia</i>	C
Sleepy Orange	<i>Eurema nicippe</i>	C
Dainty Sulphur	<i>Nathalis iole</i>	C
Little Yellow	<i>Eurema lisa</i>	A
Mimosa Yellow	<i>Eurema nise</i>	S
Cloudless Sulphur	<i>Phoebis sennae</i>	A
Large Orange Sulphur	<i>Phoebis agarithe</i>	A
Apricot Sulphur	<i>Phoebis argante</i>	S
Lyside Sulphur	<i>Kricogonia lyside</i>	U
Statira Sulphur	<i>Phoebis statira</i>	S
White Angled-Sulphur	<i>Anteos clorinde</i>	S

Hairstreaks

Gray Hairstreak	<i>Strymon melinus</i>	A
Oak Hairstreak	<i>Satyrium favonius</i>	R
Soapberry Hairstreak	<i>Phaeostrymon alcestis</i>	C
Red-banded Hairstreak	<i>Calycopis cecrops</i>	S

Appendix B: Aransas NWRC Species List

Dusky-blue Groundstreak	<i>Calycopis isobea</i>	A
Mallow Scrub-Hairstreak	<i>Strymon columella</i>	U
<i>Blues</i>		
Marine Blue	<i>Leptotes marina</i>	R
Western Pygmy-Blue	<i>Brephidium exile</i>	A
Ceraunus Blue	<i>Hemiargus ceraunus</i>	A
Reakirt's Blue	<i>Hemiargus isola</i>	C
<i>Metalmarks</i>		
Rounded Metalmark	<i>Calephelis nilus</i>	U
<i>Longwings and Fritillaries</i>		
Gulf Fritillary	<i>Agraulis vanillae</i>	C
Julia Heliconian	<i>Dryas julia</i>	S
Variegated Fritillary	<i>Euptoieta claudia</i>	A
<i>Crescents and Checkerspots</i>		
Pearl Crescent	<i>Phyciodes tharos</i>	C
Phaon Crescent	<i>Phyciodes phaon</i>	A
Elada Checkerspot	<i>Texola elada</i>	R
Bordered Patch	<i>Chlosyne lacinia</i>	C
<i>Typical Brushfoots</i>		
Question Mark	<i>Polygonia interrogationis</i>	U
Red Admiral	<i>Vanessa atalanta</i>	C
American Lady	<i>Vanessa virginiensis</i>	A
Painted Lady	<i>Vanessa cardui</i>	U
Common Buckeye	<i>Junonia coenia</i>	A
Mangrove Buckeye	<i>Junonia evarete</i>	S
'Dark' Tropical Buckeye	<i>Junonia genoveva nigrosuffusa</i>	A
White Peacock	<i>Anartia jatrophae</i>	C
Viceroy	<i>Limenitis archippus</i>	C
Common Mestra	<i>Mestra amymone</i>	C
Goatweed Leafwing	<i>Anaea andria</i>	U
Hackberry Emperor	<i>Asterocampa celtis</i>	C
Empress Leilia	<i>Asterocampa leilia</i>	U
Tawny Emperor	<i>Asterocampa clyton</i>	C
American Snout	<i>Libytheana carinenta</i>	A-R
Monarch	<i>Danaus plexippus</i>	M
Queen	<i>Danaus gilippus</i>	C
<i>Satyrs</i>		
Carolina Satyr	<i>Hermeuptychia sosybius</i>	C
Gemmed Satyr	<i>Cyllopsis gemma</i>	U

Cloudywing

Northern Cloudywing	<i>Thorybes palides</i>	U
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Spread-wing Skippers

Long-tailed Skipper	<i>Urbanus proteus</i>	U
Dorantes Longtail	<i>Urbanus dorantes</i>	U
White-striped Longtail	<i>Chioides catillus</i>	C
Sickle-winged Skipper	<i>Achlyodes thraso</i>	C
Horace's Duskywing	<i>Erynnis horatius</i>	C
Funereal Duskywing	<i>Erynnis funeralis</i>	A
Mournful Duskywing	<i>Erynnis tristis</i>	U
Wild Indigo Duskywing	<i>Erynnis baptisiae</i>	R
False Duskywing	<i>Gesta gesta</i>	C
Common Checkered-Skipper	<i>Pyrgus communis</i>	A
Tropical Checkered-Skipper	<i>Pyrgus oileus</i>	C
Desert Checkered-Skipper	<i>Pyrgus philetas</i>	R
Laviana White-Skipper	<i>Helioptetes laviana</i>	C
Turk's Cap White-Skipper	<i>Helioptetes macaira</i>	U
Common Sootywing	<i>Pholisora catullus</i>	C

Grass Skippers

Fiery Skipper	<i>Hylephila phyleus</i>	A
Sachem	<i>Atalopedes campestris</i>	C
Whirlabout	<i>Polites vibex</i>	C
Least Skipper	<i>Ancyloxypha numitor</i>	U
Orange Skipperling	<i>Copaeodes aurantiacus</i>	U
Southern Skipperling	<i>Copaeodes minimus</i>	C
Clouded Skipper	<i>Lerema accius</i>	A
Fawn-spotted Skipper	<i>Cymaenes odilia</i>	S
Julia's Skipper	<i>Nastra julia</i>	U
Southern Broken-Dash	<i>Wallengrenia otho</i>	U
Dun Skipper	<i>Euphyes vestris</i>	C
Celia's Roadside-Skipper	<i>Amblyscirtes celia</i>	C
Nysa Roadside-Skipper	<i>Amblyscirtes nysa</i>	C
Eufala Skipper	<i>Lerodea eufala</i>	R
Ocola Skipper	<i>Panoquina ocola</i>	U
Salt Marsh Skipper	<i>Panoquina panoquin</i>	U
Obscure Skipper	<i>Panoquina panoquinoides</i>	C
Brazilian Skipper	<i>Calpododes ethlius</i>	R

Reference:

Brock, James P. and Kenn Kaufman. 2003. Butterflies of North America, Houghton-Mifflin Publishing.

Revised as of: March 2010

Dragonflies

Darners

Common Green Darner

Anax junius

Clubtails

Sulphur-tipped Clubtail

Gomphus militaris

Broad-striped Forceptail

Aphylla anugustifolia

Skimmers

Gold-winged Skimmer

Libellula auripennis

Needham's Skimmer

Libellula needhami

Roseate Skimmer

Orthemis ferruginea

Variegated Meadowhawk

Sympetrum corruptum

Little Blue Dragonlet

Erythrodiplax minuscule

Seaside Dragonlet

Erythrodiplax berenice

Blue Dasher

Pachydiplax longipennis

Eastern Pondhawk

Erythemis simplicicollis

Wandering Glider

Pantala flavescens

Black Saddlebags

Tramea lacerate

Carolina Saddlebags

Tramea carolina

Red Saddlebags

Tramea onusta

Striped Saddlebags

Tramea calverti

Hyacinth Glider

Miathyria marcella

Marl Pennant

Macrodiplax balteata

Red-tailed Pennant

Brachymesia furcata

Four-Spotted Pennant

Brachymesia gravida

Halloween Pennant

Celithemis eponina

Banded Pennant

Celithemis fasciata

Reference:

Dunkle, Sidney W. 2000. Dragonflies Through Binoculars, A Field Guide to Dragonflies of North America. Oxford University Press. *Revised as of: 2005*

Bivalves

Concentric Nut Clam

Nuculana concentrica

Mossy Ark

Arca imbricata

Incongruous Ark

Anadara brasiliana

Cut-Ribbed Ark

Anadara floridana

Transverse Ark

Anadara transversa

Blood Ark

Anadara ovalis

Ponderous Ark

Noetia ponderosa

Scorched Mussel

Brachidontes (Brachidontes) exustus

Hooked Mussel

Ischadium recurvus

Tulip Mussel

Modiolus americanus

Paper Mussel	<i>Amygdalum papyria</i>
Ribbed Mussel	<i>Geukensia demissa granosissima</i>
Half-Naked Pen Shell	<i>Atrina seminuda</i>
Saw-Tooth Pen Shell	<i>Atrina serrata</i>
Atlantic Pearl Oyster	<i>Pinctada imbricata</i>
Atlantic Wing Oyster	<i>Pteria colymbus</i>
Flat Tree Oyster	<i>Isognomon alatus</i>
Atlantic Bay Scallop	<i>Argopecten irradians amplicostatus</i>
Atlantic Thorny Oyster	<i>Spondylus americanus</i>
Kitten's Paw	<i>Plicatula gibbosa</i>
Common Jingle Shell	<i>Anomia simplex</i>
Eastern Oyster	<i>Crassostrea virginica</i>
Horse or Crested Oyster	<i>Ostrea equestris</i>
Florida Lucina	<i>Pseudomiltha floridana</i>
Buttercup Lucina	<i>Anodontia alba</i>
Leafy Jewel Box	<i>Chama macerophylla</i>
Broad-Ribbed Cardita	<i>Carditamera floridana</i>
Common Egg Cockle	<i>Laevicardium laevigatum</i>
Morton's Egg Cockle	<i>Laevicardium mortoni</i>
Giant Atlantic Cockle	<i>Laevicardium (Dinocardium) robustum</i>
Fragile Atlantic	<i>Mactra Mactra fragilis</i>
Dwarf Surf Clam	<i>Mulinia lateralis</i>
Common Rangia	<i>Rangia (Rangia) cuneata</i>
Brown Rangia	<i>Rangia (Rangianella) flexuosa</i>
Atlantic Surf Clam	<i>Spisula (Hemimactra) solidissima</i>
Smooth Duck Clam	<i>Anatina anatina</i>
Channeled Duck Clam	<i>Raeta plicatella</i>
Jackknife Clam	<i>Ensis minor</i>
Alternate Tellin	<i>Tellina (Eurytellina) alternata</i>
Taylor's Tellin	<i>Tellina (Eurytellina) alternata tayloriana</i>
Rose Petal Tellin	<i>Tellina (Eurytellina) lineata</i>
Coquina Shell	<i>Donax roemeri roemeri</i>
Common Atlantic	<i>Abra Abra (Abra) aequalis</i>
Stout Tagelus	<i>Tagelus (Mesopleura) plebius</i>
Florida Marsh Clam	<i>Polymesoda (Pseudocyrena) maritima</i>
Sunray Venus	<i>Callista (Macrocallista) nimbosea</i>
Disk Dosinia	<i>Dosinia discus</i>
Cross-Barred Venus	<i>Chione cancellata</i>
Lady-In-Waiting Venus	<i>Chione intapurplea</i>
Clench's Chione	<i>Chione (Lirophora) clenchi</i>
Southern Quahog	<i>Mercenaria campechiensis</i>
Pointed Venus	<i>Anomalocardia auberiana</i>
False Angel Wing	<i>Petricola (Petricolaria) pholadiformis</i>
Campeche Angel Wing	<i>Pholas (Thovana) campechiensis</i>
Angel Wing	<i>Cyrtopleura (Scobinepholas) costata</i>
Unequal Spoon Clam	<i>Periploma margaritaceum</i>

Gastropods*

Florida Applesnail	<i>Pomacea paludosa</i>
Common Sundial	<i>Architectonica nobilis</i>
Cancellate Cantharus	<i>Cantharus cancellarius</i>
Striate Bubble	<i>Bulla striata</i>
Common Atlantic Slipper	<i>Crepidula fornicata</i>
Scotch Bonnet	<i>Phalium granulatatum granulatatum</i>
Atlantic Distorsio	<i>Distorsio clathrata</i>
Coffee Melampus	<i>Melampus bidentatus</i>
Wentletraps	<i>Epitonium spp.</i>
Mitchell's Wentletrap	<i>Amacea mitchelli</i>
Angulate Wentletrap	<i>Epitonium angulatum</i>
Multiribbed Wentletrap	<i>Epitonium multistriatum</i>
True Tulip Shell	<i>Fasciolaria tulipa</i>
Florida Horse Conch	<i>Pleuroploca gigantea</i>
Banded Tulip Shell	<i>Fasciolaria lilium</i>
Common Purple Storm Snail	<i>Janthina janthina</i>
Marsh Periwinkle	<i>Littorina irrorata</i>
Pear Whelk	<i>Busycon spiratus plagosum</i>
Lightning Whelk	<i>Busycon perversum pulleyi</i>
Florida Rock Shell	<i>Thais haemastoma floridana</i>
Giant Eastern Murex	<i>Murex fulvescens</i>
Common Baby's Ear	<i>Sinum perspectivum</i>
Shark's Eye	<i>Polinices duplicatus</i>
Miniature Natica	<i>Natica pusilla</i>
Virgin Nerite	<i>Neritina virginea</i>
Lettered Olive	<i>Oliva sayana</i>
Single-toothed	<i>Simnia Pseudocyphoma intermedium</i>
Sea Whip	<i>Simnia Simnialena marferula</i>
Plicate Horn Shell	<i>Cerithidea pliculosa</i>
Fighting Conch	<i>Strombus alatus</i>
Salle's Auger	<i>Hastula salliana</i>
Giant Tun Shell	<i>Tonna galea</i>
Smooth Atlantic	<i>Tegula Tegula fasciata</i>
West Indian Worm Shell	<i>Vermicularia cf. V. spirata</i>

* - The majority of these gastropods were found on the Matagorda Island unit of the Refuge Complex.

Reference:

Andrews, Jean A. 1992. Field Guide to Shells of the Texas Coast, Texas Monthly Press.

Revised as of: March 2006

B.6 Plants

ACANTHACEAE

Narrowleaf dyschoriste

Dyschoriste linearis

Violet ruellia

Ruellia nudiflora

AGAVACEAE

Spanish dagger (Yucca)

Yucca treculeana

AIZOACEAE

Sea purslane

Sesuvium portulacastrum

AMARANTHACEAE

Tall amaranth

Amaranthus rudis

Globe amaranth

Gomphrena globosa

Alligatorweed*

Alternanthera philoxeroides

APIACEAE

Hooker eryngo

Eryngium hookeri

Coast pennywort

Hydrocotyle bonariensis

Dogshade

Limnoscium pumilus

APOCYNACEAE

Oleander*

Nerium oleander

AQUIFOLIACEAE

Yaupon

Ilex vomitoria

ASCLEPIADACEAE

Savannah milkweed

Asclepias oenotheroides

ASTERACEAE

Western ragweed

Ambrosia psilostachya

Broomweed

Amphiachyris dracunculoides

Eastern baccharis (Groundsel)

Baccharis halimifolia

Sea ox-eye daisy

Borrchia frutescens

Spiny aster

Chloracantha spinosa

Bull thistle

Cirsium horridulum

Texas thistle

Cirsium texanum

Betony-leaf mistflower

Conoclinium betonicifolium

Blue mistflower

Conoclinium coelestinum

Goldenmane coreopsis

Coreopsis basalis

Plains coreopsis

Coreopsis tinctoria

Scratch daisy

Croptilon divaricatum

Corpus Christi fleabane	<i>Erigeron procumbens</i>
Yankeeweed	<i>Eupatorium compositifolium</i>
Late-flowering boneset	<i>Eupatorium serotinum</i>
Cottonrose	<i>Evax verna</i>
Yellowstems	<i>Flaveria brownii</i>
Indian blanket	<i>Gaillardia pulchella</i>
Cudweed	<i>Gamochaeta pensilvanica</i>
Bitterweed	<i>Helenium amarum</i>
Common sunflower	<i>Helianthus annuus</i>
Silverleaf sunflower	<i>Helianthus argophyllus</i>
Coast sunflower	<i>Helianthus debilis</i>
Camphorweed	<i>Heterotheca subaxillaris</i>
Narrow-leaf sumpweed	<i>Iva angustifolia</i>
Seacoast sumpweed	<i>Iva annua</i>
Marsh elder	<i>Iva frutescens</i>
Texas camphor daisy	<i>Machaeranthera pinnatifida</i>
Texas palafoxia	<i>Palafoxia texana</i>
Purple pluchea	<i>Pluchea purpurascens</i>
Texas dandelion	<i>Pyrrhopappus grandiflorus</i>
Upright prairie coneflower	<i>Ratibida columnifera</i>
Gulf Coast Mexican hat	<i>Ratibida peduncularis</i>
Butterweed	<i>Senecio imparipinnatus</i>
Seacoast goldenrod	<i>Solidago sempervirens</i>
Prickly sowthistle	<i>Sonchus asper</i>
Cowpen daisy	<i>Verbesina encelioides</i>
Frostweed	<i>Verbesina microptera</i>
White crownbeard	<i>Verbesina virginica</i>
Cocklebur	<i>Xanthium strumarium</i>
BASELLACEAE	
Medeira vine	<i>Anredera leptostachys</i>
BORAGINACEAE	
Seaside heliotrope	<i>Heliotropium curassavicum</i>
Texas heliotrope	<i>Heliotropium racemosum</i>
BRASSICACEAE	
Peppergrass	<i>Lepidium virginicum</i>
CACTACEAE	
Black lace cactus	<i>Echinocereus reichenbachii albertii</i>
CHENOPODIACEAE	
Glasswort	<i>Salicornia virginica</i>
Annual seepweed	<i>Suaeda linearis</i>

COMMELINACEAE

Erect dayflower	<i>Commelina erecta</i>
Stemless spiderwort	<i>Tradescantia subacaulis</i>

CONVOLVULACEAE

Gray bindweed	<i>Convolvulus equitans</i>
Silky evolvulus	<i>Evolvulus sericeus</i>
Goat-foot morning glory	<i>Ipomoea pes-caprae</i>

CYPERACEAE

Salt-marsh bullrush	<i>Bolboschoenus robustus</i>
Taperleaf flatsedge	<i>Cyperus acuminatus</i>
Jointed flatsedge	<i>Cyperus articulatus</i>
Baldwin's flatsedge	<i>Cyperus croceus</i>
Finger flatsedge	<i>Cyperus digitatus</i>
Globe flatsedge	<i>Cyperus echinatus</i>
Sticky flatsedge	<i>Cyperus elegans</i>
Deep-rooted sedge*	<i>Cyperus entrerianus</i>
Chufa flatsedge	<i>Cyperus esculentus</i>
One-flower flatsedge	<i>Cyperus pseudothyrsiflorus</i>
Globe umbrella sedge	<i>Cyperus retrorsus</i>
White spike-rush	<i>Eleocharis albida</i>
Ditch fimbry	<i>Fimbristylis caroliniana</i>
Dunes fimbry	<i>Fimbristylis castanea</i>
Fimbry	<i>Fimbristylis puberula</i>
White-topped umbrella grass	<i>Rhynchospora colorata</i>
American bullrush	<i>Schoenoplectus americanus</i>

EBENACEAE

Texas persimmon	<i>Diospyros texana</i>
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EUPHORBIACEAE

Wild mercury	<i>Argythamnia humilis</i>
Wooly croton	<i>Croton capitatus</i>
Prairie tea	<i>Croton monanthogynus</i>
Snow-on-the-prairie	<i>Euphorbia bicolor</i>
Heart-leaf euphorbia	<i>Euphorbia cordifolia</i>
Birdseed leaf-flower	<i>Phyllanthus pudens</i>
Castor bean*	<i>Ricinus communis</i>
Chinese tallow*	<i>Sapium sebiferum</i>
Betonyleaf noseburn	<i>Tragia betonicifolia</i>
Castor bean	

FABACEAE

Fern acacia	<i>Acacia angustissima</i>
Huisache	<i>Acacia farnesiana</i>

Indigo bush	<i>Amorpha fruticosa</i>
Slimpod locoweed	<i>Astragalus leptocarpus</i>
Coffee senna	<i>Cassia occidentalis</i>
Butterfly pea	<i>Centrosema virginianum</i>
Partridge pea	<i>Chamaecrista fasciculata</i>
Wedge-leaf prairie clover	<i>Dalea emarginata</i>
Round head prairie clover	<i>Dalea multiflora</i>
Dwarf dalea	<i>Dalea nana</i>
Bundleflower	<i>Desmanthus virgatus</i>
Coralbean	<i>Erythrina herbacea</i>
Hoary milkpea	<i>Galactia canescens</i>
Longleaf milkpea	<i>Galactia longifolia</i>
Bladderpod	<i>Glottidium vesicaria</i>
Scarlet pea	<i>Indigofera miniata</i>
Bush indigo	<i>Indigofera suffruticosa</i>
Yellow sour clover*	<i>Melilotus indicus</i>
Sensitive briar	<i>Mimosa latidens</i>
Catclaw sensitive briar	<i>Mimosa nuttallii</i>
Powderpuff	<i>Mimosa strigillosa</i>
Yellowpuff	<i>Neptunia lutea</i>
Tropical puff	<i>Neptunia pubescens</i>
Honey mesquite	<i>Prosopis glandulosa</i>
Snoutbean	<i>Rhynchosia americana</i>
Texas snoutbean	<i>Rhynchosia senna</i>
Coffee senna	<i>Senna occidentalis</i>
Rattlepod	<i>Sesbania drummondii</i>
Slick weed wildbean	<i>Strophostyles leiosperma</i>
Louisiana deer vetch	<i>Vicia ludoviciana</i>

FAGACEAE

Live oak	<i>Quercus virginiana</i>
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GENTIANACEAE

Bluebell	<i>Eustoma exaltatum</i>
Prairie gentian	<i>Sabatia campestris</i>

GERANIACEAE

Carolina geranium	<i>Geranium carolinianum</i>
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HYDROPHYLLACEAE

Bluecurls	<i>Phacelia congesta</i>
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IRIDACEAE

Wild iris	<i>Herbertia lahue</i>
Wiry blue-eyed grass	<i>Sisyrinchium biforme</i>
Dotted blue-eyed grass	<i>Sisyrinchium langloisii</i>

JUNCACEAE

Toad rush	<i>Juncus bufonius</i>
Grass-leaf rush	<i>Juncus marginatus</i>
Cherry-coke rush	<i>Juncus megacephalus</i>
Rush	<i>Juncus spp.</i>

KRAMERIACEAE

Prairiebur	<i>Krameria lanceolata</i>
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LAMIACEAE

Henbit	<i>Lamium amplexicaule</i>
Spotted horsemint	<i>Monarda punctata</i>
Drummond skullcap	<i>Scutellaria drummondii</i>
Skullcap	<i>Scutellaria muriculata</i>
Coast germander	<i>Teucrium cubense</i>
American germander	<i>Teucrium canadense</i>

LAURACEAE

Camphor Tree*	<i>Cinnamomum camphora</i>
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LILIACEAE

False garlic	<i>Nothoscordum bivalve</i>
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LINACEAE

Stiff-stem flax	<i>Linum rigidum</i>
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LYTHRACEAE

California loosestrife	<i>Lythrum californicum</i>
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MALVACEAE

Indian mallow	<i>Abutilon fruticosum</i>
Winecup	<i>Callirhoe involucrata</i>
Spreading sida	<i>Sida abutifolia</i>
Bracted sida	<i>Sida ciliaris</i>
Prickly sida	<i>Sida spinosa</i>
Wooly globemallow	<i>Sphaeralcea lindheimeri</i>

MELIACEAE

Chinaberry*	<i>Melia azedarach</i>
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OLEACEAE

Tanglewood	<i>Forestiera angustifolia</i>
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ONAGRACEAE

Yellow evening primrose	<i>Calylophus serrulatus</i>
Beach evening primrose	<i>Oenothera drummondii</i>

Fluttermill	<i>Oenothera grandis</i>
Pink evening primrose	<i>Oenothera speciosa</i>

OXALIDACEAE

Yellow wood sorrel	<i>Oxalis dillenii</i>
Purple wood sorrel	<i>Oxalis drummondii</i>

PAPAVERACEAE

White prickly poppy	<i>Argemone albiflora</i>
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PHYTOLACCACEAE

Pigeonberry	<i>Rivina humilis</i>
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PLANTAGINACEAE

Heller's plantain	<i>Plantago helleri</i>
Redweed plantain	<i>Plantago rhodosperma</i>

PLUMBAGINACEAE

Sea lavender	<i>Limonium carolinianum</i>
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POACEAE

Bushy bluestem	<i>Andropogon glomeratus</i>
Broomsedge bluestem	<i>Andropogon virginicus</i>
Plains triple-awn	<i>Aristida longespica</i>
Prairie threeawn	<i>Aristida oligantha</i>
Giant reed*	<i>Arundo donax</i>
Australian bluestem*	<i>Bothriochloa bladhii</i>
King Ranch bluestem*	<i>Bothriochloa ischaemum</i>
Silver bluestem	<i>Bothriochloa laguroides</i>
Sideoats grama	<i>Bouteloua curtipendula</i>
Texas grama	<i>Bouteloua rigidiseta</i>
Rescuegrass	<i>Bromus catharticus</i>
Buffalograss	<i>Buchloë dactyloides</i>
Southern sandbur	<i>Cenchrus echinatus</i>
Coastal sandbur	<i>Cenchrus spinifex</i>
Fringed windmillgrass	<i>Chloris ciliata</i>
Hooded windmillgrass	<i>Chloris cucullata</i>
Shortspike windmillgrass	<i>Chloris subdolichostachya</i>
Coastal Bermuda grass	<i>Cynodon dactylon</i>
Durban crowfoot grass	<i>Dactyloctenium aegyptium</i>
Kleberg bluestem*	<i>Dichanthium annualatum</i>
Angleton bluestem*	<i>Dichanthium aristatum</i>
Silky bluestem	<i>Dichanthium sericeum</i>
Rosettegrass	<i>Dichanthium spp.</i>
Sand witchgrass	<i>Digitaria arenicola</i>
Southern crabgrass	<i>Digitaria ciliaris</i>

Smooth crabgrass	<i>Digitaria ischaemum</i>
Common saltgrass	<i>Distichlis spicata</i>
Goosegrass	<i>Eleusine indica</i>
Canada wildrye	<i>Elymus canadensis</i>
Mediterranean lovegrass*	<i>Eragrostis barrelieri</i>
Gummy lovegrass	<i>Eragrostis curtipe dicellata</i>
Mourning lovegrass	<i>Eragrostis lugens</i>
Red lovegrass	<i>Eragrostis secundiflora</i>
Purple lovegrass	<i>Eragrostis spectabilis</i>
Cupgrass	<i>Eriochloa pseudoacrotricha</i>
Texas cupgrass	<i>Eriochloa sericea</i>
Stiff-leaf chloris	<i>Eustachys petraea</i>
Little barley	<i>Hordeum pusillum</i>
Red sprangletop	<i>Leptochloa mucronata</i>
Nealley sprangletop	<i>Leptochloa nealleyi</i>
Ozark grass	<i>Limnodea arkansana</i>
Gulf muhly	<i>Muhlenbergia capillaris</i>
Texas wintergrass	<i>Nassella leucotricha</i>
Beach panic	<i>Panicum amarum</i>
Hackel panic	<i>Panicum bergii</i>
Halls panic	<i>Panicum hallii</i>
Heller panicum	<i>Panicum oligosanthos</i>
Switchgrass	<i>Panicum virgatum</i>
Longtom	<i>Paspalum lividum</i>
Gulfdune paspalum	<i>Paspalum monostachyum</i>
Brownseed paspalum	<i>Paspalum plicatulum</i>
Thin paspalum	<i>Paspalum setaceum</i>
Vaseygrass*	<i>Paspalum urvillei</i>
Buffelgrass*	<i>Pennisetum ciliare</i>
Canary grass*	<i>Phalaris canariensis</i>
Common reed	<i>Phragmites australis</i>
Rabbitfoot	<i>Polypogon monspeliense</i>
Little bluestem	<i>Schizachyrium scoparium</i>
Plains bristle grass	<i>Setaria leucopila</i>
Knot bristle grass	<i>Setaria parviflora</i>
Yellow Indiangrass	<i>Sorghastrum nutans</i>
Johnsongrass*	<i>Sorghum halepense</i>
Smooth cordgrass	<i>Spartina alterniflora</i>
Marshhay (saltmeadow) cordgrass	<i>Spartina patens</i>
Gulf cordgrass	<i>Spartina spartinae</i>
Prairie wedgescale	<i>Sphenopholis obtusata</i>
Meadow dropseed	<i>Sporobolus compositus</i>
Smutgrass	<i>Sporobolus indicus</i>
Whorled dropseed	<i>Sporobolus pyramidatus</i>
Padre Island dropseed	<i>Sporobolus tharpii</i>
Seashore dropseed	<i>Sporobolus virginicus</i>

Crinkleawn	<i>Trachypogon</i> spp.
White tridens	<i>Tridens albescens</i>
Pink tridens	<i>Tridens congestus</i>
Seaoats	<i>Uniola paniculata</i>
Browntop panicum	<i>Urochloa fasciculata</i>
Guineagrass*	<i>Urochloa maxima</i>
Six-weeks fescue	<i>Vulpia octoflora</i>

POLEMONIACEAE

Split-leaf gilia	<i>Gilia incisa</i>
Drummond phlox	<i>Phlox drummondii</i>

POLYGALACEAE

White milkwort	<i>Polygala alba</i>
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POLYGONACEAE

Wild buckwheat	<i>Eriogonum multiflorum</i>
Smartweed	<i>Polygonum hydropiperoides</i>
Knotweed	<i>Polygonum ramosissimum</i>
Dock	<i>Rumex chrysocarpus</i>

PONTEDERIACEAE

Water hyacinth*	<i>Eichhornia crassipes</i>
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PORTULACACEAE

Shaggy portulaca	<i>Portulaca pilosa</i>
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POTAMOGETONACEAE

Wigeongrass	<i>Ruppia maritima</i>
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PRIMULACEAE

Scarlet pimpernel	<i>Anagallis arvensis</i>
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RHAMNACEAE

Brasil	<i>Condalia hookeri</i>
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ROSACEAE

Macartney rose*	<i>Rosa bracteata</i>
Southern dewberry	<i>Rubus riograndis</i>

RUBIACEAE

Virginia buttonweed	<i>Diodia virginiana</i>
Bluntleaf bedstraw	<i>Galium obtusum</i>
Prairie bluet	<i>Hedyotis nigricans</i>

RUTACEAE

Colima *Zanthoxylum fagara*

SCROPHULARIACEAE

Beach gerardia *Agalinis fasciculata*
 Prairie gerardia *Agalinis heterophylla*
 Snapdragon vine *Maurandya antirrhiniflora*
 Toadflax *Nuttallanthus texanus*

SOLANACEAE

Carolina wolfberry *Lycium carolinianum*
 Downy ground-cherry *Physalis pubescens*
 Silver-leaf nightshade *Solanum elaeagnifolium*
 Tomatillo *Solanum triquetrum*

STERCULIACEAE

Anglepod melochia *Melochia pyramidalata*

TAMARIACACEAE

Saltcedar* *Tamarix gallica*

TYPHACEAE

Southern cattail *Typha domingensis*

ULMACEAE

Granjeno *Celtis pallida*

VERBENACEAE

Common lantana *Lantana urticoides*
 Wedgeleaf frogfruit *Phyla cuneifolia*
 Texas frogfruit *Phyla nodiflora*
 Texas vervain *Verbena halei*

* *Invasive or non-native plant species on Aransas NWRC (See also: Appendix E)*

Reference:

Each specimen was updated using Vascular Plants of Texas, 1997 by Stanley D. Jones, Joseph K. Wipff and Paul M. Montgomery and An Annotated List of the Plants of the Aransas National Wildlife Refuge by Dr. Wayne H. McAlister.

Revised: 2008

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C. Federally-threatened and Endangered Species List–Aransas NWRC

Birds

Whooping Crane	<i>Grus americana</i>	E w/CH
Brown Pelican	<i>Pelecanus occidentalis</i>	E
Northern Aplomado Falcon	<i>Falco femoralis septentrionalis</i>	E
Attwater's Greater Prairie Chicken*	<i>Tympanuchus cupido attwateri</i>	E
Piping plover	<i>Charadrius melodus</i>	T

Mammals

Gulf Coast Jaguarundi**	<i>Herpailurus yagouaroundi cacomitli</i>	E
Ocelot**	<i>Leopardus pardalis</i>	E
West Indian Manatee†	<i>Trichechus manatus</i>	E

Reptiles

Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	E
Hawksbill Sea Turtle	<i>Eretmochelys imbricate</i>	E
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E
Green Sea Turtle	<i>Chelonia mydas</i>	T
Loggerhead Sea Turtle	<i>Caretta caretta</i>	T

Fish

Smalltooth Sawfish	<i>Pristis pectinata</i>	E
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E = Species in danger of extinction throughout all or a significant portion of its range.

T = Species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

w/CH = With critical habitat

*** = Extirpated

**** = Hypothetical

† = These species need verification but may occur on Refuge lands.

Source: Corpus Christi Ecological Services Field Office (Updated: June 2010)

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D. State-threatened and Endangered Species List—Aransas NWRC

Birds

American Peregrine Falcon	<i>Falco peregrinus anatum</i>	T*
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	T*
Attwater's Greater Prairie Chicken	<i>Tympanuchus cupido attwateri</i>	E
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T
Brown Pelican	<i>Pelecanus occidentalis</i>	E*
Eskimo Curlew	<i>Numenius borealis</i>	E*
Henslow's Sparrow	<i>Ammodramus henslowii</i>	
Mountain Plover	<i>Charadrius montanus</i>	
Northern Aplomado Falcon	<i>Falco femoralis septentrionalis</i>	E*
Peregrine Falcon	<i>Falco peregrinus</i>	T*
Piping Plover	<i>Charadrius melodus</i>	T
Reddish Egret	<i>Egretta rufescens</i>	T
Snowy Plover	<i>Charadrius alexandrinus</i>	
Sooty Tern	<i>Sterna fuscata</i>	T
Southeastern Snowy Plover	<i>Charadrius alexandrinus tenuirostris</i>	
Western Burrowing Owl	<i>Athene cunicularia hypugaea</i>	
Western Snowy Plover	<i>Charadrius alexandrinus nivosus</i>	
White-faced Ibis	<i>Plegadis chihi</i>	T
White-tailed Hawk	<i>Buteo albicaudatus</i>	T
Whooping Crane	<i>Grus americana</i>	E
Wood Stork	<i>Mycteria americana</i>	T

Fishes

American Eel	<i>Anguilla rostrata</i>	
Opossum Pipefish	<i>Microphis brachyurus</i>	T*
Smalltooth Sawfish	<i>Pristis pectinata</i>	E

Mammals

Jaguarundi	<i>Herpailurus yaguarondi</i>	E
Ocelot	<i>Leopardus pardalis</i>	E
West Indian Manatee	<i>Trichechus manatus</i>	E
White-nosed Coati	<i>Nasua narica</i>	T

Reptiles

Atlantic Hawksbill Sea Turtle	<i>Eretmochelys imbricata</i>	E
Green Sea Turtle	<i>Chelonia mydas</i>	T
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	E
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E
Loggerhead Sea Turtle	<i>Caretta caretta</i>	T
Indigo Snake	<i>Drymarchon corais</i>	T

Appendix D: State-threatened and Endangered Species List—Aransas NWRC

Texas Horned Lizard	<i>Phrynosoma cornutum</i>	T
Texas Scarlet Snake	<i>Cemophora coccinea lineri</i>	T
Texas Tortoise	<i>Gopherus berlandieri</i>	T
Timber/Canebrake Rattlesnake	<i>Crotalus horridus</i>	T

Amphibians

Black-spotted Newt	<i>Notophthalmus meridionalis</i>	T
Sheep Frog	<i>Hypopachus variolosus</i>	T
Rio Grande Lesser Siren	<i>Siren intermedia siren</i>	T

* *E*: Endangered species are those species which the Executive Director of the Texas Parks and Wildlife Department has named as being "threatened with statewide extinction."

* *T*: Threatened species are those species which the TPWD Commission has determined are likely to become endangered in the future. Laws and regulations pertaining to endangered or threatened animal species are contained in Chapters 67 and 68 of the Texas Parks and Wildlife Department (TPWD) Code and Sections 65.171 - 65.176 of Title 31 of the Texas Administrative Code.

Source: Texas Parks and Wildlife Dept. Annotated County Lists of Rare Species (Updated June 2010)

E. Major Invasive Plants Found on Aransas NWRC

Alligatorweed

Alligatorweed (*Alternanthera philoxeroides*) is a perennial emergent plant native to South America. It was first introduced into the U.S. through ship ballast water and often forms very dense monocultures along shorelines and canals. Alligatorweed is not effectively controlled through physical or mechanical means due to its ability to propagate from roots and stem fragments. Currently, on the Refuge, it is only located on the Myrtle Foester Whitmire Unit. Aerial herbicide applications and biological controls are being used to address this species, as well as continued monitoring and follow-up treatment.

Angleton Bluestem

Angleton bluestem (*Dichanthium aristatum*) is native to Taiwan, India, and Southeast Asia, where it was commonly used as fodder for livestock. In the 1980s and 1990s, it was introduced into the U.S. to serve as a cultivar for pastureland. Its qualities make the species seem favorable for agriculture; it thrives under grazing conditions, grows rapidly, requires full sunlight, and is very drought- and cold-resistant. However, these same characteristics allowed this plant to be an effective invader of native coastal prairies. On the Refuge, Angleton bluestem is usually found throughout in long stretches along roadsides and ditches. Effective treatment of these areas is accomplished through foliage treatment. However, it is nearly impossible to find every plant, and new ones often sprout from seeds. This makes it necessary for follow-up observations and treatments.

Australian Bluestem

Australian Bluestem (*Bothriochloa bladhii*) originated in Asia, Australia, and various islands of the Pacific Ocean. It commonly serves as forage for livestock and was brought into the U.S. for this purpose around 1969. However, similar to Angleton bluestem, this plant has a tendency to invade native grasslands. It is drought resistant, does well in soils that have been disturbed, and reproduces with vast quantities of seeds, which are usually dispersed by wind. This plant has been noted most frequently around the headquarters, North Boundary Road, Boat Dock Road, and the boat house. It is common along ditches and is treated with spot-spraying techniques. Of course, management of this plant is a constant requirement, as seeds and strays often remain after herbicide applications.

Camphor Tree

Camphor tree (*Cinnamomum camphora*) is a fast growing, broad-leafed evergreen tree native to China and Japan; it was introduced into the U.S. in Florida in 1875 for camphor production and as an ornamental. It has since spread to the southeastern states, including Texas. Camphor trees can grow up to 50 feet tall, but some can reach up to 100 feet in height. On the Refuge, camphor tree occurs sporadically on the Blackjack Peninsula and has spread to various locations. Camphor tree can establish itself in dry, disturbed areas such as along roadsides, but camphor tree will also invade natural areas. This invasive species grows rapidly, produces large amounts of seed, and invades open or disturbed lands such as mowed, burned, or cleared areas. Therefore, managing for healthy biotic communities with good species diversity will help deter infestation, along with monitoring disturbed areas more frequently.

Castor Bean

Castor bean (*Ricinus communis*) is originally from tropical eastern Africa but may be found in tropical or warm temperate regions worldwide. Castor bean plants are typically found along stream banks, river beds, bottomlands, or any hot area with well-drained soils and sufficient nutrients to support its vigorous growth. Castor bean plants can displace native plants and are known to exhaust soil because it does not act as a nitrogen fixer. The bean of this plant produces a toxin called Ricin, which can be extremely poisonous to most vertebrates. On the Refuge, several of these plants were discovered in 2006, mainly around the headquarters area, with a few plants along the tour loop across from the picnic area. These plants are treated with herbicides, and monitoring and treatment are ongoing.

Chinaberry

The Chinaberry (*Melia azedarach*) is a deciduous tree with purplish bark that typically grows to about 30 feet in height. Chinaberry trees are native to Asia and were brought into the U.S. in the late 1700s as an ornamental plant, shade tree, and for fuel wood. Chinaberry trees can grow rapidly and displace the native vegetation. These plants are able to shade out other species and have “allelopathic” properties, which make the soil more alkaline, preventing other species from growing. Therefore, Chinaberry trees can reduce the plant diversity in any area where it grows. On the Refuge, Chinaberry trees are found on old homestead sites on the Blackjack Peninsula, as it was used as an ornamental.

Chinese Tallow

Chinese tallow (*Sapium sebiferum*) was introduced to the U.S. from China in the 1700s as an ornamental (Vines 1960). Chinese tallow grows and spreads rapidly and once established, it quickly out-competes native species and converts the landscape to a homogeneous grove of tallow trees. Tallow is difficult to kill and matures rapidly; effective control of this species relies on early detection and treatment. Past control efforts of Chinese tallow on the Refuge have included hand and aerial spraying. The most effective method of controlling tallow is to systematically treat an area and follow up the initial treatment for several years with additional treatments to control new plants.

Deep-rooted Sedge

Deep-rooted sedge (*Cyperus entrerianus*) is an invasive plant found in old rice fields or other areas of disturbed soil. It was accidentally imported from South America in 1990. Easily mistaken for “Black-seed” or “Elegance” sedge, its characteristics are very distinctive. Deep-rooted sedge, when established, grows in colonies connected by rhizomes. When mature, it is virtually impossible to pull out of the ground. Approximately 40 acres have been found and treated on the Myrtle Foster Whitmire Unit. Refuge staff continue to monitor and treat any new infestations.

Giant Reed

Giant reed (*Arundo donax*) is a perennial grass that can grow over 20 feet in height. Giant reed was first introduced to the U.S. in the 1800s; since then, it has been planted as an ornamental and for erosion control. It grows best in well-drained soils where abundant moisture is available. In Texas, it is commonly observed in ditches and riverbanks. It can reproduce vegetatively through root and stem fragments and can quickly create large

monoculture stands. A stand of giant reed was identified in 2008 on the Matagorda Island Unit. Suggested control methods involve chemical treatment through stump or foliage application after flowering. Prescribed burning combined with chemical treatment may be most effective, if conducted after flowering.

Guineagrass

Guineagrass (*Urochloa maxima*) was originally found in tropical Africa. It was introduced to the U.S. in 1786 as a forage grass. This plant does especially well in hot and humid environments. It is fairly drought resistant, prefers moderate shade, and easily survives fires due to the thick mass of roots it accumulates. Although this plant is usually slow to invade new territory, in cases of fire or similar disturbances, Guineagrass can quickly regenerate and displace native grasses before they have a chance to reestablish themselves. However, it does not tolerate extended periods in standing water, freezing temperatures, or especially heavy grazing. Guineagrass is scattered in several locations on the Blackjack Peninsula and the Tatton Unit. The plant tends to appear more in shady locations, such as under trees along ditches, but it also grows in full sun. Management of these areas consists of foliage applications and monitoring for new patches.

Johnsongrass

Johnsongrass (*Sorghum halepense*) was originally native to the Mediterranean region and Syria but has since spread nearly worldwide. It first arrived in the U.S. in 1830. Johnsongrass produces large amounts of seeds that can be spread in a variety of ways, including by wind, consumption by livestock or birds, running water, debris stuck in farm machinery, mixing with grains, transportation as hay, or even through rhizomes. Seeds can grow after long periods of dormancy as well; in five years, half may still be viable. Once they sprout, these plants are extremely invasive and grow rapidly, quickly driving out and replacing native vegetation. Johnsongrass is one of the most common invasive species on the Refuge. Treatment consists of foliage application. However, because its seeds are so tenacious and extensively spread, it is very difficult to completely eradicate this species.

King Ranch Bluestem

Although King Ranch bluestem (*Bothriochloa ischaemum*) has probably been in the U.S. since 1917, it first gained recognition in 1937 on the King Ranch. This plant was used by ranchers as forage for livestock, but is native to Europe and North Africa. It has also been utilized by the highway department to prevent erosion. The spread of this invasive plant occurs mainly through dispersal of seeds by wind, especially in areas where the earth and indigenous plants have been disturbed. King Ranch bluestem is yet another of the more prevalent invasives on the Refuge. Substantial patches of this plant have been treated at the Tatton Unit, at the Matagorda Island Unit, and across the Blackjack Peninsula. Foliage treatment is an effective management tool, but like most other invasive grasses, constant monitoring and continued herbicide applications are necessary to maintain some degree of control.

Macartney Rose

Macartney rose (*Rosea bracteata*) was introduced from China into the Gulf Coast around 1870 as a potential hedge species (Rechenthin et al. 1964). Macartney rose is a difficult plant to control because it sprouts from roots, seeds, and nodes (Scifres 1980). Since 1997, the Refuge

has concentrated on controlling Macartney rose with herbicides. The Whitmire and Matagorda Island Units have dense stands of Macartney rose. In the past, herbicide control treatments of Macartney rose have been conducted in conjunction with prescribed burns. Fire normally does not kill the plants but promotes a low, spreading growth form that can be effectively treated with herbicides. Effective treatment of Macartney rose requires complete spray coverage of foliage and stems, and burning is utilized as an initial treatment to gain access to dense stands.

Oleander

Oleander (*Nerium oleander*) is an evergreen tree or shrub, usually about six feet in height with showy, fragrant flowers. Oleander grows well in warm subtropical regions and is native from a broad area ranging from the Mediterranean region to southern China. This plant is drought resistant and can grow on a variety of poor soils. All parts of the plant are also highly toxic, if ingested. On the Refuge, oleander is usually found on old homestead sites on the Blackjack Peninsula, as it was used as an ornamental.

Saltcedar

Saltcedar (*Tamarix gallica*) is a deciduous shrub that can reach up to 15 feet in height. Saltcedar are usually found along streambanks, sandbars, lake margins, wetlands, moist rangelands, and saline environments. They can crowd out native plants, reduce water tables, and alter early successional habitats. Native to Eurasia and Africa, saltcedar was introduced in the western U.S. in the early 1800s as an ornamental and as a windbreak species. Saltcedar now occurs throughout the central and western U.S., but is problematic in the Southwest (source: <http://www.invasive.org>). On Aransas NWRC, saltcedar is most prevalent on Matagorda Island.

Vaseygrass

Vaseygrass (*Paspalum urvillei*) is native to South America, where it was used as fodder for livestock. It was brought to the U.S. for this reason and appeared in Texas by 1854. This plant has since spread rapidly, as it prefers moist, disturbed areas, such as along roadside ditches. It reproduces primarily through seeds, which are distributed by wind, water, and occasionally birds. Vaseygrass displaces the natural vegetation and can impede the flow of water in shallow areas if allowed to grow uncontrolled. Vaseygrass is found scattered through the Refuge. Complete foliage coverage is very effective but, due to the widespread distribution of its seeds, new sprouts often reappear quickly—even in areas that have recently been treated. The fact that Vaseygrass grows as an individual plant, rather than in a cluster, also makes it difficult to manage, as single specimens are easier to overlook than large patches. For these reasons, constant monitoring and treatment is necessary to control the spread of this species.

Water Hyacinth

In 2002, with the aid of a private landowner, Refuge personnel discovered a water supply canal completely covered with water hyacinth (*Eichhornia crassipes*). The concern of the Refuge was that this canal system feeds into Foester Lake, a 900-acre shallow water impoundment, most of which occurs on the Myrtle Foester Whitmire Unit. An aerial survey of the Whitmire Unit indicated no hyacinth present in the lake. However, water hyacinth was documented to be within ½ mile of the Refuge boundary, and less than a mile from the confluence with

Foester Lake. The potential for this species to spread is high, and it is therefore certain that, at some point, this invasive plant will invade the lake. Thus, the goal is to stop the spread of the hyacinth before it reaches the lake. This requires the Service to work with adjacent land owners and the Guadalupe-Blanco River Authority to develop a management strategy to systematically remove and control this species. Control methods include chemical, biological, and mechanical methods.

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F. 1994 Memorandum of Agreement (MOA) with Texas Parks and Wildlife Department and the Texas General Land Office regarding Management of Matagorda Island

MEMORANDUM OF AGREEMENT BETWEEN
UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
AND
STATE OF TEXAS
FOR THE MANAGEMENT OF
THE MATAGORDA ISLAND NATIONAL WILDLIFE REFUGE
AND MATAGORDA ISLAND STATE NATURAL AREA
LOCATED IN
CALHOUN COUNTY, TEXAS
11/18/1994

This Memorandum of Agreement (MOA) supersedes the December 8, 1982, Memorandum of Agreement (Agreement) between the United States Department of the Interior (Interior), acting through the U.S. Fish and Wildlife Service (FWS), and the State of Texas (Texas), acting through the Governor, the Texas Parks and Wildlife Department (TPWD), and the Texas General Land Office (GLO), (1) for the purposes of the conservation easements exchanged between FWS and GLO and hereby made a part of this MOA, and (2) to provide for a partnership relationship in the management of Matagorda Island, hereafter known as the Matagorda Island National Wildlife Refuge (NWR) and Matagorda Island State Natural Area (SNA).

The Federal and State owned lands covered by this MOA total 56,668 \pm acres, as summarized below and platted on the map marked Exhibit A attached hereto.

- | | |
|----------|--|
| Parcel A | 19,000 \pm acres of land, including 6.90 \pm acres in Port O'Connor, acquired by the U.S. Air Force in 1942 and transferred to FWS on December 8, 1982, by the General Services Administration as excess Federal property pursuant to the authority contained in Public Law 80-537, as a unit of the National Wildlife Refuge System (NWRS). |
| Parcel B | 24,893 \pm acres of State Tide and Submerged Lands consisting of 21,568 \pm acres of State bayside wetlands and 3,325 \pm acres of State Gulf Shore lands added to the NWRS by exchange of 100-year conservation easements on December 8, 1982, with GLO. |
| Parcel C | 11,502 \pm -acre acquisition of American Liberty Oil Company Ranch located on the south end of Matagorda Island acquired by FWS on November 8, 1988, under authority contained in the Endangered Species Act, utilizing Land and Water Conservation Funds. |
| Parcel D | 1,273 \pm acres of State Gulf lands administered by GLO and adjacent to the 11,502 \pm -acre tract. |

EXHIBIT 1

On December 8, 1982, Interior, acting through the FWS, and Texas executed the Agreement providing for the integrated management of all Federal and State lands on Matagorda Island. That Agreement covered Parcels A and B. The FWS and GLO exchanged conservation easements on their respective publicly owned lands and the TPWD managed Parcels A and B as a park and wildlife management area, pursuant to the terms of that agreement and a lease from GLO. On August 4, 1983, Congress enacted Public Law 98-66, ratifying the 1982 Agreement between Interior and Texas covering establishment of the Matagorda Island State Park and Wildlife Management Area (now SNA) as a unit of the NWRS.

Whereas, FWS and GLO now wish to add Parcels C and D to the partnership relationship for the management of Matagorda Island; and

Whereas, Interior, by and through FWS, is the Federal agency responsible for carrying out this Nation's migratory bird and endangered species program responsibilities, including providing proper protection and sound integrated management with the State for said wildlife species utilizing Matagorda Island; and

Whereas, the Commissioner of the GLO, as chairman of the School Land Board, is charged with management of the Texas Coastal Public Lands; and

Whereas, TPWD is the Texas agency responsible for outdoor recreation and the management of wildlife in the State, as well as for the administration of Texas laws relating to wildlife, fish, oysters, and marine life; and

Whereas, Interior and Texas continue to recognize Matagorda Island as a valuable and delicate State and national resource and that it would be in their mutual interest and benefit to have an agreement that provides for cooperative and integrated management of the entire Island; and

Whereas, the parties to this MOA recognize Matagorda Island as one of the few barrier islands in the Nation which remains essentially in a natural state, and agree that it should be preserved in an undeveloped condition except for minor improvements as spelled out in a Comprehensive Management Plan (CMP); and

Whereas, the parties to this MOA recognize Matagorda Island as being of particular importance for wildlife, especially for the protection of endangered species such as the whooping crane, as a significant natural outdoor and historical area, and is of recreational importance both to the citizens of Texas and to the Nation; and

Whereas, recreational hunting and fishing have historically occurred on the beaches, bayside waters, and marshes of Matagorda Island; and

Whereas, Matagorda Island, by virtue of Federal ownership of fee title and conservation easements over State lands, is managed in its entirety as a unit of the NWRS and its management is therefore subject to all laws and regulations applicable to the NWRS; and

Whereas, the State lands encompassed by this MOA comprise a valuable parcel of Coastal Public Land in the State and are required by State law to be managed in accordance with the policies stated in the Texas Coastal Public Lands Management Act of 1973.

NOW, THEREFORE, INTERIOR AND TEXAS HEREBY AGREE:

Subject to pre-existing, valid rights of record which may be held by the United States, State of Texas, Calhoun County, and other parties, and as also provided for in the conservation easements;

1. Management of the entire Island will be conducted through a formalized partnership among the FWS, the TPWD, and the GLO.
2. For the purposes of carrying out their respective obligations and responsibilities under this MOA, Texas will be represented by the Executive Director, TPWD, and the Texas Land Commissioner, GLO; and Interior will be represented by the Regional Director, FWS, Albuquerque, New Mexico.
3. The management principles, goals, and objectives set forth in the NWRS Manual will be adopted in managing all land on Matagorda Island (Parcels A, B, C, and D). Should inconsistencies arise between this MOA and the NWRS Manual, this MOA shall govern.
4. The Federal land on Matagorda Island, Parcels A and C, shall remain under the primary jurisdiction of FWS as a unit of the NWRS. Primary jurisdiction of the State lands, Parcels B and D, shall remain with Texas. The Federal conservation easement on the State lands shall be included in the NWRS, and the State conservation easement on the Federal lands shall be part of the SNA classification.
5. Management will be in accordance with an agreed upon, jointly prepared CMP for the Island. FWS will have lead responsibility for preparation of the CMP, with input and concurrence from GLO, and when completed, will replace the TPWD 5-year plan and all other subsequent plans required under the terms of the former 1982 Agreement. The CMP will be prepared using a 10-year planning horizon and will be reviewed at 3- to 5-year intervals and amended as determined necessary and appropriate, with an opportunity for public comment.
6. The partnership arrangement to implement the CMP will be based on a division of functional roles and responsibilities as follows:
 - a. FWS will have lead responsibility for wildlife and habitat management for all lands encompassed by this MOA and the continuing responsibility to determine the compatibility of all proposed uses and activities on these lands, except as provided in paragraph 9. The daily operational

responsibility of FWS will rest with the Refuge Manager, Matagorda Island NWR, under the supervision of the Aransas NWR Project Leader.

- b. TPWD will have lead responsibility for compatible public use management, except that FWS will have responsibility for administration and coordination of use of the old ranch headquarters and associated facilities (as described in the CMP) on Parcel C. TPWD operational responsibility will rest with the Matagorda Island SNA Park Superintendent.
7. FWS and TPWD shall jointly prepare an annual work plan and an annual report of activities for management of the Island. The annual report will include information on financial expenditures, progress on management objectives, current and completed research activities, and any empirical data on the success of various management techniques utilized to achieve the planned objectives. The annual work plan and report shall be submitted to each party to this MOA and made available for public review.
8. In effecting this MOA, FWS shall comply with the provisions of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq.*), and shall provide 30 days public notice prior to taking any action subject to the requirements of NEPA.
9. Except as provided for in the easement from the State to the United States the parties shall not use or permit the use, and shall take such measures as many be necessary to prevent the use or occupancy of the Island for any purpose which is inconsistent or incompatible with the purposes for which the NWR was established and those purposes herein specified as provided in the CMP or annual operations plans for the Island. FWS National Wildlife Refuge System regulations regarding the administration of reserved and excepted mineral rights shall be applicable to the exercise of valid, existing mineral rights.
10. Subject to valid existing rights, oil, gas, and other authorized mineral exploration and development will be permitted on the publicly owned portion of Matagorda Island under applicable Federal and State laws, rules, and regulations necessary to assure protection of wildlife and other natural resources. Although the subsurface estate retained by GLO is exempt from refuge compatibility requirements, the State environmental codes in the FWS approved Aransas National Wildlife Refuge Oil and Gas Plan (Exhibit C, attached hereto and incorporated by reference in this MOA) shall be used as guidelines for development. Deviations from these guidelines must be recommended by GLO and approved by TPWD and the FWS Regional Director. Response from FWS shall be in writing within 30 days after receipt of such recommendations. Both FWS and TPWD will be notified of any proposed mineral activity.

11. Texas shall refer to the FWS Regional Director for consultation all applications relative to permits, easements, rights-of-way for pipelines and all other proposed uses on or affecting State owned lands on the Island. With such referral, Texas shall indicate its intentions as to the application, with a statement that such proposed uses will or will not interfere with the use of the lands for the purposes stipulated in this MOA. FWS retains the authority to grant or deny applications on all Federal lands. Applications affecting the State conservation easement shall not be granted by FWS unless approved by the Commissioner of the GLO. Applications affecting the Federal conservation easement shall not be granted by Texas unless approved by the FWS Regional Director, subject to the provisions of paragraph 9 relating to oil and gas exploration and development. Upon receipt of such referral, GLO or FWS shall respond in writing within 30 days except for actions requiring preparation of an environmental impact statement.
12. No causeway, highway, bridge, vehicular ferry, public airport, or similar mode of transportation providing motorized land vehicle or aircraft access to the Island will be permitted. No motorized land vehicle or aircraft will be allowed on the Island except as authorized for the proper administration of the Island in the CMP for the Matagorda Island NWR and SNA.
13. The parties will share use of all buildings, structures, and facilities as necessary to perform their respective obligations under this MOA and as spelled out in the CMP, and will maintain those not disposed of as provided herein. All buildings, utilities, and facilities not selected by the parties will be removed from the site or disposed of as mutually agreeable in accordance with the rules and regulations of the General Services Administration covering disposal of excess Federal property. All parties, subject to each other's consent, will be permitted to construct, modify, or move any building, structure, or utility system to enable it to meet its intended use as authorized by this MOA and specified in the CMP.
14. Nothing in this MOA shall impair the ability of TPWD to permit hunting and fishing on State lands in accordance with good wildlife management practices and consistent with Texas Parks and Wildlife Department Code and applicable Federal law. All hunting and fishing shall be managed to assure that these activities will not jeopardize any federally listed endangered or threatened species.
15. All monies received from products of the land or privileges granted on Federal lands (subject to valid existing rights) in this MOA shall accrue to FWS for deposit into the National Wildlife Refuge Revenue Sharing Fund. All monies received from products of the land or privileges on the State lands (subject to valid existing rights) in this MOA shall accrue to GLO for deposit into the appropriate State school fund.

16. No admission fees of any kind shall be charged for entrance onto the Island. User fees may be charged to defray actual expenses for special programs and services. Fees so obtained by the State may be retained by the agency or organization responsible for the special program or service; fees so obtained by the United States shall be retained by the United States for disposition in accordance with applicable law.
17. For the Federal land on Matagorda Island, FWS will make payments to Calhoun County, Texas, in accordance with the Refuge Revenue Sharing Act (16 U.S.C. 715-s).
18. The 1983 Law Enforcement Memorandum of Understanding between TPWD and FWS as provided by section 3(b) of the Fish and Wildlife Improvement Act of 1978, Public Law 95-616 (16 U.S.C. 742 l(b)) covering all public lands on Matagorda Island shall remain in full force and effect, except as may be revised by mutual consent of both parties.
19. If any party to this MOA has any reason to believe that activities are occurring on the property or that management practices are being employed in a manner that is inconsistent with the terms of this MOA or one of the conservation easements which have been previously granted, they shall simultaneously notify the other two parties of their concerns in writing. The notice shall include a detailed description of the specific activity or management practice that is involved, identification of the responsible party, the reason the complaining party believes it to be inconsistent with the terms of this MOA or one of the conservation easements, and whatever remedial action the complaining party considers appropriate.

If the complained of activity or management practice has not been previously included in the CMP or any amendments thereto; or authorized in writing by the complaining party, the party responsible for regulating or conducting the activity or management practice, upon receipt of written notice of complaint, shall immediately cease the activity or practice pending appeal and shall respond in writing within 30 days.

If the complained of activity or management practice has been previously included in the CMP or any amendments thereto, or authorized in writing by the complaining party and, in the latter case, is being conducted in accordance with all terms, conditions, or limitations required in the original written authorizations, the party responsible for regulating or conducting the activity or management practice, upon receipt of written notice of complaint, shall respond in writing within 30 days; Provided, that notwithstanding the provisions of this paragraph, the party responsible for regulating or conducting the activity or management practice shall immediately cease the activity or practice if the party raising the objection finds that continuing the activity or practice would result in immediate and irreparable harm to the habitat resources, or would otherwise be prohibited under the Endangered Species Act.

The party receiving the complaint may reject the complaint and exercise its right of appeal, take the recommended action suggested by the complaining party, or renegotiate an alternative response that shall be agreed upon by all parties to this MOA.

In the event the complaint is rejected or an acceptable remedy cannot be agreed upon, the complaining party can appeal to the Secretary of the Interior, if it occurs on Federal land, or to the Commissioner of GLO if on State land, who will make a final decision after notice and opportunity for any of the parties to submit arguments with regard to the dispute.

20. Any public or private organization may petition any party to this MOA for the purpose of asserting allegations that the Island is not being managed in a manner consistent with the terms of this MOA, with the CMP for the Island, or other applicable Federal or State law.

The agency receiving the petition shall within 30 days commence an investigation and no later than 60 days from the date of petition make a determination pursuant to paragraph 19 of this MOA. If the agency receiving the petition fails to investigate the complaint or determines that no further action is necessary, the petitioner may request a hearing under the Texas Administrative Procedures Act or, in the alternative, may appeal to the Secretary of the Interior who will make a final decision after providing an opportunity to the petitioner and the responsible party to submit comments. Upon receipt of the hearing request under the Texas Administrative Procedures Act, the State agency receiving the petition shall immediately commence the hearing or appeal process as required by law.

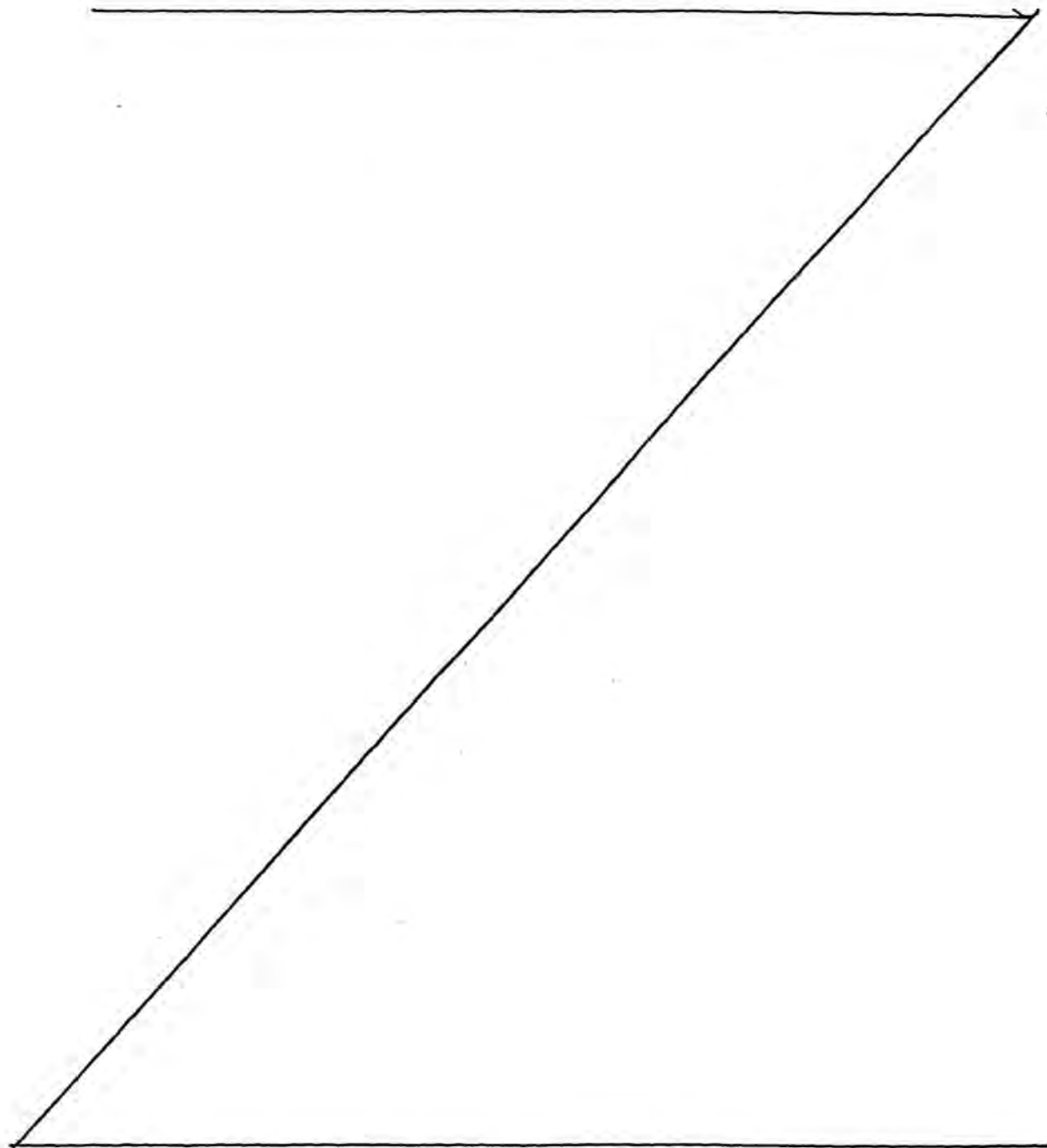
21. If for any reason any one of the three parties to this MOA determine that it is not in their best interest to continue the management of the Island under this MOA, the MOA may be cancelled with 1 year's written notice to the Secretary of the Interior and the Governor of the State of Texas. In the event of the termination of this MOA the FWS shall immediately resume management of the federally owned portion of the Island and the School Land Board shall immediately assume management of the State-owned lands.

Upon notice of termination the parties to this MOA shall each appoint a representative to a committee that will negotiate a dissolution agreement to effect an orderly transition into separate management and allocate any disposal, removal, or future use of Federal and State improvements located on the property in accordance with the terms of this MOA.

22. Any future amendment to this MOA shall be subject to the same public review and legislative approval processes required for approval of this MOA. All other documents referred to herein, may be amended in the future by mutual consent or agreement of the Executive Director of TPWD, Regional Director of FWS, and Commissioner of GLO. In effecting any such amendment, FWS shall comply with

the provisions of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.), and shall provide 30 days public notice prior to the effective date of any amendment to this MOA.

23. The term of this MOA shall coincide with the expiration date of the conservation easements which are a part of this MOA, or December 8, 2082. This MOA shall commence on the date it is fully executed and ratified by an Act of Congress.



IN WITNESS WHEREOF, the parties have executed this MOA on the day, month, and year opposite their signatures thereto:

THE UNITED STATES OF
AMERICA

Department of the Interior

March 16, 1994

BY: B. Babbitt

Bruce Babbitt
Secretary of the Interior

March 16, 1994

BY: Mollie Beattie

Mollie Beattie
Director, U.S. Fish and
Wildlife Service

and

November 18, 1994

THE STATE OF TEXAS

BY: Ann Richards

Ann Richards
Governor, State of Texas

April 6, 1994

BY: Garry Mauro

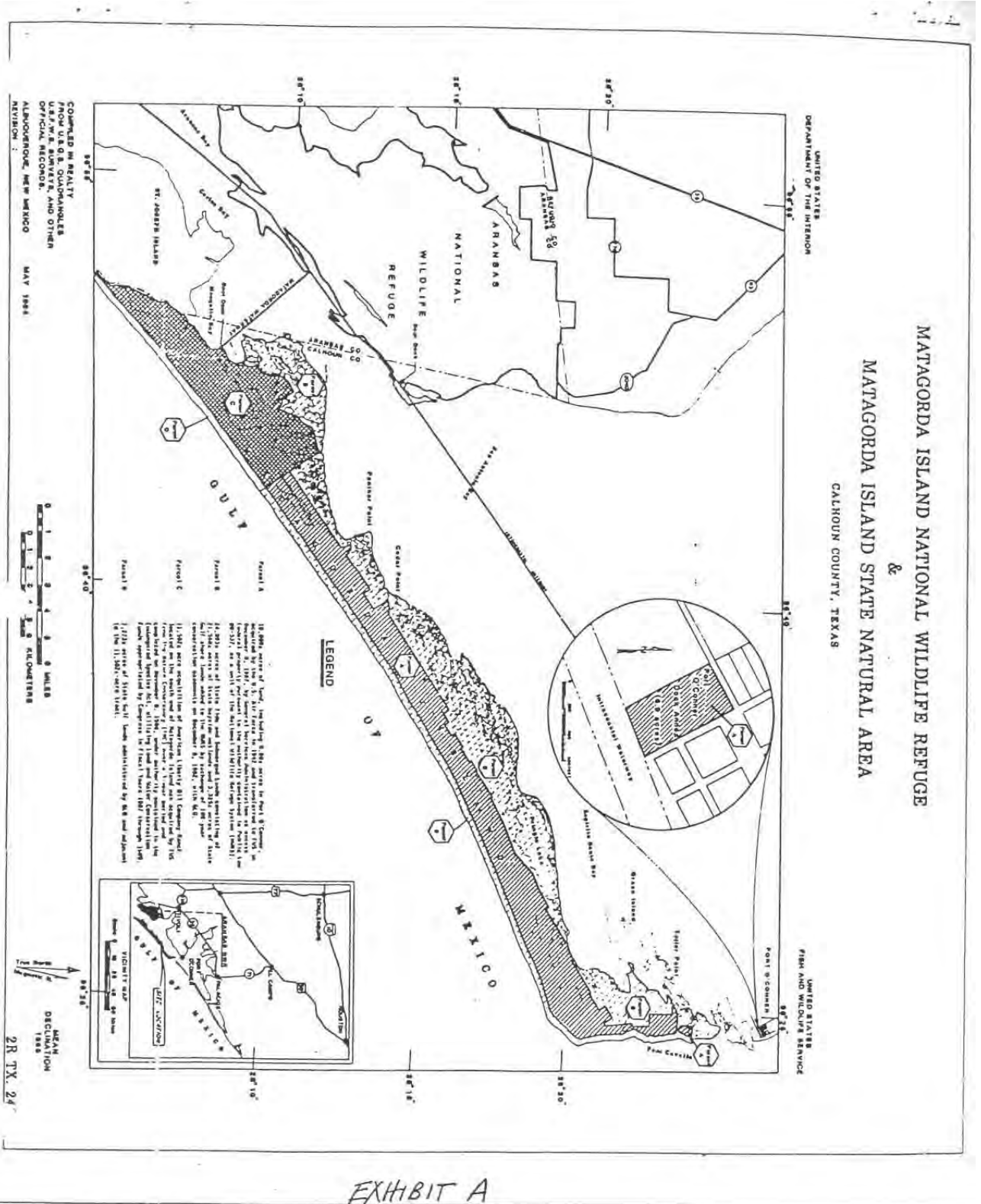
Garry Mauro
Commissioner, General
Land Office and Chairman,
School Land Board

March 22, 1994

BY: Ygnacio D. Garza

Ygnacio D. Garza
Chairman, Texas Parks and
Wildlife Commission

Attachments



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H. Intra-Service Endangered Species Consultation

Originating Person: Felipe Prieto, Wildlife Refuge Specialist

Telephone Number: 361-286-3559

Date: August 10, 2009

Consultation No: 21410-2009-I-0321

I. **Region:** Southwest

II. **Service Activity (Program):** Refuges: Implementation of a Comprehensive Conservation Plan (CCP) for Aransas National Wildlife Refuge Complex (NWRC).

III. **Pertinent Species and Habitat:**

A. Listed species and/or their critical habitat within the action area:

Aransas NWR—Aransas, Calhoun, and Refugio Counties

Whooping Crane w/i CH - bay marshes mostly with some upland use

Northern Aplomado Falcon - coastal prairie

Piping Plover w/i CH - beach and bay marshes

Brown Pelican - Gulf and bay waters and beach

Sea Turtles (5 species) - Gulf and bay waters

B. Proposed species and/or proposed critical habitat within the action area:
None

C. Candidate species within the action area:
None

D. Include species/habitat occurrence on a map: See attached map.

IV. **Geographic area or station name and action:** Aransas NWR, Austwell, Texas;
Comprehensive Conservation Plan Implementation.

V. **Location (attach map):** See attached draft CCP

A. County and state: Aransas, Calhoun, and Refugio Counties, Texas

B. Latitude and longitude: Aransas NWR Headquarters: 28 18' 28" deg N. / 96 48' 16" deg W.

C. Distance (miles) and direction to nearest town: About 6 ½ miles southeast of Austwell, TX

VI. Description of proposed action:

The proposed action is to implement the Comprehensive Conservation Plan (CCP) for Aransas NWR over the next 15 years. The CCP will emphasize native habitat protection, enhancement, and restoration over species management with the exception of invasive and exotic species management. For invasive and exotic species active control and/or management efforts will occur.

The CCP is divided into a series of goals, objectives, and strategies that will be implemented throughout the 15-year term of this Plan. Specific goals associated with the CCP are to: 1) to protect, restore, and maintain a diversity of native wildlife with special emphasis on Federal trust species and other species of management concern; 2) to protect, restore, and maintain the prominent features within the Texas Gulf Coast Ecosystem, which include blackland coastal prairie, wetlands, coastal woodlands, barrier island, and tidal and estuary habitats on and near the Refuge while controlling the spread of invasive or exotic plants; and 3) to provide quality, wildlife-dependent recreational and environmental education opportunities to a diverse audience and increase Refuge System support by promoting an understanding and appreciation for the unique wildlife, fish, habitats, and cultural history of the Aransas NWR. Implementation of the CCP is consistent with the goals of the Refuge, the Refuge System, and ecosystem and other landscape-level plans and initiatives.

The overall management of the Refuge will focus on protecting and restoring native habitats; protecting and providing habitat for waterfowl, migratory birds, Federally-listed species, and providing opportunities for public use, environmental education, and interpretation. Based on an ecosystem approach, the wildlife and habitat goals and objectives focus more on providing viable and healthy habitats whereby wildlife can naturally flourish. For detailed descriptions of CCP goals and proposed actions (objectives and strategies), please refer to Chapter 5 of the attached draft CCP.

VII. Determination of Effects:

- A. Explanation of effects of the action on species and critical habitat in item III A (attach additional pages as needed):

Wildlife and Habitat Actions

Federally-listed species which breed or seasonally utilize the Refuge's habitats are the whooping crane, northern aplomado falcon, brown pelican, piping plover, and sea turtles (i.e., Kemp's ridley, green, hawksbill, loggerhead, and leatherback sea turtles). Specific activities of the CCP which may affect listed species (whooping crane, piping plover, northern aplomado falcon, brown pelican, and sea turtles) include: prescribed burning; live-oak brush control through a combination of fire and mechanical treatments in selected areas; planting native vegetation in restoration areas; maintaining impoundments/moist soil/secondary rice crops for waterfowl that include the use of prescribed fire, disking, mowing, and herbicides where applicable (Myrtle Foester Whitmire Unit only), and invasive species management. Invasive species management includes direct control of feral hogs and spot treatments of invasive plants such as Macartney rose (*Rosea bracteata*), Chinese tallow (*Sapium sebiferum*), saltcedar (*Tamarix gallica*) and water hyacinth (*Eichhornia crassipes*), using mechanical removal and approved herbicides. Chinese tallow and Macartney rose are the main species targeted for control by hand or aerial application. On average, the

Refuge annually treats approximately 60 acres with herbicide to control these two species. Feral hogs also pose a significant threat to native habitats and other animal populations, including whooping cranes and nesting sea turtles, by directly damaging habitat, competing for resources, and predating native wildlife. Typically, feral hog control efforts have been limited to Matagorda Island but the CCP proposes to expand hog control across all Refuge units, as necessary. For more information on CCP objectives and strategies related to habitat management activities, please see Chapter 5 of the CCP.

With respect to the whooping crane, the CCP proposes several objectives to help meet recovery plan goals by increasing the number of overwintering territories from approximately 72 to 125 by 2024. This involves monitoring population expansion into new areas that may need additional protection (e.g., through land protection measures or partnerships) and identifying and prioritizing whooping crane habitat outside of the Refuge for protection through appropriate mechanisms such as landowner incentives, conservation easements, and acquisition from willing sellers. Any land acquisition would be based on an approved Land Protection Plan. With respect to habitat management, prescribed fire will be used to improve the availability of acorns and small invertebrates during the winter season primarily for the benefit of wintering whooping cranes. For additional information on CCP objectives and strategies related to the whooping crane, please see Chapter 5 of the CCP (*Wildlife Objective 6*).

With respect to the northern aplomado falcon, releases of aplomado falcons on the Tatton and Matagorda Island Units have been conducted for several years up until 2003. Today, aplomado falcons nest primarily on Matagorda Island and these falcons will continue to be monitored on Aransas NWR, as part of this CCP (*Wildlife Objective 2*). Specific actions proposed in the CCP that are intended to benefit grassland species that include the aplomado falcon primarily include prescribed burning and invasive species control (*CCP Habitat Objective 1*).

Piping plovers begin migrating from their breeding grounds around July to September and may occur on the beaches and bays of Matagorda Island from September through March. The piping plover occurs primarily on Matagorda Island during the winter, typically along the beach or in washover areas. The CCP proposes protective measures that include limiting public uses to designated areas and seasons to avoid disturbing piping plovers as well as other wildlife (*Habitat Objective 5*).

The brown pelican occurs on Matagorda Island and in the bay waters and marshes along the coastal margins. The CCP includes general objectives and strategies to protect this species from disturbance and harm. There are no direct active management activities proposed for the brown pelican, other than monitoring and surveys. For more detailed information on activities involving the brown pelican, please refer to Habitat Objective 5 of the CCP.

With respect to sea turtles, the Refuge contributes to recovery plan tasks primarily through monitoring nesting and stranding, patrolling beaches, protecting nest areas, participating in recovery work groups, and partnering with sister agencies such as the National Park Service's Padre Island National Seashore. Nest monitoring includes all-terrain vehicle (ATV) beach patrols on the Matagorda Island Unit from April through June, which corresponds with the nesting season of the Kemp's ridley. The nesting season occurs from March 15 to October 1. The Refuge participates in the Sea Turtle Stranding and Salvage Network, as recommended in these recovery plans. Actions

proposed in the CCP that may (beneficially) affect sea turtles are to control feral hogs on Matagorda Island and to leave nests “in situ” to expand the number of natural nesting beaches for species such as Kemp’s ridley. The CCP proposes a more balanced approach in limiting ATV use on the beaches, to further minimize potential impacts to sea turtles and nesting shorebirds as well as to minimize disturbance to piping plovers during the winter.

Many of the specific actions proposed in the CCP have been previously addressed via prior Endangered Species Act consultations. Please reference the Tracking and Integrated Logging System (TAILS) database for all Intra-Service consultation numbers for Aransas NWR. Some of more recent consultations include: 21410-2009-I-0089 (whooping crane supplemental feeding) and 21410-2009-I-0167 (feral hog control). All habitat management activities proposed in the CCP are specifically geared to benefit endangered and threatened species, as well as other Federal trust resources. CCP wildlife and habitat goals, objectives, and strategies are also aimed at protecting, increasing, and enhancing Refuge habitats in a holistic, ecosystem-based approach.

Wildlife-dependent Recreational Actions

The CCP proposes to maintain or increase annual visitation from about 50,000 to 75,000 by adding new programs, improving hunting and fishing opportunities, upgrading existing facilities, improving outreach, and establishing additional partnerships (*People Objectives 1-7 and 9*). Wildlife-dependent recreational activities such as hunting, fishing, wildlife observation, and photography will occur in already established public use areas. The CCP does not propose opening up any new areas to new public uses.

Infrastructure and Public Access Actions

The proposed action includes maintenance and/or upgrade of access roads, buildings, trails, visitor parking areas and other improvements but these are not occurring in areas that would adversely affect listed species or critical or other listed species habitats.

B. Explanation of actions to be implemented to reduce adverse effects:

None of the activities in the CCP are proposed to be carried out within whooping crane habitat during the whooping crane wintering season. With respect to the northern aplomado falcon, brown pelican, piping plover, and sea turtles, no activities proposed in the CCP will be implemented during the seasons or times that these species are present. However, prescribed burns may affect any aplomado falcons that could be nesting. Any prescribed burns, mechanical vegetation disturbance, invasive or exotic species control, or use of chemicals to treat invasive plant species will follow specific guidance established in the specific consultations and guidelines for those actions. Regardless, surveys will be undertaken to determine the presence of aplomado falcons or any listed species potentially occurring on the Refuge in areas planned for prescribed burns or vegetation disturbance activities related to actions proposed in this CCP. If listed species are found, the Refuge will change/alter management activities so as not to disturb or impact the species, or consult with the Corpus Christi Ecological Services Field Office (ESFO) prior to undertaking such actions to determine the appropriate course of action in order to adequately address any listed species concerns. With respect to public use activities, such as hunting, fishing, and wildlife observation,

these activities will only be allowed in established pre-designated areas, seasons, and times only.

Under the CCP, the Refuge proposes to develop a thorough updated database of the flora and fauna of the Refuge's biotic communities through baseline surveys. These updates should augment the Refuge's sensitive species mandates to provide timely management and protections if, in the future, additional listed species are documented on the Refuge.

As a working document, modifications to the objectives and strategies are anticipated. If modifications result in changes to the effects analysis, or include actions that are not considered in this document, the Refuge will re-initiate consultation or consult with the Corpus Christi ESFO over a particular action that may affect Federally-listed species and/or critical habitat.

VIII. Effect determination and response requested: [* = optional]

A. Listed species/designated critical habitat:

Determination

Response Requested

No effect on species/critical habitat
(species: none)

_____ *Concurrence

May affect, is not likely to adversely affect species
/critical habitat (species:
Whooping Crane w/CH, Northern Aplomado Falcon,
Brown Pelican, Piping Plover, and Kemp's ridley,
Green, Loggerhead, Hawksbill, Leatherback Sea Turtles)

X Concurrence

May affect, is likely to adversely affect species
/critical habitat (species: n/a)

_____ Formal Consultation

B. Proposed species/proposed critical habitat:

Determination

Response Requested

No effect on proposed species/critical habitat
(species: none)

_____ *Concurrence

Is not likely to jeopardize proposed species/
adversely modify proposed critical habitat
(species: n/a)

_____ Concurrence

Is likely to jeopardize proposed species/
adversely modify proposed critical habitat
(species: n/a)

_____ Conference

C. Candidate species:

Determination

Response Requested

No effect on candidate species
(species: none)

_____ *Concurrence

Is not likely to jeopardize candidate species
(species: n/a)

_____ Concurrence

Is likely to jeopardize candidate species
(species: n/a)

_____ Conference

Daniel M Alonso

Digitally signed by Daniel M Alonso

Signature
Refuge Manager, Aransas NWRC

2009.09.16 11:35:36 -05'00'

Date

IX. Reviewing ESFO Evaluations:


A. Concurrence: X Nonconcurrence: _____

B. Formal consultation required: _____

C. Conference required _____

D. Informal conference required _____

E. Remarks (attach additional pages as needed):

 09-14-09
Allan M. Strand, Field Supervisor Date

I. Aransas National Wildlife Refuge Complex Comprehensive Conservation Plan Environmental Assessment and Finding of No Significant Impact

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Aransas National Wildlife Refuge Complex Comprehensive Conservation Plan Environmental Assessment

Background

The National Wildlife Refuge System Improvement Act of 1997 requires each national wildlife refuge to have a Comprehensive Conservation Plan (Plan). The mandate is to develop and implement a Plan for the Aransas National Wildlife Refuge Complex (NWRC), which includes the Aransas, Matagorda Island, Tatton, Myrtle Foester Whitmire, and Lamar Units administered as the Aransas NWRC (Refuge). The purpose of the Plan is to determine a management direction for the Refuge that best achieves the purposes, vision, and goals; contributes to the National Wildlife Refuge System (Refuge System) mission; addresses the significant issues and relevant mandates; and is consistent with principles of sound fish and wildlife management. The Plan will identify a set of goals, objectives, and strategies for Refuge management for the next 15 years.

1. Purpose of and Need for Proposed Action

This Environmental Assessment (EA) was prepared using guidelines of the National Environmental Policy Act of 1969 (NEPA). The act requires Federal agencies to examine the effects of proposed management actions on the natural and human environment. The EA presents three alternatives for future Refuge management and will identify the preferred course of action. Each alternative was designed to contain a reasonable mix of fish and wildlife habitat prescriptions and wildlife-dependent recreational opportunities consistent with the Refuge System Improvement Act and specific Refuge purposes.

The environmental consequences of each alternative are described in the following text and form the basis for selection of the proposed action. This Environmental Assessment was designed to cover the environmental consequences for most future management actions and current facilities on the Aransas NWRC. However, some future actions, such as the construction of major facilities, will require further environmental documentation.

1.1 Decision to be Made

Based on the assessment provided in this document, the Service will select an alternative to implement the Comprehensive Conservation Plan (Plan) for Aransas NWRC. Assuming no significant impact is found, the final Plan will include a Finding of No Significant Impact (FONSI), a statement explaining why the selected alternative will not have a significant effect on the quality of the human environment. This determination takes into consideration the Service and Refuge System mission, the purpose(s) for which the Refuge was were established, and other legal mandates. Once the FONSI is signed, the Plan will be implemented, monitored annually, and revised when necessary.

1.2 Planning Area

Currently, the Aransas NWRC occurs in three counties: Calhoun, Refugio, and Aransas. Future expansion of the Refuge may occur for habitat protection, particularly for the whooping crane and other Federal trust species¹, based on an analysis completed as part of a Land Protection Plan.

¹ Federal trust species are migratory birds, threatened and endangered species, and species of concern, according to the US Fish and Wildlife Service.

1.3 Authority, Legal Compliance, Appropriate Refuge Uses, and Compatibility

The Service developed this Plan and EA in compliance with the Refuge Improvement Act of 1997 and Part 602 of the Fish and Wildlife Service Manual (National Wildlife Refuge System Planning). The actions described within this Plan and EA also meet the requirements of NEPA.

The Plan's overriding consideration is to carry out the purpose for which the Refuge was established. Refuge purposes are stated in the laws that established each refuge and provided the funds for acquisition. Fish and wildlife management is the first priority in refuge management, and the Service allows and encourages public use (wildlife-dependent recreation) as long as it is compatible with, or does not detract from, the refuge missions and purposes.

Comprehensive Conservation Plans include a review of the appropriateness and compatibility of existing refuge uses and of any planned future public uses. If a use is determined to be an 'Appropriate Refuge Use' by a refuge manager, it is then taken through the 'Compatibility Determination' process.

1.3.1 Appropriate Refuge Uses

All uses of a national wildlife refuge over which the Service has jurisdiction must be determined to be appropriate uses under the Appropriate Refuge Uses Policy (Service Manual 630 FW 1). An appropriate use of a national wildlife refuge is a proposed or existing use on a refuge that meets at least one of the following four conditions.

- 1) The use is a wildlife-dependent recreational use as identified in the Refuge Improvement Act (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
- 2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Refuge Improvement Act was signed into law.
- 3) The use involves the take of fish and wildlife under State regulations.
- 4) The refuge manager has evaluated the use against the following guidelines in the Service Manual 603 FW 1.11 and found it appropriate.

This Plan identifies the existing and proposed uses that are found appropriate and compatible. If additional uses not addressed in this Plan are proposed for the Refuge, the Refuge manager will determine if they are appropriate uses following guidance in the Service Manual (603 FW 1).

1.3.2 Compatibility Determinations

The National Wildlife Refuge System Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, 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 is defined as *"...a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge"* (603 FW 2). In addition, "wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety."

Compatible uses may support refuge purposes or may have a neutral effect. In making a compatibility determination, the refuge manager must first determine if the use is compatible with refuge purposes based strictly on biological grounds. After making such a determination, the refuge manager must consider Service policy, other applicable laws, and public opinion. Compatibility determinations have been completed for the following activities and are provided in Appendix G of the Plan: Agriculture – Cooperative Farming Activities, Bicycling, Camping, Commercial Photography and Filming,

Environmental Education, Fishing, Hiking, Hunting, Interpretation, Livestock Grazing, Non-Motorized Boating, Photography, Picnicking, Redbay Harvest, Scientific Research, and Wildlife Observation.

1.3.3 Public Involvement

In accordance with Service guidelines and NEPA recommendations, public involvement has been a crucial factor throughout the development of the Plan and EA. Public involvement during the scoping period included holding seven “open house style” meetings at the Refuge Headquarters and in the local communities in each of five surrounding counties. Thirty-two people attended these meetings, and 41 written comments were received because of these meetings and information distribution. The public expressed a wide range of issues, concerns, and opportunities during the planning process, and the alternatives selected for analysis reflect the issues, concerns, and opportunities expressed by the planning participants. Input and comments received ranged from recommendations that the Refuge be minimally managed (i.e., custodial state) to very intensive management and public uses. The following issues, concerns, and opportunities were consolidated into broad categories: Wildlife, Habitat, and Public Use. See Comprehensive Conservation Plan, Chapter 2, for more information.

1.4 Issues

1.4.1 Wildlife

The main wildlife issues included whooping crane habitat degradation or loss in some cases, impacts to blue crabs (a major food source for whooping cranes) due to reductions in freshwater inflows into the bays, commercial crabbing, potential wind farm development, increasing public awareness to minimize disturbances to whooping cranes, expanding whooping crane protected areas, and acquiring suitable habitat and/or establishing conservation easements from willing sellers and landowners. With respect to Kemp’s ridley sea turtles, there is concern that certain activities and issues on Matagorda Island may affect their nesting areas on the beach. These include the presence of trash and debris on the beach and feral hog predation on turtle eggs. In general, some expressed the need to have better wildlife status and occurrence information for each of the Refuge units for better coordination and support of certain management activities and decisions.

1.4.2 Habitat

Generally, planning participants expressed a desire to see a natural diversity of plant, fish, and wildlife species through the proper management, preservation, and restoration of native habitat at an ecosystem level. Some participants stressed the inviolate sanctuary concept while others suggested that more intensive habitat management including mowing, disking, and grazing may be necessary to enhance diversity and use by wildlife. Another issue that became apparent is the need to better control the spread of invasive and non-native species.

1.4.3 Public Use

Several planning participants want more hiking and backpacking opportunities; more Refuge roads opened to access new areas; more facilities such as photo blinds, observation decks, and better kiosks; more guided tours; expansion of the hunting program; and more opportunities for wade fishing. In addition, participants expressed a desire to continue environmental education programs, particularly on Matagorda Island. Participants recommended improving the volunteer program and expanding partnerships with various organizations and entities. Other issues involve ongoing Refuge uses, facilities for private groups, and formalizing agreements with the State regarding use of Refuge facilities to clarify public perception over management and ownership of Matagorda Island, and limiting certain public uses at Cedar Bayou and Pass Cavallo that could be disturbing sensitive birds.

2. Description of the Alternatives

2.1 *Formulation of Alternatives*

Alternatives are different approaches or combinations of management actions designed to achieve a refuge's purposes and vision, the goals identified in the Comprehensive Conservation Plan (Plan), the goals of the Refuge System, and the mission of the Service. Alternatives are formulated to address the significant issues, concerns, and problems identified by the Service and the public during public scoping. Alternatives are combinations of wildlife and habitat management with corresponding levels of public use and services. The Refuge staff determined that each biological component required an equal or consistent public use element, e.g., restoring habitats would require that environmental education and interpretation activities be geared toward support and understanding of current management.

Five alternatives were considered in this EA. Two alternatives were considered but eliminated from detailed analysis. The remaining three alternatives cover a reasonable range of actions. These alternatives represent different approaches or management scenarios for the future protection, restoration, and management of the Refuge fish, wildlife, plants, habitats, and other resources, as well as compatible wildlife-dependent recreation. Refuge staff assessed the biological conditions of Refuge habitats and analyzed the external relationships affecting each Refuge unit. This information contributed to the development of Refuge goals and, in turn, helped formulate the alternatives, summarized in Table 1.

2.2 *Alternatives Considered But Eliminated From Detailed Analysis*

2.2.1 *Minimal Habitat Maintenance and Reduction of Existing Public Uses*

This alternative considered taking a “hands off” approach to management, with the least possible restoration and maintenance of habitats that support endangered, threatened, or priority species of plants and animals. This would consist of minimal management of existing prairie, moist soil units, and barrier island habitat. Fire would be the main habitat management tool. In other areas or habitats, there would be no management at all. Generally, a reduction in active wetland and upland habitat management practices would occur over a period of years. The primary strategy would be to allow natural processes to regulate the extent of habitat types. Natural succession processes would occur in these areas with no specific habitat emphasis pursued by the Refuge.

In addition, we considered modifying or excluding existing uses and recreational activities that conflict with wildlife needs, such as hunting and fishing. This modification included minimizing the use of the auto tour loop (i.e., open only seasonally or perhaps shortened); closing trails seasonally; conducting fewer interpretive talks; and limiting environmental education to only teacher-led field trips. Only minimal maintenance of facilities would be provided. According to the Refuge Improvement Act of 1997, these uses—wildlife observation and photography, and environmental education and interpretation, hunting and fishing—are considered the priority wildlife-dependent public uses. Some secondary recreational uses, such as camping and beachcombing, would be restricted to specific areas and seasons as identified in the 1990 Comprehensive Management Plan and 1994 Memorandum of Agreement (MOA) with the State of Texas.

This alternative was not considered further because 1) it does not meet the habitat needs of Federal trust species, the need to control and manage invasive plant and animal species, and the requirement to manage according to Fish and Wildlife management and policy (which includes maintaining biological integrity); and 2) it does not meet the Refuge Improvement Act mandate that priority wildlife-dependent public uses be allowed on refuges as long as they are compatible.

2.2.2 *Emphasize Habitat Restoration and Allow Only Priority Public Uses*

We considered an alternative that would place management emphasis on alteration of habitats and restoration to some predetermined state (i.e., pre-settlement), regardless of current land uses or changing wildlife habitat needs. Restoration activities would primarily involve the Myrtle Foester Whitmire and Aransas Units, as these units have the most anthropogenic influences of all Aransas NWRC units. Management for endangered species and migratory birds would continue if this type of management fit into restoration objectives. On the Myrtle Foester Whitmire (MFW) Unit, croplands and controlled water impoundments, which are not parts of the original landscape, would be removed and the land restored to original habitat conditions. Original habitat conditions for MFW indicate this was a low upland prairie, based on soil types somewhat similar to the Tatton Unit. On the Aransas Unit, soil types, land physiography (ridge and swale topography), and plant and animal community components indicate that this area contained more of an even ratio of woodland to grassland as compared to today, although some believe that the Aransas Unit was entirely prairie with little or no woodland component.

Priority wildlife-dependent public uses (hunting, fishing, wildlife observation, photography, environmental education and interpretation) would be the only activities allowed. These uses are normally allowed on refuges if they are compatible with the purposes of the Refuge. A use is compatible so long as it "... will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuges." Priority wildlife-dependent activities would be expanded above current levels, but remain within compatibility standards. Environmental education and interpretation activities would emphasize habitat restoration and related management activities of this alternative. However, other recreational activities (e.g., primitive camping or beachcombing) would be eliminated.

This alternative was not considered further because it does not fully meet the habitat needs of Federal trust species and the requirement to manage according to U.S. Fish and Wildlife policy, as it is not likely that this level of habitat restoration is achievable based on present land conditions, both inside and outside Refuge boundaries. For example, physiological responses of live oak to management treatment are such that this species would need to undergo drastic treatment measures that are labor intensive and cost prohibitive, such as root plowing and intensive herbicide application, to control and restore it, resulting in extensive ecosystem damage. Furthermore, consensus on which historic (or even prehistoric) condition to restore the Refuge to may likely not be reached. Therefore, this alternative is not viable.

2.3 *Alternatives Analyzed in Detail*

The following alternatives were developed to comply with NEPA and to provide ways to represent a number of issues, concerns, and opportunities that were identified during the public and internal scoping process. Though the alternatives may have different emphases, habitat maintenance, restoration, and preservation are common elements of each alternative. The alternatives are intended to provide a range of public uses and access and respond to significant issues or concerns identified during the planning process.

2.3.1 *Alternative A: No Action (Current Management)*

This alternative is the baseline for comparison with the action alternatives because it does not involve change from current management programs and emphases. It represents biological management and public use activities presently occurring and those that have occurred on Aransas NWRC during the last 10 or so years. Activities such as prescribed fire, wildlife management, livestock grazing, rice farming, nature photography, interpretation, environmental education, kayaking, hunting, fishing, primitive camping, and beachcombing would continue without any major changes.

Habitat Management

Invasive and Exotic Species Management

The continuing need for management and control of invasive and exotic species, plants and animals alike, is aptly recognized and would continue to be supported on and around the Refuge. Invasive plant control measures would continue consistent with Service guidance such as “Recommended Protection Measures for Pesticide Applications in Region 2 of the U.S. Fish and Wildlife Service.” This document provides Regional Office herbicide recommendations for protecting Federal trust species in Region 2.

Herbicide use to control and manage invasive plant species would occur only under ideal weather conditions. Acceptable application practices and guidelines would be implemented during all prescription events and under an approved plan to prevent or minimize affects to water quality. Mechanical treatments include the use of shredders or mulchers to treat large patches of tree or shrub invasives. These treatments would usually be followed by herbicide application.

Exotic animal control measures would continue for the feral hog, using the best management practices available. Techniques include aerial and ground gunning, public hunts, and trapping.

Prescribed Burning

Prescribed fire would continue as a management tool to improve habitat and to reduce the likelihood of a severe wildfire. It would also be used to clean up brush and excess vegetative debris after mechanical treatments. All wildfires not within prescription parameters would be immediately suppressed. Habitat management involving prescribed burning would continue to occur only under ideal weather conditions. Smoke management practices would be implemented during all burning events. The Refuge would continue to ensure that an approved prescribed fire Burn Plan, favorable weather conditions, and adequate firefighting resources all work together to prevent pervasive air pollution or from significantly affecting air and water quality.

Livestock Grazing

Grazing would be utilized on the Myrtle Foester Whitmire Unit as a grassland management tool. Short-duration grazing is currently being used on the Whitmire Unit where a permittee grazes approximately 35 head of cattle for four months per year. The grazing would be done to reduce the height and density of vegetative cover and make the area more attractive for waterfowl, shorebirds, and other migratory birds.

Farming

The Refuge would continue management of organic rice farming croplands on the Myrtle Foester Whitmire Unit. Rice croplands on the Refuge include about 154 acres on this Unit. This rice crop is produced by a cooperative farmer and rotated among the available cropland. After the first rice crop is harvested, the fields are flooded again and the second crop of rice is left for wildlife. This method provides a valuable food supply, but more importantly, flooded fields provide shallow water habitat in mid-summer when freshwater is a rare commodity. The remaining fallow fields provide feeding areas for waterbirds and waterfowl, with water being added at strategic intervals to best provide for the species reliant upon it.

Mechanical Treatments

The Refuge would continue to use heavy equipment to perform roller-chopping, mowing, and disking to create fuel breaks, to manage invasive plants, and to open areas for wildlife viewing.

Migratory Bird and Threatened and Endangered Species Management

The Refuge would continue habitat management activities for threatened and endangered species, including 1) whooping cranes – prescribed burning to provide access to food, management of boat and vehicular activity when the cranes are present, and aerial monitoring; 2) piping plover – ensure habitat is intact and protected through surveying and monitoring; 3) aplomado falcon – chicks released and

raised for population expansion (on Matagorda Island), habitat protected and falcons occasionally monitored; and 4) Kemp's ridley sea turtles – habitat protected and turtles monitored. Protection of all threatened and endangered species would continue to be accomplished by purchasing land and protecting habitat. Access by humans would be controlled to the extent necessary, and people would only be allowed in designated public use areas.

Management of Priority Species or Species of Concern

Priority Species monitoring would continue to occur on up to an annual basis, depending on the species; coordination would continue to occur with Texas Parks and Wildlife Department, US Geological Survey, and other academic institutions for research purposes. On the Myrtle Foester Whitmire Unit, the mottled duck habitat is a prime management focus, and the Refuge would continue to work to provide nesting habitat and cover for rearing by flooding impoundments and mowing, disking, and shredding vegetation to coincide with nesting season. Details and timing of when this is done are variable for every unit based on differing species' needs. White-tailed hawk habitat management would continue to be accomplished primarily by maintaining upland grasslands through burning and providing open prairie habitat for all prairie-dependent species. Occasionally, no active management of habitat occurs for some of these species with the understanding that passive management can be the best course of action.

Public Use Opportunities

Public use would continue to occur on the Aransas Unit, within the 5,000-acre Public Use Management Area, which is set aside for public uses. Located in this area is the Visitor Center that would continue to provide information on the Refuge and the wildlife in and around it with maps, brochures, auditorium, interpretive exhibits, and the Friends of Aransas and Matagorda Island National Wildlife Refuges (FAMI) sales outlet. A 16-mile auto tour loop, seven self-guided walking trails, boardwalk, and viewing decks with telescopes would provide opportunities for nature study, wildlife photography, and observation. The picnic area would allow for a peaceful, scenic spot for a quick lunch or birding in the surrounding oak motte. The Youth Environmental Training Area is set aside for groups coming to the Refuge, usually for an overnight stay to conduct nature studies. The 40-foot high observation tower provides an elevated perspective and grand vista of San Antonio Bay, Mustang Lake, and the Gulf Intracoastal Waterway (GIWW). Occasional planned outings would continue to occur to other units on a case-by-case basis (such as issuing special use permits for class field trips, etc.). Otherwise, the other units would continue to be closed to public use. Matagorda Island would continue to be managed according to terms agreed to in the 1994 MOA with the State of Texas, where Texas Parks and Wildlife administers public uses (See Appendix F).

Archaeological and Paleontological Resources Management

The Refuge would continue to manage natural and cultural prehistoric and historic resources in accordance with the 1990 Comprehensive Management Plan (CMP), which recommends preserving cultural and historical sites "in place." Prior to any Refuge undertaking, appropriate surveys are made to identify any cultural resources that may be within the area of potential effects. All known natural and cultural resources would continue to be preserved in place.

Management of Oil and Gas Activities and Other Developments

The Refuge would continue to receive requests for oil and gas exploration because the mineral interests are privately owned. Owners of these mineral rights have the right to develop, produce, and transport the oil and gas resources located within a refuge (USGAO 2001). The Refuge, in compliance with applicable mandates, would continue to review permits for oil and gas activities on the Refuge and ensure special conditions are included in these permits such as mitigation for unavoidable habitat destruction, drilling fluids removal from the drilling site, and returning the site to as natural a condition as possible. The Refuge would also continue to work with oil and gas companies to limit activities from April 15 through October 15 annually.

Land Protection

Currently, there is no active land acquisition or land protection plan. The Refuge would continue to acquire land on a case-by-case basis.

Partnerships and Cooperative Relationships

The Aransas NWRC would continue to foster working relationships with local communities, governments, individuals, neighbors, conservation groups, and other organizations. The recently formed Friends of Aransas and Matagorda Island National Wildlife Refuge (FAMI) would likely continue to be a catalyst for partnerships, environmental education, and other programs. The Refuge staff would also seek out opportunities to engage people in fulfilling the goals and objectives of the Aransas NWRC.

On the A tract, the cooperative agreement between the Service and Murphy Properties for joint management of this tract would continue. Eventually, the land would be deeded to the Refuge pending the outcome of title litigations and expiration of the existing Life Easement. On Matagorda Island, the agreement between the State (Texas Parks and Wildlife Department and the Texas General Land Office) and the Service, per the 1994 MOA, would continue to provide management guidance of the Island. Certain components of the MOA have changed recently that reflect the State's restructuring. With these changes in mind, the 1990 Comprehensive Management Plan for the Island is updated as part of this planning process.

Staffing, Budget, and Facilities

Base funding and staffing would continue at current levels, maintaining approximately 27 full-time staff (including one Law Enforcement Officer) and several temporary employees, with the budget evenly divided between staff and operation and maintenance. Facilities for administrative and public uses would remain at current numbers (including the office building, maintenance and residential buildings, boat facilities, and all public use facilities mentioned previously under 'Public Use Opportunities') and would undergo only routine upkeep and maintenance.

2.3.2 Alternative B: Proposed Action. Optimal Habitat Management Featuring Priority Public Uses and Existing Uses (Natural Diversity of Habitats and Services)

This alternative would provide for a proactive approach to making concerted strategic decisions through the consideration and analysis of the best available science based on the goals for management of the Refuge. This alternative is based on input received from the public, partners, Service staff, and U.S. Fish and Wildlife Service (USFWS) biological and visitor services reviews; this alternative was developed based on public input and the professional judgment of the planning team. This alternative is based on successful pre-existing Refuge management strategies and some desirable attributes from other alternatives, and has incorporated ecological principles that apply to the Texas Gulf Coast Ecosystem-Gulf Coast Prairies and Marshes Ecoregion.

This is the alternative that would best achieve Refuge purposes, vision, and goals and would best contribute to the Refuge System mission. Alternative B, with associated goals, objectives, and strategies, comprises the Comprehensive Conservation Plan for the Aransas NWRC. It would consider Refuge lands in context with other adjacent lands at the broad ecosystem level rather than as disjunct independent and unrelated units. This alternative would also stress the use of adaptive resource management based on observation and the most current scientific research.

Habitat Management

The focus of this alternative, fully described in the Plan, is to emphasize the maintenance of contiguous mature coastal woodland and natural marsh, manage for grassland and barrier island integrity, and enhance degraded habitats where needed. This alternative also places habitat and wildlife management emphasis on the various units whose acquisition purposes included meeting international migratory bird treaty obligations. This integrative approach is based on soil types, site characteristics, and wildlife values found on the Refuge and adjacent lands. This alternative would seek to better protect and

preserve the natural diversity of unique Gulf coastal habitats and sensitive wildlife through a holistic, partnered, and publicly involved approach as land continues to be developed and subdivided along the Texas Coastal Bend.

This alternative would consider and attempt to preserve and maintain habitats important to the unique species of the Texas Coastal Bend. In so doing, the Refuge would contribute significantly to the State of Texas' Comprehensive Wildlife Conservation Strategy (2005–2010) and economically important species to the State, such as blue crabs, shrimp, oysters, and fish that use coastal wetlands for spawning, nursery, and rearing habitat. This alternative emphasizes wildlife and habitat management needs for today and tomorrow.

Invasive and Exotic Species Management

Management of these species would be the same as Alternative A; however, under this alternative, the Refuge would consider invasive species abundance, density, and threat level, and react with the best professional judgment and available science.

Prescribed Burning

Management of this use would be the same as Alternative A; however, under this alternative, the Refuge would consider vegetative density and fuel load, and react with the best professional judgment and available science.

Livestock Grazing

Management of this use would be the same as Alternative A; however, under this alternative, the Refuge would consider habitat and vegetative conditions and trends, and react with the best professional judgment and available science. The timing and duration of grazing would be more tightly managed and more closely monitored to avoid overgrazing and its associated impacts.

Farming

Management of this use would be the same as Alternative A; however, under this alternative, the Refuge would consider Federal trust species and other wildlife conditions and trends, and react with the best professional judgment and available science.

Mechanical Treatments

Management of this use would be the same as Alternative A; however, under this alternative, the Refuge would consider vegetative conditions and trends, and react with the best professional judgment and available science.

Migratory Bird and Threatened and Endangered Species Management

Management of these species would be the same as Alternative A, but would also consider monitoring, Refuge observation, and other relevant information to ensure flexibility and adaptability in management to react to changing conditions.

Management of Priority Species or Species of Concern

Management of these species would be the same as Alternative A, but would also consider monitoring, Refuge observation, and other relevant information to ensure flexibility and adaptability in management to react to changing conditions.

Public Use Opportunities

Public uses would continue to be managed as they are under Alternative A, but Alternative B would also improve and enhance the quality of and provide for the expansion of the existing facilities and programs. A focus of this alternative is to improve the quality of the Refuge experience for all Refuge visitors, where public uses are compatible. A mix of existing uses and priority wildlife-dependent uses

(hunting, fishing, wildlife observation and photography, and environmental education and interpretation), as described in the Plan, would be allowed. Environmental education and outreach campaigns would occur to alert people to potential impacts to Gulf Coast ecosystems or to raise awareness about sensitive natural habitats.

Archaeological and Paleontological Resources Management

Management of these resources would be the same as Alternative A.

Management of Oil and Gas Activities and Other Developments

Management of these resources would be the same as Alternative A.

Land Protection

Land acquisitions would be based on an approved Land Protection Plan, as a step-down plan of the Comprehensive Conservation Plan. The emphasis would remain on protecting available acres of existing wetland or restorable wetland habitat and adjacent uplands in portions of Aransas, Calhoun, and Refugio counties on the Refuge proper. This emphasis would be enhanced by the expansion of the Refuge through land acquisition, which would continue to be a management consideration and objective. To greatly complement the direction of the Aransas NWRC, future land acquisition priorities would include the blackland true prairie (dark) soils type and whooping crane habitat. This land would be acquired or purchased from donations or willing sellers as opportunities and funding arises.

Partnerships and Cooperative Relationships

Management of partnerships and cooperative relationships would be the same as Alternative A.

Staffing, Budget, and Facilities

Base funding and staffing would increase as determined by the Plan to fully implement this alternative. The Refuge would hire one more Law Enforcement Officer to increase patrol and presence over the 115,000-acre Refuge, and one more visitor services staff would be added to increase assistance to the Visitor Center. Facilities for administrative uses and for public uses would be upgraded or newly built based on the needs identified in the Plan.

2.3.3 Alternative C: Maximal Habitat Management Emphasizing Increased Priority Refuge System Public Uses

Alternative C is based on input received from the public, partners, Service staff, and biological and visitor services reviews. This alternative responds to the issue of a more active and intense habitat management and the request for greater public access throughout the Refuge. Alternative C would depart from Alternative A by emphasizing the intensive management of the Refuge habitat types (woodlands, wetlands, croplands, grasslands, shrublands, and water impoundments) to benefit the highest possible variety of plants and wildlife—not only the Refuge Federal trust species. Refuge lands would be intensively managed for these habitats, also, for the purpose of meeting vegetation treatment targets and enhancing visitor viewing opportunities and visitor services.

Habitat Management

This alternative would utilize the same vegetative treatment tools as those used in Alternative A, although they would be increased substantially. In addition, this alternative would allow for any other management tools needed to effectuate habitat goals. This alternative would entail increasing species diversity based on the idea that more intensive human management and manipulation of natural systems would create better habitat. The treatments would occur simultaneously and would continue until the annual targets are met.

Invasive and Exotic Species Management

The increase in intensive land management as compared with Alternative A would likely mean more opportunities for introduction of invasive species. Therefore, the emphasis on treatment of invasive plants would grow. Management of exotic wildlife species would likely remain the same as under Alternative A.

Prescribed Burning

Management of this use would be the same as Alternative A. However, burning used to clean up brush and excess vegetative debris would likely increase due to more frequent mechanical treatments.

Livestock Grazing

Livestock grazing acreages and intensity would increase as compared with Alternative A.

Farming

Farming would likely increase to other units under Alternative C. The intent of this expansion of farming would be to benefit Federal trust species with a larger food source.

Mechanical Treatments

Use of heavy equipment would increase under Alternative C (compared to Alternative A) to more aggressively control invasives and open greater amounts of area for wildlife viewing opportunities.

Migratory Bird and Threatened and Endangered Species Management

Management of these species would be the same as Alternative A. The Refuge would, however, increase the intensity and the frequency of vegetative treatments. The objective would be to manage all of these (and all wildlife) species' habitat needs in an effort to keep them on the Refuge rather than wandering in and around the general area. This alternative strives to maintain high population levels of all wildlife both for the benefit of the wildlife and people.

Management of Priority Species or Species of Concern

Management of these species would be the same as "Migratory Bird and Threatened and Endangered Species Management."

Public Use Opportunities

Priority wildlife-dependent public uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) identified in the National Wildlife Refuge System Improvement Act of 1997 would be increased significantly above current levels identified in Alternative A. Recreational facilities such as new trails, auto tour routes, and other visitor facilities would be a priority. For example, on the Lamar and Myrtle Foester Whitmire Units, potential opportunities include adding viewing platforms with telescopes, which would involve adding public access roads (approximately one-half mile and two miles, respectively) with parking areas. A year-round auto tour would be provided, open seven days a week from dawn to dusk. The Refuge visitor center would be open seven days a week. Regularly scheduled interpretive programs would be conducted. Refuge walking trails would lead through all habitats and areas of the Refuge, except during critical times around whooping crane and priority resting waterfowl areas. Environmental education on the Refuge would include both staff-led and educator-led field trips, and the number of teacher workshops conducted each year would be increased.

Archaeological and Paleontological Resources Management

Management of these resources would be the same as Alternative A.

Management of Oil and Gas Activities and Other Developments

Management of these resources would be the same as Alternative A, with the exception of the roads built to access developments and associated facilities. Refuge staff would maintain these roads after leases have expired to provide for a public use opportunity to access parts of the Refuge previously inaccessible.

Land Protection

When opportunities present themselves, the Refuge would acquire adjacent or surrounding lands but would not pursue active land acquisition.

Partnerships and Cooperative Relationships

Management of partnerships and cooperative relationship would be the same as Alternative A.

Staffing, Budget, and Facilities

Base funding and staffing would increase (compared with Alternative A) to meet the needs of the increased habitat management and public use opportunities this alternative calls for. The expanded staff would include additions of Law Enforcement Officers on the Refuge, as this alternative would expand public use and access. New construction and maintenance would be increased over levels provided for under Alternative A. Facilities for administrative uses (and for public uses) would be upgraded or newly built to accommodate increased staffing and public use.

Table 1. Comparison of Alternatives

Major Action Areas	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C (Maximal Uses)
<i>Habitat Management</i>	Habitat management—including use of prescribed burning, livestock grazing, farming, and mechanical treatments—based on targets to be met and vegetative treatment objectives determined by a reactionary approach.	Same management tools as Alternative A. Emphasis on ecosystem management principles and holistic management approach.	Same management tools as Alternative A. Intensive management intended to benefit highest variety of wildlife and habitat.
<i>Migratory Bird and Threatened and Endangered Species Management</i>	Habitat management would occur with the use of all management tools as the Refuge staff determines are necessary.	Same as Alternative A but with added monitoring and adaptive management response.	Increase in intensity and frequency of habitat management to accommodate all wildlife.
<i>Management of Priority Species or Species of Concern</i>			
<i>Public Use Opportunities</i>	Wildlife-dependent recreational opportunities managed mainly in public use area on Aransas Unit. Some secondary uses occur on Aransas and Matagorda Island Units.	Same as Alternative A with the added enhancement of priority public uses balanced with wildlife and habitat needs.	Same as Alternative A with the added emphasis on maximizing all priority public uses throughout the Refuge.

Major Action Areas	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C (Maximal Uses)
Archaeological and Paleontological Resources Management	All known natural and cultural resources would continue to be managed in place.	Same as Alternative A.	Same as Alternative A.
Management of Oil and Gas Activities and Other Developments	Refuge would grant access according to law, regulation, and policy, and would work with oil and gas companies to reduce effects.	Same as Alternative A.	Same as Alternative A, but also includes the use of roads built by oil and gas companies to serve as public roads.
Land Protection	Would not actively pursue land acquisition.	Any additional land acquisition would be based on an approved Land Protection Plan.	Would not actively pursue land acquisition.
Partnerships and Cooperative Relationships	Would continue to maintain relationships and work with partners where beneficial and/or needed.	Same as Alternative A.	Same as Alternative A.
Staffing, Budget, and Facilities	Would continue Refuge staffing at approximately 27 staff positions and maintain all administrative and public use facilities without any new additions.	Base funding and staffing would increase; build new or upgrade existing facilities.	Highly increased staff, funding, and facilities, including access roads.

Table 2. Mitigation Measures and Monitoring Description by Alternative

Mitigation Measure and Monitoring Description	Alternatives
General	
Gather updated resource baseline data to form a current analytical base from which to judge future management impacts and effects.	A, B, C
Develop and implement an extensive and ongoing monitoring program to judge management action effectiveness and provide alternative solutions that would lessen any short-term or long-term negative impacts on fish and wildlife resources and other environmental elements.	A, B, C
Regulate management actions to adequately address any potential impacts. For example, activities would be conducted during times of the year and in areas where breeding and nesting activities are at a minimum.	A, B, C
Prohibit or restrict activities in areas where listed species occur. The potential effects of Comprehensive Conservation Plan implementation on federally listed species has been reviewed per an Intra-Service Section 7 Consultation (see Appendix H).	A, B, C
Seek public input in future planning for any management actions that are considered major Federal actions, per NEPA requirements.	A, B, C

Air Quality	
Habitat management involving prescribed burning will occur only under ideal weather conditions, and smoke management practices will be implemented during all burning events.	A, B, C
The Refuge will ensure that it is working with an approved prescribed Burn Plan, favorable weather conditions, and adequate firefighting resources.	A, B, C
Blowing dust is abated by performing work during times of low to no wind.	A, B, C
Water Management and Quality	
Avoid spraying during or immediately before a rainfall event to reduce the chances of runoff and herbicide delivery to water resources.	A, B, C
Use best management practices for treatments around wet areas, including injecting herbicide into selected plants rather than broadcast spray, aerial spraying during dry times such as during droughts and during the summer dry season, and treating invasives with very low-level toxicity herbicide.	A, B, C
Erosion fences will be established on construction sites when erosion is a concern. If heavy sediment deposits occur in water, maintenance workers will use excavators to pull sediment and move it back into place.	A, B, C
Agency approved application practices and guidelines will be implemented during all prescription events and under an approved plan to prevent or minimize effects to water quality.	A, B, C
Soils	
Erosion fences will be established on construction sites when erosion is a concern. If heavy sediment deposits occur in water, maintenance workers will use excavators to pull sediment and move it back into place.	A, B, C
Habitats	
Take a proactive approach to working with information provided through biological surveys, inventories, and monitoring to determine changing conditions and vegetative and associated wildlife needs.	B
Wildlife	
The Refuge will look to the efforts of neighbors and partners to see what others are doing for migratory bird management and to determine the impacts/benefits of working together on habitat/wildlife management.	B
Oil and Gas Activities	
The Refuge will work with oil and gas companies to minimize effects to whooping cranes by limiting activities from April 15 through October 15 annually.	A, B, C

3. Affected Environment

The Aransas NWRC comprises a total of 115,240 acres of wildlife habitat in Aransas, Calhoun, and Refugio Counties, about 80 miles northeast of Corpus Christi along the Texas Coastal Bend. Because of its geographically strategic location along the Central Flyway, further enhanced by the convergence of several habitat types and its proximity to the Gulf of Mexico, the Refuge is a major stopover for birds during their fall and spring migration. Waterfowl, shorebirds, raptors, and songbirds are particularly abundant. The combination of mild winters, abundant food sources, and diverse habitats makes the Refuge a prime wintering area for many avian species, including the endangered whooping crane. These same features also make the Refuge a haven for many other forms of endemic and resident wildlife, ranging from marine to temperate upland and subtropical species.

3.1 *Physical Environment*

Air Quality

The U.S. Environmental Protection Agency monitors air quality through a scale known as the Air Quality Index. This scale is based on the National Ambient Air Quality Standards (NAAQS). The Aransas NWRC is located in a remote area along the south Texas Gulf Coast. The Refuge is about 40 miles from Victoria and 80 from Corpus Christi, Texas, as the crow flies. The entire Texas Coastal Bend area from Victoria south to the Lower Rio Grande Valley is included in the near-nonattainment standard for all atmospheric pollutants, including ozone, sulfur dioxide, and hydrogen sulfide, as specified by Federal Air Quality Regulations.

The Aransas NWRC engages in activities that could affect air quality, including the spraying of invasive plants, prescribed burning, oil and gas extractions, and construction activities. Spraying of invasive plants occasionally occurs through aerial spraying, which can result in an immediate, although temporary, air quality impact. The Refuge implements this spraying in times of low to no wind, and crop dusters fly as close to the target species as possible. Burning also has occurred and continues to occur on the Refuge but typically only in low or no wind, in accordance with a burn plan. Countywide burn bans are implemented occasionally but largely occur only when there is a concern over control of fires—more so than concerns over ozone conditions. The greatest air quality concern comes from the petrochemical industry, regulated by Texas Commission on Environmental Quality (TCEQ), which sets standards along with the Environmental Protection Agency (EPA). Infrequent construction activities occur on the Refuge and can generate temporary dust.

Water Management and Quality

Water resources on the Aransas NWRC are primarily managed through the use of infrastructure (dams, impoundments, and levees) to allow for maintenance of reservoirs, flooding of rice fields, and movement of water. The Refuge is authorized to divert and use water not to exceed 7,685 acre-feet per year to fill the reservoirs for the operation and maintenance of the Refuge and for recreational purposes. Water quality has been tested periodically at various locations on the Refuge (e.g., Burgentine Lake), and harmful levels of contaminants such as agricultural chemicals have not been found to be significant. However, the Refuge periodically tests water quality, particularly at wetlands frequented by migratory birds, to address any potential concerns.

Aside from water quality, one of the Refuge's largest concerns involves freshwater inflows. Gulf coastal habitats are influenced by actions off-Refuge that affect the quantity and quality of freshwater inflows into the San Antonio Bay and Aransas Bay ecosystems. Several rivers converge and empty into the bays surrounding the Refuge that affect the health and populations of the blue crab, a primary food source for the whooping crane. Some segments of these rivers and associated water bodies are listed on the State's 303(d) list as having impaired water quality including: TX-2462 (San Antonio Bay/Hynes Bay/Guadalupe Bay) and TX-2472 (Copano Bay/Port Bay/Mission Bay).

Soils

The soils of the Texas coastal prairie and marsh are characterized by vertisols, mollisols, alfisols, and entisols at their broadest levels (Godfrey et al. 1973) (*Comprehensive Conservation Plan, Table 2*). Four distinct soils associations characterize the Refuge: 1) Galveston-Mustang-Dianola, 2) Narta-Aransas-Victoria (Guckian and Garcia 1979), 3) Galveston-Adamsville, and 4) Livia-Francitas (Mowery and Bower 1978). For comparison, the dark fertile coastal prairie soils in agricultural production near the Aransas Unit are of the Victoria-Raymondville-Orelia association (Guckian and Garcia 1979).

Topography of the Refuge is generally flat and contains a mix of soil types that include dark clays, sandy, loamy, and coastal hydric soils. Agriculture is the predominant feature of the surrounding landscape, with small towns and cities scattered throughout. The Refuge and surrounding land are part of what is known as the Gulf Coast Prairies and Marshes Ecoregion. This area includes an estimated 9.5 million acres along the western Gulf Coast in Texas and extends inland up to 60 miles.

Soil types and conditions play a large role in determining type and health of vegetative communities and associated fauna. However, human land use and activity can result in changes to both. Prior to settlement, this vast area was comprised of immense river deltas and marshes, tidal flats, barrier islands, coastal woodlands with sandy prairie openings, coastal upland prairies, and oak savannah. Historically, the Coastal Prairies component was primarily composed of vast dark-soiled upland prairies along the coast. The mosaic of sandy-soiled prairie openings and oak savannah found on some of the peninsulas today is only a minor part of this component. Coastal marshes, which are found adjacent to this strip of sandy soil along the immediate coast, comprise the balance of the Coastal Prairies habitat. These two components (the sandy prairie/oaks and the coastal marshes) are so interwoven and integrated as to make one habitat type. Thus, along the immediate coastline within the Coastal Marshes component lays a narrow strip of sandy soil, which is different in character from the Coastal Prairie that occurs just inland. Today, less than one percent of the original Coastal Prairie dark-soiled habitat further inland from the peninsulas remains. This is because the dark-soiled habitat type is principally in agricultural production. On the Refuge, only the Tatton Unit is a remnant of this Coastal Prairie. Nonetheless, the remaining Coastal Marshes component, with associated low sandy peninsulas and barrier islands, provides habitat for a tremendous diversity of wildlife. Therefore, Aransas NWRC makes up an important part of this remaining habitat for wildlife.

3.2 Biological Environment

Habitat

Upland Plant Communities

Oak-Bay Forest Community

This habitat type is mainly found on the Aransas Unit and somewhat on the Lamar Unit. The primary floral components in this community are live oak, redbay, and laurel oak. Secondary floral components include blackjack oaks, hackberries, tree huckleberry, yaupon, beautyberry, greenbriar, Turk's cap, and coral bean. These deep sands are remnant depositions of old beachfront ridges or coastal cheniers (Gosselink et al. 1979), formed much like the currently accreting barrier islands and which form the highest points on the Refuge. Common fauna include raccoon, opossum, armadillo, striped skunk, deer, javelina (collared peccary), feral hog, hognose snake, eastern mole, fox squirrel, cardinal, and white-eye vireo. Rare and uncommon fauna include short-tailed shrew, buff-bellied humming bird, whippoorwill, and yellow-billed cuckoo.

Ridge and Swale Community

On the Blackjack Peninsula, this is the most widespread biotic community and it owes its occurrence and appearance to both geology and human land use history. The Ridge and Swale Community can be divided into three components (running live oak thicket, live oak motte/woodland, and grassland).

The oak mottes and woodlands component is dominated by live oak, laurel oak, redbay, and lime prickly ash. The understory supports yaupon, greenbriar, and beautyberry. Mustang grape is also usually found growing among the trees. The grasslands are dominated by an array of mid- and tall-perennial bunchgrasses, the likes of which are rarely seen outside the Refuge. Primary floral components include bushy bluestem, broomsedge, seacoast bluestem, silver bluestem, big bluestem, and others. These are joined by switchgrass, dropseeds, Gulf muhly, paspalums, sprangletops, and indiagrass. About 85 grass species have been recorded within the oak mottes/woodland component. In areas where water accumulates, sawgrass, rattlesnake, bulrushes, and sedges can be found.

Many of the wildlife species found on the Refuge occur in this interwoven mesh of habitats comprising the Ridge and Swale Community. Common fauna include the white-tailed deer, cotton rat, feral hog, cardinal, bobcat, gray fox, mountain lion, mockingbird, white-footed mouse, rough green snake, rat snake, javelina, meadowlark, savannah and vesper sparrow, slender glass lizard, and northern harrier. Rare and uncommon fauna include the Texas scarlet snake, long-tailed weasel, white-tailed hawk, and aplomado falcon. See Comprehensive Conservation Plan Chapter 3 Refuge Resources for more information.

Barrier Flat Community

The grassy ridge and swale association that occupies the interior (uplands) of Matagorda Island is termed the Barrier Flat Community. 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. Common fauna include white-tailed deer, cotton rat, harvest mice, feral hog, eastern meadowlark, marshwren, dickcissel, slender glass lizard, Gulf Coast ribbon snake, ground skink, ornate box turtle, speckled kingsnake, massasauga rattlesnake, western diamondback rattlesnake, coachwhip, mockingbird, loggerhead shrike, and scissor-tailed flycatcher. Rare and uncommon flora and fauna include ladies tresses, white-tailed hawk, aplomado falcon, American badger, white-tailed kite, Le Conte's sparrow, short-eared owl, and burrowing owl.

Upland Grassland Community

This coastal prairie community occurs on relatively well-drained dark soils. On the Refuge, due to the proximity and influence of coastal bays and the gradual slope in that direction, the remnant that remains of this community is considered low upland prairie (lowland flats). These are transitional areas between the blackland soils and the sandy prairie and, in some cases, between blackland soils and salt marshes. This grassland is composed of seacoast bluestem and silver bluestems, windmill grass, knotroot bristle grass, white tridens, Texas wintergrass, and an assortment of panic grasses. It is here that the Attwater's prairie chicken once existed on the Refuge. This is home to a variety of grassland birds, raptors, and prairie-dependent species. This community is found on the northern half of the Tatton unit and once existed on the Myrtle Foester Whitmire unit. This is the only remnant on the Refuge of the vast open true coastal prairie that once covered much of the area on this soil type and the more fertile blackland soils just inland. Most of this soil type is under cultivation today, used as ranch land, or is being incorporated into urban development.

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, granjeno, blackbrush, agarito, retama, Texas prickly pear, and devil's head cacti on the higher clay loam uplands. Birds and mammals more typical of the south Texas

brushlands can be found in this community including: cactus wren, Bell's vireo, Bewick's wren, Cassin's sparrow, roadrunner, and wood rat.

Shoreline Plant and Animal Communities

Gulf Beach and Dune Communities

This biotic community occurs where the Gulf of Mexico meets the land at the leading edge of the barrier island. The Gulf beach and the dunes are categorized into several zones; beginning at the water's edge and inland are the swash zone, forebeach, berm/strandline, and backbeach, primary, and secondary dunes. Vegetation on the backbeach includes goat-foot morning glory, frogfruit, fleabane, sandpinks, sea rocket, sea purslane, seaside heliotrope, beach evening primrose, ground-cherry, fimbry, coast pennywort, beach amaranth, marshhay cordgrass, gulfdune paspalum, and sea oats. The primary dunes include much of the vegetation of the backbeach and may include Gulf croton, fiddleleaf morning glory, camphorweed, partridge pea, western ragweed, and groundsel. In the secondary dunes, one will find marshhay cordgrass, gulfdune paspalum, American snoutbean, hoary milkpea, coast prickly pear, partridge pea, loosestrife, silverleaf sunflower, and sea oats. The beach swash zone fauna includes primarily detritivores (mole crab, surf crab, coquina clam, ghost shrimp, sand digger amphipods and palp worms) and predators (Atlantic moon, lettered olive, Salle's auger, blue and speckled crab, sanderling, and ruddy turnstone). The forebeach consists of transient feeders (juvenile ghost crab, tiger beetle, dragonflies, and robberflies) and loafers (gulls, terns, and brown pelicans). The berm/strandline is utilized by scavengers (beach flea, shore fly, ghost crab, seaweed fly, carrion fly, most shorebirds, crested caracara, turkey vulture, feral hog, and coyote). On the backbeach, ghost crabs, horned larks, jackrabbits, badgers, and coyotes can be found. The primary dunes are home to prairie-lined racerunner, horned lizard, cotton rat, jackrabbit, badger, and coyote. Secondary dune fauna are similar to that of the surrounding grassland. Rare and uncommon fauna include the red land crab, sea turtles, white-tailed tropicbird, Northern gannet, magnificent frigatebird, and sooty tern.

Shell Ridge/Chaparral Community

This habitat type is formed by a windrow of oyster shell, piled by wind-driven waves and associated woody vegetation. This is one of the smallest—yet most distinctive and diverse—communities on the Refuge. It is found scattered about in isolated fragments on the bayside of Matagorda Island, natural islands, and some spoil islands. On the Aransas Unit, this biotic community is found along the Heron Flats Trail and on the Tatton Unit, along Salt Creek.

Primary floral components include seashore dropseed, sand saltbush, clammyweed, bushy sea oxeye, sea lavender, mesquite, coral bean, Carolina wolfberry, granjeño, colima, tanglewood, Spanish dagger, snapdragon vine, ivy tree vine, balsam gourd, Texas prickly pear, Texas persimmon, brasil, lotebush, Texas torchwood, lantana, la coma, Berlandier wolfberry, Texas nightshade, and tasajillo. On the mainland, one can add Mexican buckeye, netleaf hackberry, live oak, agarito, retama, epiphytes (Spanish and ball moss, true mosses, fungi and lichens), and the greatest assortment of vines found on the Refuge can be found along Heron Flats Trail. More than 150 species of plants have been identified in the Shell Ridge/Chaparral Community.

On Matagorda Island, specialized ants, known as pyramid ants (*Conomyrma flava*), are not found elsewhere. This habitat also provides some of the best shelter, cover, and feeding areas for Neotropical migrant fallouts. The soil type is the Galveston-Adamsville association with shell and high calcium content. Common Island fauna include ghost crab, sand fiddler crab, imported fire ant, walking stick, wood-boring beetle, cotton rat, raccoon, coyote, diamondback rattlesnake, prairie-lined racerunner, horned lizard, white-tailed kite, white-tailed hawk, and horned owl. On the mainland, one can add the white-footed mouse, fence lizard, green anole, rough green snake, white-eyed vireo, armadillo, opossum, and skunk.

Tidal Shore Grassland (Marshhay Cordgrass and Gulf Cordgrass Communities)

This is the gently-sloped linear stretch of land found just inland from the tidal flats community. It is densely covered with marshhay cordgrass and rimmed with Gulf cordgrass and bluestems along the upper edge. The Gulf cordgrass component occurs on saline clay soil types and may include bluestems. Tidal shore grassland occurs on all units to various degrees and is most extensive along the eastern boundary of the Aransas and Matagorda Island Units. The Gulf Cordgrass Community can also be found on all units to varying degrees, with large stands found north of Burgentine Lake and on the lower third of the Tatton Unit. Its open aspect and heavy rodent population appeals to a variety of raptors, including the white-tailed hawk, white-tailed kite, northern harrier, and loggerhead shrike. Also found here are a variety of sparrows, sedge wren, hispid cotton rat, pygmy mouse, racers, and coachwhip snake.

Wetland Plant and Animal Communities*Freshwater Community*

Throughout the Refuge are a variety of freshwater plant and animal communities. They include the backbeach, interdune area, barrier flat swales, peninsular swales, ponds, lakes, drainage ditches, and scrapes where rainfall collects. A few of these intercept the perched aquifer and are semi-permanent sources of fresh water, some are filled by windmills, and others receive runoff from artesian wells. During wet years, every swale on the Refuge will be full for weeks. The specific vegetative mix will depend on the permanence of the water.

More permanent water will develop submerged plants like hornwort and southern naiad, as well as floating plants such as duckweed and pondweed. Emergent plants along the shoreline include cattails, California and American bulrush, burhead, arrowleaf, and common reed. The bankside trees are typically black willows and other vegetation includes rattlepods and coffee bean, saltmarsh and spiny aster, and groundsel. The edges of temporary pools are generally marked by a thick stand of bushy bluestem, a variety of rushes and sedges, and switchgrass and button bush. On the barrier flats, floral components include green algae, wigeongrass, stonewort, seashore paspalum, American bulrush, burhead, cattails, black rush, coffee bean senna, Bermudagrass, water hyssop, umbrella pennywort, creeping seedbox, smartweed, and saltcedar.

The unifying characteristic of these wetland habitats is that almost all Refuge wildlife depends on the fresh water. Even those species strongly associated with salt water (e.g., gulls and terns) need to drink fresh water daily. Frogs and toads breed only in fresh water and the mottled duck and black-bellied whistling duck nesting and brood rearing cycle revolves around these freshwater areas. Common fauna of freshwater communities include the water flea, ostracods, larval midge, mosquitoes, dragonflies, whirligig, water boatmen, aquatic snails, mole cricket, staphylinid beetle, earthworm, leopard frog, Gulf Coast toad, narrow-mouthed toad, yellow mud turtle, red-eared slider, Gulf Coast ribbon snake, approximately twenty species of fish, ducks, grebes, gallinules and coots, belted kingfisher, marsh and sedge wrens, killdeer, raccoon, feral hog, and white-tailed deer. Rare and uncommon fauna include: nutria, blue-winged teal (occasionally nests), yellow and black rails, wood stork, yellow-crowned night-heron, and broad-banded water snake. The most spectacular resident of the Refuge freshwater biotic community is the American alligator.

Tidal Flat/Pool Community (Salt Marsh Community)

This habitat type is often called “salt marsh,” though not really true salt marsh, which is more applicable to the extensive growth of emergent grasses, reeds, and rushes known from around the Colorado River eastward. The mid- and lower-Texas coast shoreline is not regularly flushed by significant tides and washed by freshwater drainage; hence “salt marshes” dwindle rapidly. The only hint of salt marsh in the area of the Refuge consists of a long narrow band dominated by smooth cordgrass up to a few feet to yards wide, and it is not extensive enough to support distinct animal communities. Typically, when the term salt marsh is used, it is referring to the tidal flat community.

This area marks the transition from the uplands to the bays, and within it lies the unique community of plants and animals specially adapted to the ebb and flow of 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. Specialized components include blue-green algal mats. Shallow tidal pools, 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: detritivores - marine worm, clam, ghost shrimp, and many tiny crustaceans; grass shrimp, juvenile brown shrimp, pistol shrimp, blue crab, marsh crab, mud crab, stone crab, hermit crab, marine snails, striped mullet, and killifish; shore flies, shorebugs, beach flea, fiddler crab, shorebirds, waders, herons and egrets, gulls, terns, black skimmer, clapper rail, seaside sparrow, Gulf saltmarsh snake, saltmarsh grasshopper, marsh rice rat, western pygmy blue and great white southern butterflies, tiger beetles, wolf spider, rice rat, raccoon, feral hog and white-tailed deer. Rare and uncommon flora and fauna include black mangrove, wood stork, diamondback terrapin turtle, white mullet, blue crab, and, of course, the federally endangered whooping crane.

Moist Soil Units

The Myrtle Foester Whitmire Unit contains the only managed wetlands on the Refuge. This area is cooperatively farmed for organic rice with the second crop left for wildlife. This habitat provides much needed water during the summer when fresh water is at a premium. These constructed wetlands are surrounded by dikes, which allow for managing water levels for crop or other plant and invertebrate production. Gravity flow and pump systems are used to raise or lower water levels to achieve desired mixes of aquatic plants, thus enhancing their value to wildlife. Managing these wetlands for wildlife is essentially based on controlling plant succession to meet seasonal needs.

Within these marsh complexes, invertebrates such as insects, gastropods, and other organisms living among the vegetation provide an important food source for fish and small vertebrates that are food for larger animals. Waterbirds and other wetland wildlife rely on marsh plants for subsistence, nest sites, and cover, while other wetland wildlife utilizes the fish and invertebrates that inhabit the vegetation. Each habitat component within the marshes attracts its own assemblage of plants, birds, mammals, reptiles, amphibians, invertebrates, and fish. Within the marshes, zonation and succession, in response to environmental conditions, are among the important ecological processes. Water level fluctuation, whether natural or human-induced and the resultant plant and animal responses are often the most significant driving forces in managed wetland communities.

Land Management

Invasive and Exotic Species

The introduction and spread of invasive and exotic species is an ongoing and serious threat to native habitats. An invasive plant is a native or non-native plant to an ecosystem that lacks natural controls and tends to aggressively dominate the plant community, often forming extensive monocultures. Invasive species generally reduce the diversity and health of ecosystems when they become dominant. The major non-native invasive plant species of concern on Aransas NWRC are referenced in Appendix E. Three primary herbicides are used on Aransas NWRC: Glyphosate, Triclopyr, and Imazapyr. Toxicity and persistence in the environment is low to moderate as indicated on Material Safety Data Sheets.

Herbicides have been used on the Aransas NWRC to control invasive plants (e.g., mesquite, eastern baccharis, poison ivy, Chinese tallow, Macartney rose, Camphor tree, and a variety of non-native grasses and cattail), and pesticides have been used for insect pests: roaches, fire ants, termites, and bees. Chinese tallow, Macartney rose, and other woody invasives are the main species targeted for control.

An exotic species is any species that is non-native to the ecosystem under consideration that was either introduced intentionally or unintentionally and may be considered invasive. On Aransas NWRC, feral hogs are considered the primary exotic pest species. Others include Africanized bees, nutria, and, occasionally, exotic game animals. Feral hogs negatively affect all habitat components, such as oak woodlands, coastal prairie grassland, marshes, and wetlands. They reproduce at a high rate and are difficult to control.

Feral hogs on the Refuge provide recreational hunting opportunities and meat for local charities. Hogs have never been successfully controlled on the Aransas Unit (Blackjack Peninsula) despite many years of effort. Hogs occurring on Matagorda Island used to “plow up” large percentages of coastal prairie, which was particularly noticeable after fire. Recent control efforts on Matagorda have greatly reduced hog numbers but control efforts still need to be continued. The Habitat Management Plan, a step-down plan, includes measures to control exotic species and the damage they cause to Refuge habitats.

Prescribed Burning

Fire is an important ecological factor in most terrestrial ecosystems. Fire management activities on Aransas NWRC focus on two major fronts. One is the use of fire as a habitat management tool including fuels reduction using prescribed burning; and the other is the suppression of unwanted fires that threaten life, property, or other resources. The Refuge Fire Management Plan guides all fire management activities on the Refuge in accordance with policy. With respect to the use of fire as a habitat management tool there are five objectives: 1) restore fire as a natural ecological process; 2) perpetuate the natural occurrence of native vegetation beneficial to Federal trust species by restoring Texas coastal prairie communities; 3) restore and perpetuate Federal trust and other wildlife species by maintaining a diversity of plant communities; 4) develop and set up a process to ensure the collection, analysis, and application of high quality fire management information needed for sound management decisions; and 5) reduce fuel loading.

Habitat management involving prescribed burning occurs only under ideal weather conditions. Smoke management practices are implemented during all burning events. The Refuge ensures that an approved prescribed Burn Plan, favorable weather conditions, and adequate firefighting resources all work together to prevent pervasive air pollution or from significantly affecting air and water quality. Fires are primarily conducted in the summer for maintenance of prairie and during the winter for whooping cranes. Prescribed burning occurs on all units, with the exception of the Lamar Unit, and it is not consistently used on the Myrtle Foester Whitmire Unit.

Livestock Grazing

Today, grazing occurs on the Myrtle Foester Whitmire Unit and is now seen as a grassland management tool. Short-duration grazing is currently being used on the Myrtle Foester Whitmire Unit, where a cooperative farmer grazes approximately 35 head of cattle for four months per year. The grazing is done to reduce the height and density of vegetative cover and make the area more attractive for waterfowl, shorebirds, and other migratory birds.

Farming

Rice farming historically occurred on the Myrtle Foester Whitmire Unit, and since its acquisition by the Service, it has converted to organic rice farming. Rice croplands on the Refuge include about 154 acres on this unit. This rice crop is produced by a cooperative farmer and rotated among the available cropland. Benefits from organic rice farming come in the form of a second rice crop, water, and no chemicals. After the first rice crop is harvested, the fields are flooded again, and the second crop of rice is left for wildlife. This method provides a valuable food supply, but more importantly, flooded fields provide shallow water habitat in mid-summer when freshwater is a rare commodity. The remaining fallow fields provide feeding areas for waterbirds and waterfowl with water being added at strategic intervals to best provide for the species reliant upon it.

Mechanical Treatments

Heavy equipment to perform the tasks of roller-chopping, mowing, and disking aids in the creation of a range of successional stages, helps manage invasive plants, and creates fuel breaks and open areas for wildlife viewing. Currently, no active treatments occur on the Lamar Unit.

Wildlife*Management of Priority Species or Species of Concern*

State-threatened, endangered, or species of concern, vertebrate wildlife species (183 species) are dependent on the Gulf Coast Prairies and Marshes Ecoregion, and many of these species occur on the Refuge. One hundred and thirty-five birds occur on the State-listed and species of concern list. Most of these birds are migratory and occur on the Refuge at some point. Many of these birds also nest on the Refuge. These include such birds as the buff-bellied hummingbird, seaside sparrow, mottled duck, white-tailed hawk, Wilson's plover, yellow-billed cuckoo, and reddish egret.

State-listed mammals for the same Ecoregion include 20 species. Of those, many occur on the Refuge and include the following: hog-nosed skunk, Attwater's pocket gopher, southern yellow bat, long-tailed weasel, short-tailed shrew, swamp rabbit, and American badger. Twenty-eight State-listed and species of concern reptiles and amphibians occur in the Gulf Coast Prairies and Marshes Ecoregion, with the Refuge supporting about half of these. Additionally, there are 97 State invertebrate species of concern for the area and a number of State-listed estuarine/marine fish and invertebrates that use coastal wetlands for spawning, nursery, and rearing habitat. These wildlife species and others necessitate the proper stewardship of wildlife habitat resources found on the Refuge.

Management of Threatened and Endangered Species

The only wild population of whooping cranes, a federally endangered species, makes the Aransas NWRC its winter home. The entire Aransas-Wood Buffalo population of whooping cranes is dependent on this part of the Texas coast. Other federally listed threatened and endangered species that may be found on or near the Refuge in suitable habitat include the Kemp's ridley sea turtle (endangered), loggerhead sea turtle (threatened), green sea turtle (threatened), leatherback sea turtle (endangered), hawksbill sea turtle (endangered), brown pelican (endangered), aplomado falcon (endangered), and piping plover (threatened). The endangered West Indian manatee is occasionally documented in the Coastal Bend area but needs further verification within Aransas NWRC. Although the highly endangered Attwater's prairie-chicken is no longer found in the area, at some point, it may be re-introduced on the Aransas NWRC.

3.3 Human Environment*Public Use Opportunities*

The Aransas NWRC provides the six priority public uses of the Refuge System (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that are compatible with Refuge purposes and the Refuge System mission. In addition, three approved secondary uses occur: picnicking on the Aransas Unit, beachcombing (which includes swimming, and picnicking), and camping on Matagorda Island. Bicycling also occurs but only as an incidental public use on the auto tour loop on the Aransas Unit and on Matagorda Island. There are no special accommodations provided for this type of use.

The Refuge is able to accommodate public uses through the construction and maintenance of facilities and access. Existing public facilities include the 5,500-square-foot Claude F. Lard Visitor Center, built in 1981. This building contains an after-hours registration area, foyer, bathrooms, exhibit area, auditorium, storage/audio-visual room, and office spaces. The recently rebuilt 40-foot observation tower overlooks whooping crane habitat. The Refuge also maintains a boardwalk, fishing pier, walking trails, and fishing access points.

Access on refuges is provided primarily to facilitate the six priority public uses of the Refuge System (hunting, fishing, wildlife observation and photography, and environmental education and interpretation), when compatible with Refuge purposes and the Refuge System mission. Public access is normally allowed in designated areas and along designated routes of travel (e.g., roads, trails, waterways, and other routes).

Aransas Unit

Seven walking trails, Tomas Slough Observation Area, the picnic area, Jones Lake viewing deck, the boardwalk, and a 40-foot high observation tower with interpretive signage and/or telescopes are located along the first 5 miles of the 16-mile paved driving tour loop. On the remaining 11 miles of the tour loop, Hog Lake viewing deck, five wayside exhibits, and several pullouts are available. There are also group campsites, photo blinds at Birding Trail #2 and Heron Flats Trail, and comfort stations.

Tatton Unit

An informational kiosk, interpretive signs, parking, and a viewing deck occur on the Tatton Unit. The Tatton Interpretive Coastal Prairie Trail begins at the State Highway 35 roadside rest area and leads into the remnant coastal prairie for one-quarter of a mile.

Matagorda Island Unit

On Matagorda Island, the agreement between the State (Texas Parks and Wildlife Department and the Texas General Land Office) and the Service, per the 1994 Memorandum of Agreement (MOA) provides management guidance of the Island. Certain components of the MOA have changed recently to reflect the State's restructuring. However, Texas Parks and Wildlife Department is still responsible for public use, and the Service is responsible for wildlife and habitat management on Matagorda Island.

Matagorda Island has some public use facilities administered by TPWD and the Refuge. Matagorda Island Unit offers interpretive trails at both the south and north ends. At the south end, four trails are located near the Environmental Education Center: 1) the Wetlands Trail (three miles) with six interpretive signs, two boardwalks, and an observation platform providing an elevated view of the salt marsh; 2) the Bayside Trail (.33 miles) skirts the edge of the salt marsh and is ideal for observing the transition from marsh to grassland; 3) the Grassland Trail (.75 miles) takes the visitor into a waist-deep stretch of Gulf Coast prairie; and 4) the Sand Dunes Trail (.33 miles) gives the visitor a close-up view of the geology and adapted xeric vegetation of a dune field. At Shell Reef Bayou, an elevated wooden observation deck overlooks extensive wetlands. Additionally, there are numerous hunter blinds for deer and duck hunting scattered across the Island. All these sites are used by guided groups transported from the Environmental Education Center or from the north end of the Island. On the north end of the Island, the Lighthouse Trail leads from the beach access road across the Civil War trenches to the lighthouse and Gulf Beach. All of the trails and public use facilities on Matagorda Island are interconnected by the Main Island Road, which is currently a 35-mile long, gravel-shell road. This road had been paved in the past and is the primary artery for access to all public uses on the Island.

Myrtle Foester Whitmire and Lamar Units

These units are currently closed to public use and contain no public facilities or infrastructure.

Hunting

Hunting is one of the priority public uses and to accommodate hunters, Aransas NWRC provides annual archery and firearms hunting opportunities for white-tailed deer and feral hogs. The majority of hunts take place on 33,500 acres of the Blackjack Peninsula uplands, apart from the Public Use Management Area. Each year, there are about 1,300 hunters on the Aransas NWRC, making the white-tailed deer and feral hog hunting a very popular activity. The hunts are popular because they are an affordable and rare public recreational opportunity. Texas has relatively little public hunting opportunities as most of Texas land is privately owned.

On the Matagorda Island Unit, as part of the Refuge agreement with the State to support recreation on Matagorda Island, TPWD provides hunts for waterfowl, feral hogs, and white-tailed deer. Based on annual trend surveys, the deer herd has averaged about 1,580 on the Aransas Unit and 1,000 individuals on the Matagorda Island Unit. About 96 and 40 deer per year are harvested, respectively. Currently, hunters take up to 75 hogs each year on the Aransas Unit and very few on Matagorda Island. Hunters are made aware that endangered species, especially whooping cranes, occur within these areas and hunters should exercise caution and good judgment at all times while hunting.

Four firearms youth hunts for white-tailed deer and feral hogs are held on the Refuge. One, in which local kids participate, is hosted by the Refuge and the Texas Wildlife Association on the Tatton Unit. A second hunt is held on Matagorda Island and co-sponsored by the Refuge and the Texas Wildlife Association as part of the Texas Youth Hunting Program. A third hunt is held on Matagorda Island twice annually and hosted by TPWD. The Youth Hunting Program was established to increase youth participation in safe and ethical hunting and to promote the hunting heritage of Texas. As governed by State hunting regulations, waterfowl hunting is allowed by a State annual public hunting permit and regular hunting license on Matagorda Island only.

The feral hog is considered an exotic pest and is very destructive to habitat. Feral hogs also compete with native wildlife for food such as acorns and grapes, and their aggressive, predatory nature can adversely affect ground-nesting birds and larger animals such as javelina. A major objective of feral hog hunting is to help control these species on the Refuge, as there is no bag limit for either the firearms or archery hunts.

Fishing

Although the Aransas NWRC does not manage any waters open to fishing, the tidal waters surrounding the Refuge are State-owned and open to fishing. Five areas, along the shoreline of San Antonio Bay via the auto tour route, are made available for fishing access: the Picnic Area, Bay Overlook, Dagger Point, Birding Trail #2, and the Observation Tower. A 120-foot long fishing pier into San Antonio Bay along the auto tour loop at the picnic area has recently been constructed and is now open year round. With the exception of the fishing pier, all other fishing access points are closed October 16 through April 14 annually. Currently, the Refuge has no public boat ramp facilities, but in 2004, it began allowing kayak and canoe launching at the fishing access points. Matagorda Island is also a popular fishing area, and visitors can access the Island's shorelines by personal watercraft. Access points and prohibitions do not occur on Matagorda Island, given the fact that these are State waters and access is not through the Refuge. Most of the fishing is wade fishing or by small boat entry into the surrounding saltwater flats. Typical fish caught include speckled trout, redfish, black drum, and flounder. To ensure compatibility with Refuge purposes, fishing access and kayak and canoe launching are seasonally permitted from April 15 through October 15 annually but are prohibited the rest of the year, when whooping cranes and major waterfowl and shorebird concentrations are present. Only the fishing pier is open year round.

Wildlife Observation and Photography

Wildlife observation and photography, including the observation of native plants and other natural features, are the most popular recreational uses of the Refuge, attracting about 60,000 visitors annually. In 2005, approximately 91 percent of visitors to the Aransas NWRC came for wildlife observation, and about half of all visitors brought cameras (based on staff surveys in the Visitor Center). Wildlife observation and photography are followed by environmental education and interpretation in popularity. The most popular time of the year for wildlife observation occurs in the fall and winter months when the whooping cranes are wintering on the Refuge and the temperatures are cooler. On the Aransas unit, prescribed burning and roller-chopping for prairie restoration have opened up large portions of these areas for visitors to have greater vistas. Benches, photo blinds, feeding stations, and a more extensive trail system beyond the observation tower have not been installed, due primarily to costs and maintenance issues. However, as the area's population grows, visitation to the Refuge is expected to increase.

Environmental Education

For years, the Aransas NWRC has been a focal point of national conservation and international acclaim, due in large part to the critical wintering habitat of the endangered whooping crane. Therefore, the Aransas NWRC is an ideal place for visitors to learn about the values of the nation's wildlife and wildland heritage, as well as the Service's mission to protect, enhance, and restore these resources.

The EE Program at Aransas consists of several quality outdoor classrooms designed to give students the opportunity to enjoy the outdoors while promoting an understanding of wildlife conservation. Such activities include an introduction to birding, fish, and wildlife management, food-chain relationships, and animal tracks identification, as well as an understanding of biodiversity, and island, beach, and bay ecology. These programs are aligned with the Texas Essential Knowledge and Skills (TEKS) for Science.

The Refuge also offers an orientation to the Refuge, welcome programs for groups, educational videos, interpretive van tours, an Aransas lecture series, a Youth Environmental Education Training Area, and outreach for schools, organizations, and community groups. The Matagorda Island Environmental Education Center offers beach, bay, and marsh ecology classes open to eighth grade and higher students. The Refuge visitor center provides a bookstore containing wildlife and nature books, brochures, animal checklists, and other printed materials.

Interpretation

The Refuge offers quality interpretive programming with the goal of helping visitors enjoy the outdoors while promoting an understanding of wildlife conservation and stewardship for natural resources. Brochures, interpretive exhibits, the Refuge video, and the FAMI nature store with wildlife and nature books, animal checklists, and other printed materials are located in the Visitor Center. Welcome programs for groups, educational wildlife videos, interpretive van tours, and the Aransas lecture series with regularly scheduled wildlife-related programs are also offered. Programs include events where families, students, and scouts are invited to come out to learn about wildlife topics such as birds, insects, and sea turtles. The Youth Environmental Training Area (YETA) is available for overnight camping and interpretation by organizations such as universities, scouts, and church groups.

Socioeconomic Resources

Regional Economic Profile (Growth)

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. Farming and agribusiness have 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 48,648 acres of cotton, 33,104 acres of sorghum, and 26,380 acres of corn were planted—the three major field crops in the counties of Aransas, Calhoun, and Refugio (National Agricultural Statistics Service, 2002 data). Other crops include pecans, forage, various grains, and vegetables. From 1997 through 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. These industries were originally attracted to the area because of available natural gas supplies, fresh water, distance from heavily populated areas, and the GIWW. 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 (Economic Pulse 2003).

Another industry that has rapidly developed and is particularly important to the Refuge and the region's economy is ecotourism (State of Texas Tourism Tip Sheet, March 2004). 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.

Scenery Resources

Scenery resources on the Aransas NWRC include the views of vistas made available through public use infrastructure such as the 16-mile auto tour loop, seven self-guided walking trails, the boardwalk, the fishing pier, and viewing decks with telescopes. These amenities provide opportunities for enjoying scenic coastal habitats, as well as nature study, wildlife photography, and observation. The picnic area offers a peaceful, attractive area for a quick lunch or bird-watching in the surrounding oak motte. The newly-constructed 40-foot high observation tower provides an elevated perspective and grand overlook of San Antonio Bay, Mustang Lake, and the GIWW.

Archaeological and Paleontological Resources Management

Occasionally, natural prehistoric objects, such as fossils or bones of now extinct animals, are found on the Refuge. As often as possible, the Refuge tries to preserve these resources in place by stabilizing the surrounding soils or restricting human use so as not to disturb the site any further.

The most current cultural resources survey was conducted in 1994 on the Blackjack and Live Oak Peninsulas and the Tatton Unit. Although the Refuge had 14 known sites on the Aransas, Tatton, and Lamar Units, the plan was to relocate 13 previously recorded sites and record any other sites encountered during this survey. Seven of the 13 sites were located, while the remaining six locations revealed no evidence. One previously unrecorded site was encountered and recorded. These sites were located primarily along the exposed shorelines of the Refuge (Aransas Unit). The report determined that sites on the Refuge could include the Paleo-Indian, Archaic, and Late Prehistoric archeological sites. Myrtle Foester Whitmire Unit and Matagorda Island have not been as thoroughly surveyed for prehistoric archeological sites. However, Matagorda Island is well known for its rich history and sites including habitation by Karankawa Indians, Spanish Explorers, Civil War and World War II soldiers, as well as cattle ranchers. Many important structures and cultural sites, such as the Matagorda Island Lighthouse, remain.

Oil and Gas Activities

The Texas coast is richly endowed with extensive petroleum and mineral reserves, and the subsurface minerals on the Refuge are privately owned. On the Aransas Unit, there are pipelines and separating facilities. On the Matagorda Island Unit, oil and gas production is cyclic with activity spurred by economic incentives. There are various mineral lease holders and facilities such as pipelines, holding tanks, and a separating facility. Production is currently ongoing, and oil and gas company crews periodically perform maintenance and monitoring of the infrastructure. The Tatton Unit has recently

been seismically surveyed, which may spur future oil and gas production in this area. Development is ongoing and is expected to continue.

The activities of private mineral owners on refuges are subject to a variety of legal restrictions, including Service regulations. Service regulations require that oil and gas activities be performed in a way that minimizes the risk of damage to the land and wildlife and the disturbance to the operation of a refuge. Federal regulations require “...to the greatest extent practicable,” that “...all exploration, development and production operations” be conducted in such a manner as to “...prevent damage, erosion, pollution, or contamination to the lands, waters, facilities, and vegetation of the area.” Further, “...so far as practicable, such operations must also be conducted without interference with the operation of the refuge or disturbance to the wildlife thereon” (50 CFR Part 29.32).

Staffing, Budget, and Facilities

Base funding and staffing provide for approximately 27 full-time staff and several temporary employees, with the budget evenly divided between staff and operation and maintenance.

Administrative facilities are critical in maintaining Refuge functions. Port facilities include boat docks and ramps on the Aransas and Matagorda Island Units. Levees and impoundments on the Myrtle Foester Whitmire Unit help manage croplands. Fences for grazing occur on Myrtle Foester Whitmire Unit, and fences for boundary marking occur throughout the Refuge. A maintenance shop and equipment storage facilities are located on Matagorda Island. The Aransas Unit also has a maintenance shop and employee residences. Port O’Connor, on Matagorda Island, is a 6.9-acre area with a barge ramp and dock facilities. Throughout the Refuge, on all units, are windmills, dugouts, and road infrastructure. Old airstrips, built prior to Refuge designation, are decommissioned and not in use.

Refuge transportation infrastructure and related issues are coordinated with the respective State or county transportation agencies and metropolitan and rural road planning organizations to assure that, among other considerations, there are no negative impacts to traffic congestion or air quality on the Refuge. Bicycling also occurs but only as an incidental public use for transportation purposes on the auto tour loop on the Aransas Unit and on Matagorda Island. There are no special accommodations or infrastructure provided for this use.

Land Protection

Currently, there is no active land acquisition or land protection plan. The current acquisition and Refuge boundary are virtually synonymous. This has been the case since the acquisition of the Myrtle Foester Whitmire Unit and the lower one-third of Matagorda Island in 1993 and 1998, respectively. Lands that are currently being negotiated are a result of other opportunities that have been presented as viable options. This includes the potential addition of 729 acres (Alcoa tract) adjacent to the Myrtle Foester Whitmire Unit. The 245-acre Johnson tract, adjacent to the Lamar Unit, was donated to the Refuge in 2006. The Alcoa tract falls within the approved acquisition boundary for the Myrtle Foester Whitmire Unit, and the Johnson tract falls within the whooping crane’s designated critical habitat and will provide valuable marsh habitat to this end.

Any future acquisitions would be based on an approved land protection plan, as a step-down plan of the Comprehensive Conservation Plan. The emphasis will remain on protecting available acres of existing wetland or restorable wetland habitat and adjacent uplands in portions of Aransas, Calhoun, and Refugio Counties.

4. Environmental Consequences

This section analyzes and discusses the potential environmental effects or consequences that can be reasonably expected by the implementation of each of the three alternatives described in Section 2 of this EA. For each alternative, the expected outcomes are portrayed through the 15-year life of the Comprehensive Conservation Plan (Plan).

This section identifies, describes, and compares the physical, biological, and human environment of the three alternatives proposed in this draft Plan and EA. Current management (Alternative A, the No Action Alternative) provides the basis for comparing the effects of the action alternatives (Alternatives B and C). The direct, indirect, and cumulative effects of each alternative are analyzed in this chapter.

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 effects may result from singularly minor but collectively significant actions taking place over a period of time.

An analysis of the effects of management actions on the physical environment has been conducted for soils, water, and air quality.

Analysis of the effects of management actions on the biological environment has been conducted for vegetation, wildlife, threatened and endangered species, grazing, farming, and prescribed burning. Although all plant, animal, and fish species on the Refuge are important, many species are not expected to experience any change—or at most, a negligible one—as a result of implementing any of the alternatives. For that reason, not all Refuge species are discussed in this section.

An analysis of the effects of management actions on the human environment has been conducted for local populations and economy, recreational uses and facilities, scenery, oil and gas activities, natural and cultural prehistoric and historic resources, and land acquisition.

4.1 Definition of Terms

Impact Type

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

Adverse 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 Plan.

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 possibly longer.

Intensity of Impact

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.

Context or Scale of Impact

Under the local scale, beneficial or adverse impacts on a given resource occur only at a specific project site or its immediate surroundings and are relatively small in size (i.e., less than 15 acres).

For the moderate scale, beneficial or adverse impacts on a given resource occur beyond a specific project site but at a scale below that of the entire Refuge (i.e., 15–100 acres).

Under the widespread scale, beneficial or adverse impacts on a given resource extend beyond the moderate scale (i.e., greater than 100 acres).

4.2 Effects Common to All Alternatives

A few potential effects will be the same under each alternative and are summarized under the following categories: environmental justice, climate change, Refuge revenue sharing, and other management factors.

4.2.1 Climate Change

The U.S. Department of the Interior issued an order in January 2001 requiring Federal agencies under their direction that have land management responsibilities to consider potential climate change impacts as part of long-range planning endeavors.

The increase in carbon within the earth's atmosphere has been linked to the gradual rise in surface temperatures commonly referred to as global warming. In relation to comprehensive conservation planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact to be considered in planning. The U.S. Department of Energy's "*Carbon Sequestration Research and Development*" defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

The land is a tremendous force in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forest, wetlands, tundra, perpetual ice, and desert—are effective both in preventing carbon emissions and in acting as a biological "scrubber" of atmospheric carbon monoxide. The conclusions of the Department of Energy's report noted that ecosystem protection is important to carbon sequestration and may reduce or prevent the loss of carbon currently stored in the terrestrial biosphere.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this Plan and EA would conserve or restore land and water and would thus enhance carbon sequestration. This, in turn, contributes positively to efforts to mitigate human-induced global climate changes.

4.2.2 Refuge Revenue Sharing

Annual Refuge revenue-sharing payments to Aransas, Calhoun, and Refugio counties would continue at similar rates under each alternative. If lands are acquired and added to the Refuge, the payments would increase accordingly.

4.2.3 Other Management Factors

Management activities that could affect the Refuge natural resources, including utility lines and easements will be the same under each alternative. Thus, the impacts would be the same.

4.3 Analysis of Impacts by Resource

This following sections analyze the direct, indirect, and cumulative environmental and social impacts or consequences that can be reasonably expected by the implementation of each of the alternatives with respect to physical environment (air quality, water management and quality, and soils), biological environment (habitat, wildlife, prescribed burning, livestock grazing, farming, and mechanical treatment) and human environment (public use opportunities, hunting, fishing, socioeconomic resources, oil and gas activities, archaeological and paleontological resources, scenic resources, and land protection.

4.4 Impacts to Physical Resources

Air Quality

Alternative A: No Action

Implementation of Alternative A would produce some adverse air quality effects that would be short-term, negligible to minor in impact, and occur at the local scale, with the exception of oil and gas extraction activities which may cause longer-term effects, at least over the production's duration. Widespread scale impacts would occur during some prescribed burns, but the Burn Plan would ensure that the effects would be short-term and negligible to minor in impact.

Some Refuge habitat management and recreational activities (i.e., prescribed burning, equipment and vehicle operation, and aerial herbicide spraying) and oil and gas development and extraction activities may affect air quality; however, impacts are expected to be in line with EPA air quality emission standards.

For prescribed burning, the following precautions would be in place: 1) habitat management involving prescribed burning will occur only under ideal weather conditions, and smoke management practices will be implemented during all burning events; and 2) an approved prescribed Burn Plan, favorable weather conditions, and adequate firefighting resources all work together to prevent pervasive air pollution or from significantly affecting air quality.

Dust produced by equipment and vehicle operation associated with construction would be minimal. Performing work during times of low to no wind would abate blowing dust. Furthermore, the Refuge undertakes very few new construction efforts with the exception of the recently built Observation Tower located off of the Audio Tour Loop. Most construction occurs as maintenance to already existing facilities or infrastructure that is small scale and localized.

Aerial herbicides are occasionally sprayed on invasive plants. Spraying is handled through the hiring of a local crop duster that flies at low elevation and only during times of low to no wind. Spray drift from this activity is also very much localized.

All other proposed Refuge management activities and public uses are not expected to adversely affect air quality to a significant degree.

Alternative B: Proposed Action

The effects of Alternative B are expected to be the same as those under Alternative A.

Alternative C: Maximal Management and Use

Implementation of Alternative C would cause greater adverse effects on air quality than that of Alternative A. Due to intensified management, impacts would be medium to long term in duration, minor to moderate in impact, depending on the timing of management activities, and occur at the moderate to widespread scale.

Alternative C proposes a much more intense biological management program and more public use. Under this alternative, more burning, construction, and herbicide spraying would occur though not likely at the same time. These efforts, and the subsequent effects, would be staggered throughout the life of the Plan. All of the precautions and mitigations mentioned in Alternative A would apply here. Effects would likely be a little more severe, however, because more use of these management tools is inherent. Oil and gas development and extraction activities would remain the same as those mentioned under Alternative A; therefore, there would be no increase in effects due to this use under this alternative.

All other proposed Refuge management activities and public uses are not expected to adversely affect air quality to a significant degree.

Water Management and Quality

Alternative A: No Action

Implementation of this alternative would produce slight adverse effects to water resources because of occasional herbicide use, infrequent construction and maintenance of facilities, and oil and gas operations on the Refuge; the effects to water resources would be short-term, minor in impact, and occur at the local scale.

Herbicide is used on the Refuge to control and manage invasive plant species and would occur only under ideal weather conditions. Acceptable application practices and guidelines would be implemented during all prescription events and under an approved plan to minimize effects to water quality. On average, the Refuge annually treats approximately 60 acres with herbicide to control woody species. Overall, from 2005 through 2008, an average of 900 acres per year was treated to control invasive plants. Due to the considerations in place for treating invasives (see Air Quality section) and the low-level toxicity herbicides used, there is minimal affect to water quality.

Construction of facilities or maintenance of levees can cause some minimal erosion to facilitate movement of sediment into waterways. Erosion fences have been, and will continue to be, established on construction sites when erosion is a concern. If heavy sediment deposits occur in water, maintenance workers will use excavators to pull sediment and move it back into place.

Due to all of the mitigations on construction activities mentioned above, there is very little impact to water quality from dust and sediment deposition.

Oil and gas extraction activities could cause adverse impacts to water quality when accidental spills occur or when development sites are not properly rehabilitated. Clean up and restoration of these sites occur according to the *Oil Spill Contingency Plan for Aransas National Wildlife Refuge* (1993) and the *Spill Prevention, Control, and Countermeasures Plan* (2005), both of which proactively plan for any issues associated with these developments.

Alternative B: Proposed Action

The effects of Alternative B are expected to be the same as those under Alternative A.

Alternative C: Maximal Management and Use

Alternative C would have increased herbicide use and construction activities; therefore, more intensified adverse effects than Alternative A would occur. Oil and gas extraction activities would remain the same as those mentioned under Alternative A; therefore, there would be no increase in effects due to this use under this alternative. Effects would occur in the medium term, resulting in impacts that are minor to moderate in nature, and occur at the local to moderate scale.

Under Alternative C, increased herbicide treatments and more construction projects would take place, which would result in greater concentrations of herbicide and increased sediment erosion and deposition into water bodies. The same water quality mitigations as those used in Alternative A would be put in

place with this alternative. However, the intensified management in this alternative would cause greater effects.

Soils

Alternative A: No Action

Alternative A would result in adverse effects due to some soil disturbance. However, effects would be short-term in nature (with the exception of farming being a long-term disturbance), minor in impact, and occur at the moderate to widespread scale.

Soils on the Refuge may be impacted by a variety of management tools aimed at providing better habitat for migratory birds, threatened and endangered species, and other wildlife. These tools include farming and prescribed burning. Occasional facility or infrastructure construction or maintenance may also result in some erosion and sedimentation. Soil disturbance or quality impacts may occur due to oil and gas operations.

Soil disturbance from continual planting and harvesting on the Refuge croplands would continue; however, the organic farming and rotation practices minimize adverse soil impacts as far as nutrient loss and productivity is concerned. The ultimate goal of the farming use on the Refuge is to provide feed and cover for wildlife.

Prescribed fire results in temporary loss of ground cover and tree canopy; however, soils are not heavily impacted due to their porous nature and quick reestablishment by and rejuvenation of plants after fires.

Construction on the Refuge could affect soil resources. The recent building of the Refuge Observation Tower caused some localized soil disturbance and erosion. Construction of facilities or maintenance of levees can cause some minimal erosion to facilitate movement of sediment into waterways. Erosion fences have been, and will continue to be, established on construction sites when erosion is a concern.

Oil and gas extraction activities could cause adverse impacts to soil quality when accidental spills occur or when development sites are not properly rehabilitated. Clean up and restoration of these sites occur according to the *Oil Spill Contingency Plan for Aransas National Wildlife Refuge* (1993) and the *Spill Prevention, Control, and Countermeasures Plan* (2005), both of which proactively plan for any issues associated with these developments.

Alternative B: Proposed Action

The effects of Alternative B are expected to be the same as those under Alternative A.

Alternative C: Maximal Management and Use

Implementation of this alternative would cause adverse effects that are expected to be greater than those under Alternative A. Effects would be long-term, minor to moderate in impact, and occur at the moderate-widespread scale.

Because Alternative C calls for more intensive habitat management and public use, more farming, prescribed burning, and construction would take place. Oil and gas development and extraction activities would remain the same as those mentioned under Alternative A; therefore, there would be no increase in effects due to this use under this alternative. All of the mitigations to help protect soil resources mentioned above will be administered. However, impacts will be greater under this alternative.

4.5 *Impacts to Biological Resources*

Habitats

Alternative A: No Action

Overall, this alternative would result in some long-term adverse and beneficial effects that are expected to be minor to moderate in impact and occur at the widespread scale.

Alternative A would continue all vegetation management tools now in use, including activities such as prescribed burning, roller-chopping, and farming. These tools, in effect, help manage wildlife habitat by providing shelter, food, and protection by clearing and opening some areas and reducing vegetative density in others. However, the timing, frequency, and extent of implementation would be the result of pre-identified vegetative treatment goals rather than adaptive management based on monitoring. Quantity of acres treated would be emphasized over the quality of habitat. This alternative, therefore, would result in the lack of adequate control of invasive species and the promotion of certain undesirable native species such as live oak. Some habitat types, such as the Ridge and Swale Community, would be impacted more than others. Fauna associated with the more affected vegetative communities would also suffer minor adverse effects and would be forced to adapt to changing conditions or may move to other habitats more conducive to their needs.

Alternative B: Proposed Action

This alternative is expected to have beneficial long-term effects that are moderate to major in impact and occur at the widespread scale. This alternative is also expected to have some slight and temporary adverse effects due to disturbance through habitat management; however, it would result in greater beneficial effects over time and would be an increase in these benefits over Alternative A.

This alternative would incorporate the same vegetative treatment tools as those used in the No Action Alternative. However, treatments would occur based on the needs of wildlife to provide adequate cover, habitat, and food at the right times for the wildlife to nest and rear young. It would take a holistic approach to management rather than a unit-by-unit approach. This alternative would also take a proactive approach to working with information provided through biological surveys, inventories, and monitoring to determine changing conditions and vegetative and associated wildlife needs.

Alternative C: Maximal Management and Use

Overall, this alternative is expected to have both adverse and beneficial impacts (adverse in the distant future, beneficial in the immediate future) that are moderate to major in impact and occur at the widespread scale. This alternative is expected to have greater adverse effects and fewer beneficial effects than Alternative A.

Under this alternative, the same vegetative treatment tools as those used in the No Action Alternative would be continued. In addition, this alternative would allow for any other management tools needed to effectuate habitat goals. The treatments would occur simultaneously and would continue until the targets are met. This type of treatment can be beneficial but it is for an artificial maintenance of high wildlife populations. Therefore, over time, the more adaptable vegetative habitats and associated wildlife will remain and thrive, while other types not as resilient will begin to fail. The Refuge will then need to increase management intensively or change treatment types.

Wildlife

Alternative A: No Action

Due to the continued management but sometimes under- and/or over-utilized management tools this alternative provides for, wildlife would experience both adverse and beneficial impacts that are long-term in nature, minor to moderate in impact, and moderate to wide scale in size.

Under this alternative, current management practices on the Refuge would not change. This includes management for the benefit of migratory birds and whooping cranes as a primary focus. Status quo management on Aransas NWRC typically involves traditional waterfowl management (i.e., moist soil management, food plots, impoundment creation, and maintenance) and whooping crane recovery activities, all carried out under various scenarios, according to the direction set by the Refuge manager. See Chapter 3 Refuge Resources for more information on current habitat and wildlife management practices.

The Refuge currently manages the wildlife and habitats of Matagorda Island according to the MOA with the State of Texas. Prescribed fire on the Island would continue and would result in control of eastern baccharis. If it is not controlled, it would become overrun in a short time, contributing to a net loss of grassland and an undoing of the benefits of the current Prescribed Burn Program. Controlled baccharis is a beneficial habitat component, but left unchecked, it becomes overgrown and loses its habitat value. Birds using this habitat type need a mix of structure and composition that out-of-control baccharis cannot provide.

The Myrtle Foester Whitmire Unit is managed for waterfowl according to its establishing purpose that involves cooperative farming and secondary rice crop production. Typical management of migratory birds and habitat includes the use of croplands (food plots), impoundments, and grazing. Under this alternative, this unit could suffer from neglect due to it being a disjunct unit that lacks the management visitation that other units experience; other priorities and/or funding could supersede its management resulting in not fulfilling its purpose for waterfowl.

On the Aransas and Lamar Units, loss of woodland habitats could easily occur due to a variety of current management choices that are target based and include improper timing of use of mechanical tools, which in many cases exacerbates the running live oak or invasive Chinese tallow problem, eventually resulting in effects to migratory bird habitat and food sources.

The Tatton Unit, an existing remnant of true coastal prairie, is currently managed as a grassland, using fire as a primary tool; anything less would constitute poor stewardship, as it would become overgrown with baccharis and would affect migratory bird habitat and food sources.

Disturbance to wildlife at some level is an unavoidable consequence of any public use program, regardless of the activity involved. However, the current level of impact from recreation activities on the Refuge is considered minimal. Continued public uses in currently designated areas should not adversely affect migratory birds either.

Migratory Birds

Migratory birds, including the threatened and endangered species, whooping crane and piping plover, would continue to benefit from management under the No Action Alternative. Migratory birdlife using the Refuge is not expected to undergo any significant changes related to this alternative. Management tools such as farming and prescribed burning would continue to benefit migratory birds; however, the timing and order of these tools has not always been properly planned, which has resulted in some negative impacts. Certain vegetative species, if not managed appropriately, start to dominate and create problematic habitat components. All management tools used—including prescribed burning, farming, invasive species control, and grazing—are capable of producing beneficial impacts to wildlife so long as they are used at the right time, in the right places, and in the proper pairings.

Threatened and Endangered Species

The primary purpose of current management activities is to improve habitat condition for threatened and endangered species. The effects to threatened and endangered bird species, the whooping crane and the piping plover, will be essentially the same effects as those listed above under Migratory Birds.

Kemp's ridley sea turtles are managed for on Matagorda Island only. The Refuge initiates various types of management practices to help protect turtles. Feral hog control is done to help reduce the taking of eggs and rooting on the beach where baby turtles can get stuck in ruts. The Refuge also works with the

Texas Parks and Wildlife Department under the MOA for the Island to control public uses. Sea turtles are surveyed and monitored along the Matagorda Island beach with an All-Terrain Vehicle (ATV). This type of management could cause adverse impacts to turtles from the creation of wheel ruts that babies could get stuck in.

The aplomado falcon is benefited and maintained by the prescribed burning on the barrier flat of Matagorda Island. This would typically be considered marginal habitat, but the falcon has adapted to and utilizes this area.

Other Wildlife

Generally, implementation of the No Action Alternative would represent a continuation of current management activities and trends. Although management activities would not result in direct adverse impacts to fish and wildlife habitats, restoration and improvement of wildlife habitats and trends would not increase significantly, and in some cases, progress may slow towards improving the ecological integrity of the Refuge. The lack of publicly accepted goals and resource priorities stated in a Comprehensive Conservation Plan would make it more difficult for management to implement those priorities and obtain funding to make needed improvements.

Alternative B: Proposed Action

Altogether, this alternative would have major beneficial effects through the long-term, with negligible to minor adverse effects to other resources, and would occur at the widespread scale. This alternative would have fewer adverse effects and greater beneficial effects than Alternative A.

The primary advantage of this alternative is that it attempts to look at the Refuge as a whole within the context of the greater ecological area (Gulf Coast Prairies and Marshes Ecoregion) and thus embraces an ecosystem-based management concept. The land is divided into the natural diversity of habitats that occur on the landscape and desired manipulated habitats. This alternative endeavors to manage these lands according to their native habitat potentials and begins the process of breaking down the longstanding and foregoing notion of simply viewing the Refuge as individualistic management units.

Although Alternative B proposes a holistic management concept, Refuge unit purposes will still serve as central guidance in the appropriate management activities. Plans for the long-term protection and maintenance of these habitats (including live oak woodlands, peninsular prairie openings, shoreline savannahs, impoundments, wetlands and marshes, and grasslands) would benefit a greater variety of wildlife and listed species. Economically important species, such as blue crabs, shrimp, oysters, and fish, which depend on healthy coastal wetlands and estuaries for spawning, nursery, and rearing habitat, would also benefit in terms of improved water quality. Although the Refuge does not manage fisheries resources, strategies aimed at addressing contaminants and freshwater inflows will help to improve water quality on and near the Refuge.

The intent of this alternative is to undertake an integrative management approach. This entails expanding one's perspective from single species management or single unit management to the level of ecosystem management for the continuing and greater benefit of migratory birds and their habitats. This holistic concept is expected not only to increase numbers of all migratory birds on the Refuge, but will also provide the greatest benefits for all the wildlife groups. This landscape-level approach that encompasses the entire Refuge Complex and adjoining State and private lands (where possible), is vastly superior in providing the needed quantity and variety of habitats and fluctuating requirements of migratory birds. Protecting and maintaining this natural variety of habitats is greatly needed to ensure our wildlife legacy for future generations. Please refer to Chapter 5 of the Plan for more detailed descriptions of proposed actions.

Migratory Birds

This alternative, as previously mentioned, uses a holistic approach rather than a unit-by-unit management approach. It attempts to look to the efforts of neighbors and partners to see what others are doing for migratory bird management and what the combined effort will benefit. This alternative will consist of using the suite of management tools currently used as described in Alternative A. However, this alternative will also use the appropriate timing and techniques essential for particular habitat types to best benefit species utilizing those habitats, with priority to Federal trust species. Benefits will include the maintenance and/or increase of these species' populations by providing habitat components such as nesting cover, loafing cover, and protection.

Threatened and Endangered Species

Management concern and requirements under the Endangered Species Act will remain the same in this alternative as discussed in Alternative A. However, there will be more of an emphasis in this alternative on improving habitat quality with an ecosystem approach to management.

Under this alternative, traffic on the beach on Matagorda Island will be reduced. Kemp's ridley sea turtle nests will be left in place rather than relocated to other beaches.

Other Wildlife

Benefits to habitat of Federal trust species, also known as keystone species, will mean benefits to other wildlife. These keystone species react to management as umbrella species; if their habitats remain intact and in good condition, generally all other species in that habitat are benefited as well.

Alternative C: Maximal Management and Use

This alternative would result in both adverse and beneficial effects over the long-term, with moderate to major impacts, and would be widespread throughout the Refuge. This alternative would have larger adverse effects in the long-term and fewer beneficial effects than Alternative A.

This alternative emphasizes intensively managing existing croplands and controlled water impoundments to maximize benefits for migratory birds. Additional water impoundments and croplands would benefit a variety of waterfowl and shorebirds. However, this would shift habitat management efforts away from grassland and woodland habitats, which would result in a reduction of these habitats. In turn, a variety of resident wildlife species, including small mammals, songbirds, and several priority or focal species, may be impacted. Adverse effects also may include impacts due to development on and resultant reduction in the grasslands on the Tatton Unit, an example of remnant coastal prairie, which would be difficult to justify given the tremendous historical loss of this habitat type (less than one percent remains). Coastal marsh habitats would remain constant due to the impractical nature of trying to control coastal environments that are regulated by oceanic forces. Under this alternative, fish, reptile, and amphibian populations would generally benefit. Deer populations typically benefit from increased habitat management activity on the landscape. Public use activities and access into areas not previously permitted would have a variety of impacts to sensitive wildlife, which would likely include high levels of disturbance to wildlife feeding, breeding, and sheltering activities.

Migratory Birds

Migratory birds, particularly waterfowl and shorebirds and some game and edge species, would receive the highest benefit from this alternative. The number of ducks and geese using the Aransas NWRC during the winter would likely increase, while songbirds dependent on woodland habitats may decrease due to fragmented habitat. Edge and disturbance-related species would very likely increase, whereas species requiring interior or contiguous habitat would likely decrease. Increased public uses may increase the potential for disturbance of migratory birds or Federal trust species under this alternative.

Threatened and Endangered Species

As Alternative C would provide for greater habitat modification and manipulation, disturbance to some species is likely to occur. Altogether, there would likely be more wildlife, but this alternative would likely change the dynamics of migratory birds and affect overall species diversity, as the Refuge would target a broad assortment of species, in addition to threatened and endangered species.

Other Wildlife

Intense species diversity management would be beneficial to populations of other species on the Refuge such as wildlife that can easily live in edge habitat, including deer, javelina, mountain lion, and others.

Land Management

Prescribed Burning

Alternative A: No Action

Alternative A provides both adverse and beneficial effects that are moderate to long-term in duration, moderate to major in impact, and mostly occur at the widespread scale.

Currently, prescribed burning is used mostly in a rotational system where plots are rotated according to treatment schedules. Vegetation and wildlife habitat benefit through the maintenance of habitats that keep them from becoming overgrown. Adverse effects of prescribed burning can include the occasional wildfire that can get out of control and burn more than desired. Vegetative recovery can be hindered when prescribed burning is added to adverse climatic conditions such as drought.

Alternative B: Proposed Action

Alternative B provides both adverse and beneficial effects that are moderate to long-term, moderate to major in impact, and mostly occur at the widespread scale. This alternative would have about the same amount of adverse effect as Alternative A. It would also result in more beneficial effects than Alternative A due to the increased use of monitoring and adaptive management presented in this alternative.

Under Alternative B, prescribed burning acreage would likely remain the same but units would be evaluated, and subsequently treated, through monitoring and adaptive management. The same adverse effects as Alternative A would apply here but beneficial effects would be based on what is needed rather than what is on schedule.

Alternative C: Maximal Management and Use

Under Alternative C, both adverse and beneficial effects that are moderate to long-term, moderate to major in impact, and mostly occur at the widespread scale are expected. This alternative would have about the same amount of adverse effect as Alternative A. It would also result in more beneficial effects than Alternative A.

Alternative C proposes the increased use of all management tools. Prescribed burning would stay at the same level as Alternative A, but would also include use for a different purpose, such as cleaning up brush after a bulldozer has knocked down vegetation. This alternative would have the same adverse impacts of Alternative A, along with the benefits of knocking back vegetation and clearing for wildlife. Slash and pile burns would increase under this alternative.

Livestock Grazing

Alternative A: No Action

This alternative would result in both adverse and beneficial effects that occur over the long-term, are moderate in impact, and occur over the moderate scale on the Refuge.

Currently, livestock grazing only occurs on the Myrtle Foester Whitmire Unit, at approximately 35 head of cattle. Benefits to wildlife species here include reduction in the height and density of vegetation, which provides for better nesting habitat for mottled ducks. The cattle also help to trample vegetation in the impoundments before flooding. Timing and duration of grazing are sometimes exceeded, which leads to impacts to vegetation in terms of recovery of plants and introduction of invasive plants, resulting in subsequent impacts to wildlife.

Alternative B: Proposed Action

This alternative would result in both adverse and beneficial effects that occur over the long-term, are moderate in impact, and occur over the moderate scale on the Refuge. This alternative would have less adverse effects than Alternative A because grazing would be managed more closely. For this reason, beneficial effects would be more than Alternative A.

Alternative B would essentially be the same as Alternative A. However, the timing and duration of grazing would be more tightly managed and more closely monitored to avoid overgrazing and its associated impacts.

Alternative C: Maximal Management and Use

Overall, this alternative would result in both adverse and beneficial effects that occur over the long-term, are moderate to major in impact, and occur over the moderate scale to widespread scale on the Refuge. This alternative would have greater adverse effects and less beneficial effects than Alternative A over the long-term.

Alternative C proposes the increased use of all management tools, including livestock grazing. Livestock grazing acreages and intensity would increase. While this increase would be linked to the drive for increased and, ideally, better habitat management, increasing the livestock grazing program would likely result in adverse effects due to overgrazing and conversion of important wildlife habitat into rangelands.

Farming

Alternative A: No Action

Alternative A would result in adverse and beneficial effects that would occur over the long-term, would be moderate in impact, and occur over the widespread scale. This alternative would have slightly adverse effects due to the land disturbance farming creates and soil erosion, especially during times of high winds. Beneficial effects to wildlife would occur due to the food supply farming creates for wildlife.

Currently, farming only occurs on the Myrtle Foester Whitmire Unit. The Myrtle Foester Whitmire Unit was acquired as a cropland intermixed with native rangelands. Approximately 154 acres are used for cropland. These croplands benefit wildlife by providing a food source and some cover value. Farming is carried out in an organic means, and impoundments are rotated.

Alternative B: Proposed Action

The effects of Alternative B are expected to be the same as those under Alternative A.

Alternative C: Maximal Management and Use

Alternative C would result in adverse and beneficial effects that would occur over the long-term, are moderate to major in impact, and occur over the widespread scale. Alternative C proposes the increased use of all management tools; therefore, it would create more adverse effects than Alternative A due to the increased land disturbance, and more beneficial effects due to the increase in food supply for wildlife. Farming would likely increase to other units, and the effects would include conversion of habitat to provide for a food source. This expansion of farming would benefit Federal trust species with a larger food source, but it would also result in the loss of a natural habitat. Most lands surrounding the

Refuge are developed or converted to land uses rather than kept in their natural state. Soil types outside of Myrtle Foester Whitmire and Tatton Units are mostly sandy and likely not conducive to farming; therefore, this undertaking might necessitate more work that might not provide much benefit.

Mechanical Treatments

Alternative A: No Action

Alternative A would result in adverse and beneficial effects that would occur over the long-term, would be moderate in impact, and occur over the widespread scale. The Refuge would continue to use heavy equipment to perform roller-chopping, mowing, and disking to create fuel breaks, manage invasive plants, and open areas for wildlife viewing. Adverse effects would typically be immediate and temporary in nature, followed by the benefits of reducing vegetative height or density and opening areas for wildlife or viewing opportunities.

Alternative B: Proposed Action

The effects of Alternative B are expected to be the same as those under Alternative A; however, under this alternative, the Refuge would consider vegetative conditions and trends and react with the best professional judgment and available science.

Alternative C: Maximal Management and Use

Alternative C would result in adverse and beneficial effects that would occur over the long-term, would be moderate to major in impact, and occur over the widespread scale. The Refuge would use heavy equipment in a much more frequent and intense way than under Alternative A. Roller-chopping, mowing, and disking would be used to create fuel breaks, manage invasive plants, and open areas for wildlife viewing. Adverse effects would be immediate, and—due to the increased level of disturbance proposed in this alternative—much more severe than Alternative A. Upon recovery, there would be benefits from reducing vegetative height or density and opening areas for wildlife or viewing opportunities.

4.6 Impacts on the Human Environment

Public Use Opportunities

Alternative A: No Action

This alternative would result in both adverse and beneficial effects that, over time, would mean larger adverse effects. Impacts would be at the long-term time scale, moderate in intensity, and occur at the local to widespread scale.

No new trails or major visitor facilities would be built under this alternative. Public facilities would remain essentially the same except for maintenance or necessary improvements. New directional or interpretive signs would not be installed, and—except for addressing safety hazards—facilities would not be upgraded. Recreational opportunities would continue to be limited to traditional programs covered under existing approved plans such as hunting and fishing plans. Although the Refuge staff will continue to improve their outreach program within current budget limitations, improvements to the Visitor Services Program would most likely occur opportunistically. Under this alternative, Refuge visitation would likely stay about the same or decrease annually based on existing trends and levels of access. The Service would rely primarily on efforts by local and State agencies, organizations, universities, and volunteers to accomplish some of its resource protection and monitoring needs.

If the Refuge continues to manage visitor services as it is now, opportunities will remain the same and even potentially deteriorate. Accommodating fewer people on the Refuge will ultimately benefit wildlife, as there will be less opportunity for disturbance. However, fewer people visiting the Refuge may mean less understanding of the management the Refuge is undertaking and for what reasons, which could result in less support, less funding, and more apathy toward protecting the Refuge.

Alternative B: Proposed Action

Alternative B would result in beneficial impacts that would be at the long-term time scale, moderate in intensity, and occur at the local to widespread scale. This alternative would provide greater beneficial effects than Alternative A. This alternative promotes positive benefits with respect to priority public uses and existing uses. It incorporates elements that call for optimizing the Refuge experience by improving recreational and environmental educational opportunities. This includes the continuation of existing uses but provides a more balanced approach against the needs of wildlife and Refuge purposes. The Refuge staff would significantly improve the Outreach Program, particularly with the surrounding communities of Rockport, Port Lavaca, and Port O'Connor. Therefore, this alternative would favorably improve the Service's outreach and increase public awareness of the Service and the Refuge System missions.

Alternative C: Maximal Management and Use

This alternative would result in both adverse and beneficial effects that, over time, would mean larger adverse effects due to the expected increase in visitors. Impacts would be at the long-term time scale, moderate to major in intensity, and occur at the widespread scale. It would have greater beneficial effects than Alternative A in the near-term; however, over time the increased public use would begin to disturb habitats and wildlife.

A constructed trail system throughout the Aransas NWRC, year-round auto tour routes, and Visitor Center improvements are proposed under this alternative. The Refuge staff would significantly improve the Outreach Program. The existing auto loop would be opened year round and additional routes would be examined. New comfort facilities at the Refuge, including a restroom, outdoor tables, benches, and access to potable water, would be built. On the Lamar and Myrtle Foester Whitmire Units, potential opportunities include adding viewing platforms with telescopes, which would involve adding public access roads (approximately one-half mile and two-miles, respectively) with parking areas. The number of visitors to the Refuge may increase significantly over current levels under this alternative. Increased visitation at current non-peak times of year will require more staff time and maintenance work. However, increasing priority public uses would augment awareness of the Refuge and likely increase support for the Refuge System. Environmental education programs would be able to expand to more schools with the increased facilities and staff. Overall, this alternative would improve the Service's outreach and increase public awareness of the Service and the Refuge System missions.

Hunting***Alternative A: No Action***

Alternative A would result in both adverse and beneficial effects that would be at the long-term time scale, minor to moderate in intensity, and occur at the widespread scale.

Deer hunting occurs on the Aransas and Matagorda Island Units. Under this alternative, the Refuge would continue to work with Texas Parks and Wildlife Department to issue licenses. The Refuge would continue to issue permits based on information provided through monitoring.

Hunting on the Refuge results in both beneficial and adverse effects. With limited public lands in the State of Texas, the Refuge provides a hunting experience whereby hunters do not have to approach private landowners for those opportunities. Hunting is administered at a level that does make an impact in helping to manage herds, although not significantly. Adverse effects include a temporary disturbance to wildlife and habitat, increased maintenance to infrastructure, and heightened law enforcement needs. However, hunting is day-use only.

Alternative B: Proposed Action

This alternative would result in both adverse and beneficial effects that would occur at the long-term time scale, minor to moderate in intensity, and occur at the widespread scale. This alternative would have similar effects to those in Alternative A. Under this alternative, the Refuge would implement a streamlined process for managing hunts. If issues do develop, the program will change accordingly to

adopt an adaptive management approach to improve such aspects as efficiency of check-in, the permitting process, or management of herds. This alternative would also institute a youth hunt and slightly expanded hunting opportunities on the Tatton Unit.

Alternative C: Maximal Management and Use

Alternative C would result in both adverse and beneficial effects that, over time, would mean mostly adverse effects due to a large increase in visitors. Impacts would be at the long-term time scale, moderate to major in intensity, and occur at the widespread scale. This alternative would have more adverse effects than Alternative A, due to the increase in visitors that would result in a heightened disturbance to habitat and wildlife. However, this alternative would result in the greatest beneficial effect of all alternatives due to the increased opportunities it provides. In the long-term though, this alternative could reduce the population and vigor of deer on the Refuge.

This alternative would maximize all hunting opportunities. It would increase permits issued and number of hunts. It would result in beneficial effects that include an increased likelihood that hunters are attracted to the area. On the other hand, adverse effects would occur with the increased number of people and associated management that visitation would entail, the increased maintenance of infrastructure such as roads, and law enforcement.

Fishing

Alternative A: No Action

This alternative would result in both adverse and beneficial effects. Impacts would be at the long-term time scale, moderate to major in intensity, and occur at the widespread scale.

Fishing is allowed on the Refuge as one of the six priority wildlife-dependent public uses. The Refuge provides a place for people to go for this activity and infrastructure for pursuing it. Fishing is allowed from the fishing pier and wade-fishing access points on the Refuge proper. Beneficial effects include the allowance of and access for fishing activities. Adverse effects include maintenance of fishing-related infrastructure and the cleanup of trash and fishing line that occasionally litters areas where fishing occurs.

Alternative B: Proposed Action

Alternative B would result in both adverse and beneficial effects that would be at the long-term time scale, moderate to major in impact, and occur at the widespread scale. This alternative would have similar effects to those in Alternative A. Under this alternative, the Refuge would implement a streamlined process for managing fishing. If issues do develop, the program will change accordingly to adopt an adaptive management approach to make this activity easier for everyone to enjoy, without compromising the resource, by such efforts as increasing the understanding of rules and regulations surrounding fishing.

Alternative C: Maximal Management and Use

This alternative would result in both beneficial and adverse effects that, over time, would mean mostly adverse effects due to a large increase in visitors. Impacts would be at the long-term time scale, moderate to major in intensity, and occur at the widespread scale. This alternative would have more adverse effects than Alternative A due to the increase in visitors it would allow that would result in a heightened maintenance response needed. However, this alternative would result in the greatest beneficial effect of all alternatives due to the increased opportunities it provides.

This alternative would have similar effects as those under Alternative A. However, the Refuge would open up other areas or otherwise expand fishing opportunities, which would be a beneficial effect to public use. More public use would also mean increased adverse effects by the disturbance to wildlife and the maintenance, trash removal, and law enforcement required by Refuge management.

Socioeconomic Resources

The Refuge is an integral part of the attraction of the area that includes Aransas, Calhoun, and Refugio counties. It makes an impact to the local economy by providing jobs, customers for local businesses, and tax revenue for local governments. Refuge fund allocations have gradually risen over the years from \$1.3 million in fiscal year 2000 to about \$3.2 million in fiscal year 2007 (*Comprehensive Conservation Plan Table 6*). Nearly all of this money is spent in the local community for goods, services, and through staff salaries. The Aransas and Matagorda Island Units provide various public use activities such as hunting, fishing, bicycling, camping, birding, swimming, picnicking, wildlife observation and photography, and environmental education and interpretation. Between 75,000 and 100,000 tourists visit the Rockport area each year, and many go to the Aransas NWRC to view rare birds such as endangered whooping cranes (*Comprehensive Conservation Plan Table 7*). This provides an approximately \$5 million dollar boost to the local economy of the Rockport-Fulton area (State of Texas Tourism Tip Sheet, March 2004). The median household income for the three county areas is \$32,179, which is \$9,815 less than the national average of \$41,994 (U.S. Census Bureau, 2000 Census).

Alternative A: No Action

Implementation of Alternative A, while likely impossible to quantify, would be overall beneficial, would occur over the long-term, with minor to moderate impact on the surrounding economy, and occur at the widespread scale. No significant change in the local economy or tourist visitation over current levels would be expected because of implementing the No Action Alternative.

The presence and operation of the Refuge provides economic benefits to the surrounding communities within a 30-mile radius in several ways. The Refuge attracts local, national, and some international visitors, and by attracting these visitors to the area, the Refuge generates revenue for the local economy. Much of the Refuge annual budget is recycled into local businesses through Refuge staff, purchases of equipment and supplies, as well as contracts for local labor to accomplish Refuge projects. The Refuge provides full-time employment for 27 individuals that live in nearby communities, and the Youth Conservation Corps program provides work and income for a limited number of youths in the area. In addition, the Refuge staff makes available educational opportunities for local schools and universities.

Alternative B: Proposed Action

Alternative B, while likely impossible to quantify, is expected to be overall beneficial, would occur over the long-term, with minor to moderate impact on the surrounding economy, and would occur at the widespread scale.

In the short term, this alternative is very likely to maintain the current favorable socioeconomic setting of the Refuge in the local community. However, over the term of the Plan, publicly accepted improvements in the Refuge experience that include expanded outreach, educational opportunities, and the increasing value of preserved lands for both people and wildlife, along with improving the quality of the Refuge habitats, would provide positive socioeconomic benefits for many years to come.

Alternative B would have a positive impact on the local economy through expansion of programs, staff, and budget, and a resultant increase in Refuge visitation. Under Alternative B, short- and long-term benefits to employment would occur. Short-term benefits include local employment of contractors to construct improvements to structures and facilities associated with the development of the Plan. Long-term employment benefits would occur through the hiring of additional staff.

Alternative C: Maximal Management and Use

This alternative, while likely impossible to quantify, would be overall beneficial, would occur over the long-term, would have moderate impact on the surrounding economy, and would occur at the widespread scale. Alternative C would have no adverse effects; similar to Alternative A. Alternative C would have greater beneficial effects than Alternative A.

Under this alternative, there may be a larger increase in spending in the local economy compared with Alternative A. Not only may visitation be increased, but also this has the potential to increase the length of stay of visitors. More visitors may visit during times of year that currently see lower use. The need for increased staff to maintain and operate these new facilities would increase the employee salary base available to local vendors. Local employment and income from new construction contracts would likely occur. The expanded Visitor Services Program would result in the generation of new hunting and fishing license sales and sporting goods purchases. This alternative would result in overall positive socioeconomic benefits.

Oil and Gas Activities

Alternative A: No Action

Under Alternative A, the effects to the Refuge would be adverse and beneficial. Effects would occur over the long-term, with moderate impact, and occur at the moderate scale. The Refuge does not manage the subsurface rights and cannot restrict access; however, the Refuge works with lessees to ensure sites are reclaimed after operations have ceased.

Future oil and gas exploration, extraction, and transport operations would be managed to comply with all laws and regulations and would be managed identically under each of the alternatives. The reclamation and rehabilitation efforts would also be the same. Once it has been determined that oil and gas activities will take place in a certain location, roads are built to construct the required facilities, construction and maintenance occur throughout the lifetime of the operation, and once complete, the company holding the special use permit is responsible for the reclamation and rehabilitation efforts stipulated by the Refuge. There is some ground disturbance when testing, drilling, and construction occurs. However, once the operation is in place, the effects are stagnant until the site is regrown.

Conducting oil and gas exploration and development activities on Aransas NWRC would have beneficial impacts on the local economy due to the number of jobs filled, skilled workers employed, and local businesses benefiting from these activities. Impacts at the local scale would be a result of financial assets generated by local employees and businesses that are ultimately circulated throughout the local economy.

Alternative B: Proposed Action

The effects of Alternative B are expected to be the same as those under Alternative A.

Alternative C: Maximal Management and Use

Alternative C would result in adverse effects, though the Refuge does not manage the subsurface rights and cannot restrict access; and beneficial effects, because of the increased visitor access the associated roads would provide. These impacts would occur over the long-term, with moderate to major effects, and occur at the moderate scale. Alternative C would have similar adverse effects as those in Alternative A, but would also have indirect adverse and beneficial effects as a result of the utilization of roads constructed for oil and gas development access.

Because of the greater need for more infrastructure under this alternative, the Refuge would likely utilize roads created by oil and gas activities. The oil and gas development site-specific area would be reclaimed but the road accessing it would not. These new roads would be a benefit for users, as people looking for a more in-depth and isolated experience could use the roads to access these areas. The Refuge could also work to add visitor amenities off these roads as well. These roads, however, would be detrimental to wildlife in that roads cause habitat fragmentation and disturbance to movement and vegetation health.

Archaeological and Paleontological Resources

Prior to any Refuge undertaking, appropriate surveys will be made to identify any archaeological resources that may be within the area of potential effects. The 1990 Comprehensive Management Plan

(CMP) recommends preserving cultural and historical sites (as well as paleontological remains “in place.”) Therefore, regardless of the alternative chosen, archaeological resource inventories on the Refuge will be undertaken, if required, to identify any new archeological sites. All known resources will be preserved in place.

Alternative A: No Action

This alternative would result in potential adverse impacts that would occur over the long-term, with minor to moderate effects, and occur at the widespread scale. Alternative A would result in effects due to the level of land management (i.e., disturbance) it proposes.

This alternative affords additional land protection and low levels of development, thereby producing little negative effect on archaeological and paleontological resources. Potentially negative effects could include construction of new facilities and associated utilities. In most cases, these management actions would require review by the Service’s Regional Archaeologist in construction with the State of Texas Historical Preservation Office, as mandated by Section 106 of the National Historic Preservation Act. Therefore, the determination of whether a particular action within an alternative has the potential to affect cultural resources is an ongoing process that would occur during the planning stages of every project.

Service acquisition of land with known or potential archaeological or historical sites provides two major types of protection for these resources: protection from damage by Federal activity and protection from vandalism or theft. The National Historic Preservation Act requires that any actions by a Federal agency that may affect archaeological or historical resources be reviewed by the State Historic Preservation Office and that the identified effects must be avoided or mitigated. The Service’s policy is to preserve these archaeological or historical resources in the public trust and avoid any adverse effects whenever possible.

Alternative B: Proposed Action

The effects of Alternative B are expected to be the same as those under Alternative A.

Alternative C: Maximal Management and Use

Alternative C would have the potential for adverse impacts that would occur over the long-term, with moderate to major effects, and occur at the widespread scale. This alternative would have similar effects to those of Alternative A. However, this alternative would have greater potential for adverse effects or damage to resources due to the increase in ground-disturbing activity.

Scenic Resources

Alternative A: No Action

This alternative would result in mostly beneficial effects on scenic resources that would occur into the long-term, with impacts being minor to moderate, and occurring on the widespread scale.

Under this alternative, no new facilities or infrastructure for public uses are planned during the planning horizon. Some already existing infrastructure, both for administrative use and for public use and access, could be considered an impairment to views; however, some of the same infrastructure facilitates the enjoyment of scenery through the interpretation of what landscapes, wildlife, and history the view holds, or through increased viewing distance such as from the pier or the Observation Tower. Since there are only a few of these types of structures and they occur in the public use areas only, the No Action Alternative is not expected to impact scenery resources on the Refuge to a significant degree.

Alternative B: Proposed Action

Alternative B would result in beneficial effects that would occur into the long-term, with impacts being moderate, and occurring on the widespread scale. The effects of Alternatives A and B would be similar, but Alternative B would provide more opportunities for enjoying scenic views.

Under this alternative, some views would be altered by the construction of visitor services facilities, such as interpretive panels, trails, or parking areas. These facilities would be designed and located for minimal visual intrusion and attractive appearance to the extent possible. Habitat improvement, in general, would gradually, but favorably, alter views through desirable changes in vegetational cover or assemblages.

Alternative C: Maximal Management and Use

This alternative's impact on scenic resources would be beneficial to adverse (due to the increased habitat management occurring under this alternative), would occur into the long-term, with impacts being moderate to major, and occur on the widespread scale. Alternative C would provide more opportunities for enjoying scenery than Alternative A would; however, Alternative C would likely see adverse impacts over time associated with the increased public use.

Under this alternative, some views would be altered by the expansion of priority public uses, such as the construction of new trails, roads, and parking areas. Increased developments would have some negative impact on scenery and over time, may alter or reduce quality habitats and views through changes in vegetational cover or assemblages.

Land Protection

Funding for land acquisition from willing sellers within the approved acquisition boundary of the Aransas NWRC would come from the Land and Water Fund, the Migratory Bird Conservation Fund, or donations from conservation and private organizations. Conservation easements and leases can be used to obtain the minimum interests necessary to satisfy Refuge objectives if the staff can adequately manage uses of the area for the benefit of wildlife. The Service can negotiate management agreements with local, State, and Federal agencies, and accept conservation easements. Some tracts within the acquisition boundaries may be owned by other public or private conservation organizations. The Service would work with interested organizations to identify additional areas needing protection and provide technical assistance as needed. The acquisition of private lands is entirely contingent on the landowners and their willingness to participate.

Alternative A: No Action

This alternative would result in adverse effects that occur over the long-term, are minor to moderate in impact, and occur at the widespread scale. Under this alternative, the Refuge would not engage in active land acquisition. The Refuge would continue to expand when opportunities are presented but would not take an active role in planning for strategic acquisitions.

Alternative B: Proposed Action

This alternative would result in beneficial effects that occur over the long-term, are moderate to major in impact, and occur at the widespread scale. Alternative B would anticipate expansion and acquisition opportunities and needs for Refuge management focus where Alternative A would not with the benefit of a strategic glance at habitat needs and forethought into climate change and coastal development as future conditions.

Alternative C: Maximal Management and Use

This alternative would result in adverse effects that occur over the long-term, are minor to moderate in impact, and occur at the widespread scale. Alternative C would have similar effects to those in Alternative A. This alternative would focus on the lands the Refuge currently has rather than focus on

an active land acquisition strategy. The Refuge would continue to expand when opportunities are presented, though.

Table 3. Summary of Alternatives Effects on Refuge Resources

Summary of Effects by Alternative	Alternative A (No-Action)	Alternative B (Proposed Action)	Alternative C (Maximal Uses)
Air Quality	Minor adverse effects due to prescribed burning, aerial herbicide spraying, construction or heavy equipment use, and oil and gas development and extraction activities.	Same as Alternative A.	Moderate adverse effects due to increases in prescribed burning, aerial herbicide spraying, construction or heavy equipment use, and oil and gas development and extraction activities.
Water Management and Quality	Minor adverse effects from herbicide use, construction or heavy equipment use, and oil and gas development and extraction activities.	Same as Alternative A.	Moderate adverse effects due to increased herbicide use, construction or heavy equipment use, and oil and gas development and extraction activities.
Soils	Minor adverse effects from prescribed burning, farming, construction or heavy equipment use, and oil and gas development and extraction activities.	Same as Alternative A.	Moderate adverse effects from increased farming, prescribed fire, construction or heavy equipment use, and oil and gas development and extraction activities.
Habitat	Moderate adverse and beneficial effects from prescribed burning, livestock grazing, farming, and mechanical treatments.	Major benefits for wildlife and habitat on an ecosystem level. Same management tools as in Alternative A used. Slight and temporary adverse effects during habitat management.	Major adverse and fewer beneficial effects. Same management tools as in Alternative A used. Constant habitat manipulation could slow progress on improvements.
Wildlife	Moderate adverse and beneficial effects from prescribed burning, livestock grazing, farming, and mechanical treatments; could slow progress on threatened and endangered species protection and recovery.	Minor adverse effects and major beneficial effects. Same management tools as in Alternative A used. Emphasizes threatened and endangered species protection, recovery, and additional land protection.	Major adverse and fewer beneficial impacts. Same management tools as in Alternative A used. Constant habitat manipulation could affect wildlife species.

Summary of Effects by Alternative	Alternative A (No-Action)	Alternative B (Proposed Action)	Alternative C (Maximal Uses)
Public Use	Moderate adverse and beneficial effects. No new public use programs, facilities, or amenities would be created.	Moderate adverse and beneficial effects. Would improve recreational and educational opportunities in balance with wildlife needs.	Major adverse and beneficial effects. Adverse effects would occur with more disturbances to wildlife. Beneficial effects would occur for people due to maximizing public use opportunities.
Archaeological and Paleontological Resources	Moderate adverse effects associated with construction or heavy equipment use.	Same as Alternative A.	Major adverse effects due to increased acreages and intensities associated with construction or heavy equipment use.
Socioeconomic Resources	Moderate beneficial effects. Expected to provide positive benefits to local communities.	Same as Alternative A.	Same as Alternative A; however, Alternative C would have greater beneficial effects due to increased visitation.
Scenery	Moderate beneficial effects as already existing infrastructure allows for scenic views.	Moderate beneficial effects. Already existing infrastructure would be improved upon and new amenities built.	Major adverse and beneficial effects. Adverse effects would include impaired views due to constant habitat manipulation and construction activities. Beneficial effects would occur due to a building of new amenities or facilities aimed at improving scenery.

5. Cumulative Impacts

This section discusses the cumulative effects for all alternatives. In addition, it provides information regarding consultation and coordination that has occurred with other Federal and State agencies, interested stakeholders, and the public.

Cumulative impacts include those impacts on the environment that result from incremental effects of the alternatives when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant, actions taking place over a period of time. Implementing Alternative B would reduce the potential for cumulative impacts because of the integrated approach to managing programs. Overall, under all action alternatives, management actions would be better coordinated in the Refuge management arena for scientific soundness and will be closely monitored. Ecological and biological integrity would be at the forefront of management actions. This would be a change from the issue-by-issue, problem-solving, and reactionary approach inherent in the No Action Alternative (Alternative A).

Site-specific activities associated with new construction or enhancement of visitor facilities, habitat restoration, or species-specific management actions would be evaluated for National Environmental

Policy Act (NEPA) compliance under any alternative. At that time, any required mitigation activities would be designed into the specific project to reduce the level of unavoidable environmental impacts.

Nothing in Alternative B would contribute to significant cumulative environmental impacts. Alternative C may contribute to some cumulative impacts, such as through the building of new facilities or other developments.

5.1 Cumulative Impacts on Physical Resources

Air Quality

Surrounding city growth, the aerial spraying of croplands and invasive plants, and burning can contribute adversely to air quality. Currently, smog or other air quality issues are not a large concern, as the Refuge is about 40 miles from Victoria and 80 from Corpus Christi, Texas, as the crow flies. However, air quality could be affected when the wind blows toward the Refuge. A proposed power plant is being considered outside of Victoria and, if built, may cause impacts to air quality. Other facilities, such as the Chapparral and Exxon petrochemical facilities, exist immediately outside of the Refuge and may also cause adverse air quality impacts. Spraying of croplands for pests and weeds has occurred and continues to occur regularly but not on Refuge lands, as the Refuge administers an organic farming program. The Refuge does treat invasive plants through aerial spraying, which can result in an immediate and temporary air quality impact. The Refuge implements this spraying in times of low to no wind, and crop dusters fly as close to the target invasive species as possible. Burning also has occurred and continues to occur on both Refuge and adjacent lands but typically only in low or no wind. Countywide burn bans are implemented occasionally but largely occur only when there is a concern over control of fires—more so than concerns over ozone conditions. The greatest air quality concern comes from the petrochemical industry, regulated by Texas Commission on Environmental Quality (TCEQ), which sets standards, along with the Environmental Protection Agency (EPA).

Projects on the Refuge that result in effects to air quality would be about the same over time, with minimal differences based on conditions (i.e., prescribed burning regimen, etc.). Alternatives A and B would essentially have the same effects to air quality, as they propose a similar levels of burning, aerial spraying of invasive plants, and oil and gas development and extraction. Alternative C would have slightly greater impacts to air quality, as it proposes more burning and aerial herbicide spraying. Outside the Refuge, air quality impacts would remain about the same for the foreseeable future, pending extreme population growth and subsequent heightened impacts to air quality from smog or increases in facilities associated with the petrochemical industry.

Water Management and Quality

Some past, present, and reasonably foreseeable future Refuge activities (i.e., construction, herbicide spraying, flooding of croplands, and oil and gas development and extraction) may affect water quality. The Refuge creates and maintains dugouts or windmills to collect water or bring it to surface for wildlife drinkers. The Refuge also treats water hyacinth, the only aquatic invasive plant on the Refuge, in the lake on the Myrtle Foester Whitmire Unit. Water is also affected by local landowner use of fertilizer and herbicide and by development that is increasing along the coast; however, the amount contributed by the Refuge under Alternatives A and B is negligible and temporary. Alternative C would allow for a greater amount of construction, and potentially more herbicide spraying and flooding of croplands and therefore a little more impact; however, it would still be minor and temporary.

Off-Refuge, these same activities take place by private landowners. There is also use of wells outside of the Refuge, and use is likely increasing. Water table drawdown is a problem that will likely only increase into the future. It is unclear how this might affect surrounding water resources. The Refuge also maintains levees and culverts to maintain flow of sea in and out with the tide. But other larger-scale activities likely have the most significant impacts, on and off the Refuge, both now and into the foreseeable future. Freshwater inflows come into the bays surrounding the Refuge. These freshwater inflows, a major habitat component for some sealife (such as the blue crab), are controlled by river authorities upstream from the

Refuge. The Refuge also experiences water contaminants and occasional oil spills that effect Matagorda Island, but Refuge staff is prepared for them and have containment booms stored. Facilities, such as the Chapparral and Exxon petrochemical facilities exist immediately outside of the Refuge and may also cause water quality impacts.

State of Texas GLO manages waters and marshes surrounding the Refuge. Cedar Bayou on the Matagorda Island Unit has been dredged on occasion within the past 10 years, depending on environmental need. The dredging helps maintain the natural inflow and outflow of marine tides, which helps maintain the healthy bay ecosystem. If this area is not dredged from time to time, the exchange between gulf waters and bay waters that some species depend on is not allowed. Marine invertebrates are then affected, which in turn affects migratory birds.

There are some educational campaigns put on by other agencies or entities such as Texas CEQ to make people aware of their personal use and treatment of rivers and other water resources.

Soils

Past, present, and foreseeable future area impacts to soils include ground disturbance, which can result in erosion, sedimentation, and nutrient loss. Impacts are caused by land use activities such as construction, dugouts for wildlife drinkers, farming, livestock grazing, and oil and gas development both on and off the Refuge. The amount of ground being disturbed could increase into the future on lands surrounding the Refuge as population and associated development grow. Effects from other ground disturbance activities off the Refuge are likely to remain at roughly the same level as they are currently. Erosion on the Refuge occurs mostly when roads are built or when land is cleared of its vegetation. Farming is implemented under organic practices, which allow for maintaining soil nutrients without the use of fertilizers, pesticides, herbicides, and constant crop propagation and harvesting. Grazing on the Refuge currently occurs on a rest-rotation cycle to allow for some recovery. Alternatives A and B, which propose similar amounts of construction and other management activities, would have similar effects to soils. Alternative C proposes much more construction and intensive management activities than the other alternatives; therefore, it would likely have a larger contribution to cumulative impacts.

5.2 Cumulative Impacts on Biological Resources

Habitats

Some management actions in the past, done with minimal forethought, have caused vegetation overgrowth and promotion of undesirable species. This has resulted in, among other concerns, an increase in running live oak. Past management attempts to treat more land than could possibly be treated resulted in neglect from spreading Refuge resources too thin and ineffective practices and rushed treatments. Under all alternatives, the Refuge will continue to use monitoring and all vegetation management tools, including the prescribed burning program, mowing and disking, and treatment of invasives. Habitat is expected to improve under all alternatives, but Alternative C will also have an adverse effect due to the level of increased management and public use, which results in disturbance.

Off-refuge, past conversion of lands to new developments, rangeland, and cropland has occurred. Here, land use is driven by economics. Lands set aside for habitat are rare and include State Wildlife Management Areas and other national wildlife refuges. Therefore, the Refuge is a huge beneficial value to this area as development or other types of land conversion continues to occur.

Wildlife

The Refuge performs habitat restoration and maintenance activities and has historically managed wildlife, particularly Federal trust species, to improve habitat, condition, and populations. Flooding of croplands, prescribed burning, roller-chopping (to open up vegetation openings), installation of wildlife drinkers, livestock grazing, and protection of habitat through passive management (or inactive management) occurs on the Refuge. Negative effects are minimal, as management activities are designed to mimic natural processes. However, there are some effects associated with monitoring sea

turtles, including the driving of ATVs and human presence along the beaches of Matagorda Island. There is also accumulation of non-natural debris along these beaches and water contaminants brought in from gulf tides. Beneficial effects, however, are abundant in the maintenance of habitat for migratory birds, threatened and endangered species, and other wildlife. The Refuge purpose is to provide habitat for migratory birds and wildlife; therefore, the Refuge uses adaptive management as necessary to perform adequate and beneficial ecosystem management.

Off-refuge, management of wildlife is a large undertaking by other public land managers. Other National Wildlife Refuges, such as the Texas Mid-Coast National Wildlife Refuge Complex, occur around the Aransas NWRC, in addition to others further inland, that do make strides toward protecting migratory birds, threatened and endangered species, and other wildlife. The Texas Department of Parks and Wildlife manages some State Parks and Wildlife Management Areas around the Aransas NWRC for the purpose of public use as well as development and management of habitat for indigenous and migratory wildlife species with special emphasis on waterfowl.

Alternative A would have some beneficial effects to wildlife, as the Refuge currently manages with the intention to protect and benefit Federal trust species. However, this alternative is reactionary instead of strategic and proactive; therefore, its benefits would be limited. Alternative B would have much benefit to wildlife, as it provides opportunities to plan habitat needs and to focus attention where it is most needed. Alternative C would have some benefits and some adverse impacts, as it would involve much habitat manipulation, which would mean improvements to some species' habitats and populations while doing harm to others.

However, most wildlife in this area is stressed by the effects of poaching, loss of habitat due to land development, oil spills, or other uses of land such as conversion to intensively managed croplands. Introduction of invasive animal species negatively affects native wildlife and habitat. Wildland Urban Interface (WUI) and farming practices may facilitate spread. Recently, with the increased interest in renewable energy, wind farms have been developed on lands surrounding the Refuge on the Texas Coast. These turbines often occur along flyways and are likely responsible for some bird mortality. Commercial crabbing continues to occur throughout the area and affects the availability of blue crabs for wildlife, particularly the whooping crane. Overall, the Refuge beneficially effects wildlife and habitat and contributes to cumulative impacts positively.

Prescribed Burning

Prescribed burning occurs regularly both on and off the Refuge as it did historically in the area. Burning on the Refuge has vegetation management objectives for the maintenance of habitat structure and function. Off the Refuge, burning occurs to increase the amount of range or arable lands. Prescribed burning also has the benefit of reduction in vegetation density, which helps reduce the likelihood of wildfires. There are some minor, though temporary, cumulative impacts to air quality associated with burning. These impacts are not significant. Though each alternative proposes varying levels of prescribed burning, the slight differences in effects will likely be imperceptible. Therefore, cumulative impacts are expected to be the same under all alternatives.

Livestock Grazing

Livestock grazing only occurs on the Myrtle Foester Whitmire Unit on the Refuge. The Refuge ensures that the management of grazed lands is what is best for waterfowl, shorebirds, and other migratory birds by using a short-duration grazing method. Surrounding the Refuge, private landowners manage rangelands according to their own styles or management concerns. Some are more cognizant of environmental impacts than others. Some grazed lands do show signs of disturbance, such as increased mesquite growth and heightened populations of invasive plants, while others maintain vegetative height and density. There is some landscape change in the area due to livestock grazing, of which the Refuge is and will continue to be only a minor, although beneficial, contributor. Some private rangelands may be converted for development into the future to meet the needs of a growing population along the Gulf

Coast. The cumulative impacts of grazing are expected to be the same under all alternatives, with the exception of Alternative C, which will have somewhat higher impacts due to the expansion of grazing.

Farming

Farming only occurs on the Myrtle Foester Whitmire Unit. The Refuge practices organic farming with the objective of providing a food source for migratory birds. Farming occurs on private lands throughout the area surrounded by the Refuge. Similar to livestock grazing, some farming practices are better than others. There is some landscape change in the area due to farming, of which the Refuge is and will continue to be only a minor, although beneficial, contributor. The area is experiencing some nutrient loss in soils due to the constant planting and harvesting of fields. The cumulative impacts of farming are expected to be the same under Alternative A and B. Alternative C will result in slightly more elevated impacts due to the increase in farming on the Refuge.

Mechanical Treatment

Use of heavy equipment occurs on the Refuge for habitat management and outside of the Refuge for land development or conversion. As private lands surround much of the Refuge, there is an extensive amount of land (and therefore habitat) disturbance. However, the Refuge objectives are motivated by protection of ecosystems, and it works toward this goal—not the replacement or alteration of habitat. The cumulative impacts would likely be the same under Alternatives A and B, and slightly increased under Alternative C, as that alternative calls for more intensive habitat management through the use of all management tools.

5.3 Cumulative Impacts on the Human Environment

Public Use Opportunities

The Aransas NWRC provides opportunities for the public that are somewhat rare in the State of Texas, as most of the state is privately owned. There are also some opportunities for recreational fishing, swimming, camping, and hiking in surrounding State parks and other national wildlife refuges. Due to the limited availability of public use lands, however, these lands, and in particular the Aransas NWRC, are treasured and depended upon to provide recreational and scenic amenities. The Refuge only provides these recreational facilities on 5,000 acres of the Aransas Unit, the public use area, and on the Matagorda Island Unit. Therefore, recreation activities, facilities, and infrastructure are not having a significant impact on wildlife habitat or any other Refuge resources. These visitor use facilities and infrastructure do benefit and facilitate recreation on the Refuge.

Cumulative impacts from public use and recreation would be beneficial under all alternatives due to the lack of currently existing opportunities in the local area. Some minor cumulative impacts associated with the construction of new or maintenance of existing facilities may be expected under any alternative; however, Alternative C proposed the greatest amount of newly constructed and maintained public use amenities and would be expected to have greater impacts. Under all alternatives, most impacts would be temporary and would last only through construction or active maintenance. However, under Alternatives A and B, conversion of habitat space for public use would be more permanent but would also take place on a small area compared with the rest of the Refuge. Under Alternative C, greater areas of land would be converted for public use creating a heightened impact.

Hunting and Fishing

Both hunting and fishing are administered through the State. The Refuge is involved in hunting and fishing through established access and infrastructure to facilitate those activities. Fishing pressure is increasing, and exotic fish have been introduced to freshwater habitats. Hunting occurs on private lands around the Refuge—mostly for deer and feral hog—but it is not causing any adverse impacts and is helping manage populations. Cumulative impacts of hunting and fishing are expected to be the same

under Alternatives A and B. Alternative C would propose heightened use of hunting and fishing and therefore more impacts, both beneficial and adverse.

Socioeconomic Resources

Aransas, Refugio, and Calhoun Counties are rural, with their economies based mostly on farming, chemical industries, fishing, and tourism. Ship and rail transport facilities support such industries as petroleum refineries, metal fabrication, plastics, and chemical plants. Other economic activities on lands surrounding the Refuge include ranching, game management, hunting, recreational and commercial fishing, oil and gas production, bird watching and sightseeing, nature photography by chartered boat, boat landings and travel trailer hookups, and the GIWW (Aransas and Matagorda Island Units). Cedar Bayou Pass and Pass Cavallo near the Matagorda Island Unit provide an attraction for beachgoers, camping, fishing, and picnicking. Areas surrounding the Myrtle Foester Whitmire, Tatton, and Lamar Units are primarily farmed, producing cotton, sorghum, and corn, along with some ranching operations. More recently, there has been an increase in the development of marina communities along the Texas Coast in the vicinity of the Refuge. At least two in Calhoun County and three in Aransas County are currently in development with more likely planned. These developments are becoming increasingly popular and common in the coastal bend because this area represents some of the last undeveloped coastal areas in the United States. These communities will likely increase economic growth in the three-county area in the future.

The Refuge beneficially affects the surrounding local area in that the Refuge provides jobs, contributes to the ecotourism industry, allows for payments to counties or surrounding local governments through the Payments In Lieu of Taxes program, and through revenue sharing. Most Refuge employees live in the towns surrounding the Refuge, including Austwell, Rockport, and Fulton. Inevitably, some of their income is reinvested into the local economy. Recreation and associated spending indirectly benefits support services, such as hotels and restaurants, which also benefits the local economy. Beneficial socioeconomic cumulative impacts occur under all alternatives. Alternative C may result in attracting greater numbers of visitors, as it would add public services and amenities; therefore, it may have a larger beneficial impact than Alternatives A and B.

Archaeological and Paleontological Resources

Any ground disturbance could produce harm to paleontological and archaeological artifacts. Effects could be to the object itself or to its provenience in soil. Law, regulation, and policy such as the Antiquities Act strictly guide the proper course of action to treat, move, or leave the artifact in place and mitigate adverse effects such as further ground disturbance. The Aransas NWRC has a policy to “preserve in place” unless the items are being studied or otherwise need to be moved. Other ground-disturbing activities off the Refuge likely have effects to these resources as well, especially with land conversion to cropland or for developed uses. Impacts to paleontological and archaeological resources are expected to be the same under Alternatives A and B, as they would implement an approximately equal amount of ground disturbance. Alternative C may have slightly more cumulative impacts, as it would implement more land management both for wildlife and public uses and would therefore create more land disturbance.

Land Protection

Because the Texas coastline is one of the last undeveloped coastlines in the United States, and because of the mild climate, abundant wildlife, and commercial fishery resources, these attributes have made it attractive for industrialization, commercialization, and residential and recreational development. Development is ongoing and is expected to continue. The Refuge is expected to become increasingly more valuable with each acre lost to development and/or repeatedly altered by surface activity. In the future, the Refuge would continue to conserve and protect natural habitats necessary for the continued existence of important fish and wildlife resources such as threatened and endangered species and their habitats.

The Refuge would likely acquire more lands for habitat protection under any alternative, although Alternative B would do the most toward planning for acquisitions and being strategic about which lands are of highest conservation concern. Future acquired lands that include the blackland true prairie (dark) soils type and whooping crane habitat would greatly complement the direction of the Aransas NWRC. This land would be purchased from willing sellers or otherwise acquired as funding and opportunities arise. Doing so would benefit wildlife habitat, Federal trust species, and many other natural resources and their contributions to scenery. However, removing this land from potential development (e.g., turning it over to Refuge jurisdiction) might affect the socioeconomic environment—more so than allowing its development. But this impact would be minor to moderate, as the counties would see income through the Payments in Lieu of Taxes (PILT) program, revenue sharing, ecotourism, and other factors related to Refuge land protection.

Climate Change

Climate change is expected to affect ecosystems in a variety of ways. These impacts may include species range shifts, species extinctions, phenological changes, and increases in primary productivity. Another concern for coastal lands, including the Aransas NWRC, is rising sea levels due to thermal expansion and melting glaciers. Impacts of sea-level rise can include inundation of coastal wetlands, increased salinity of coastal wetlands, increased flooding or storm surges, and beach erosion. Because the Refuge goals and objectives call for the conservation of coastal habitat, including the protection of Federal trust species, and sea-level rise compromises these goals and objectives, sea-level rise constitutes a relevant planning issue. The Refuge may be a minute contributor to climate change; however, the benefit it provides in keeping land in a predominantly natural or undeveloped state far outweighs the impact. Therefore, the Aransas NWRC is, under all alternatives, benefiting the cumulative impacts associated with climate change. As the Refuge begins experiencing greater effects from climate change, the need for adaptive management will increase. More scientific data on when and where these changes may occur, along with what they may entail, is necessary before determining how to counteract or adapt to them.

5.4 Irreversible and Irretrievable Commitments of Resources

Most management actions identified in this document will require a commitment of funds that would then be unavailable for use on any other Service projects. At some point, commitment of funds to these projects would be irreversible, and once used, these funds would be irretrievable. Non-renewable or non-recyclable resources committed to projects identified in the Plan, such as fuel for Refuge vehicles, would also represent irreversible and irretrievable commitments of resources.

5.5 Environmental Justice

Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” was signed by President Clinton on February 11, 1994, to focus Federal attention on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed Federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The order is also intended to promote nondiscrimination in Federal programs substantially affecting human health and the environment and to provide minority and low-income communities with access to public information and opportunities for participation in matters relating to human health or the environment.

None of the management alternatives described in this environmental assessment will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Implementation of any action alternative that includes public

use and environmental education is anticipated to provide a benefit to the residents residing in the surrounding communities.

5.6 Indian Trust Assets

No Indian Trust Assets have been identified in the three-county area the Aransas NWRC is contained within—Aransas, Calhoun, and Refugio Counties. There are no reservations or ceded lands present. Some archaeological resources exist on the Refuge and are preserved in place by stabilizing the surrounding soils or restricting human use so as not to disturb these sites any further. No significant impacts are anticipated to result from implementation of any alternative described in the EA.

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**United States Fish and Wildlife Service
Environmental Action Statement**

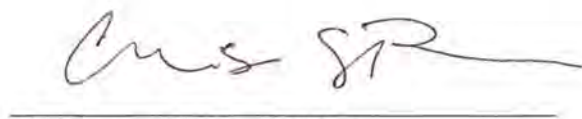
Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA), and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and determined that the action of implementing the Aransas NWRC Comprehensive Conservation Plan is found not to have significant environmental effects as determined by the attached *Finding of No Significant Impact* (following) and the *Comprehensive Conservation Plan and Environmental Assessment*.


Dr. Benjamin N. Tuggle, Regional Director
U.S. Fish and Wildlife Service, Region 2

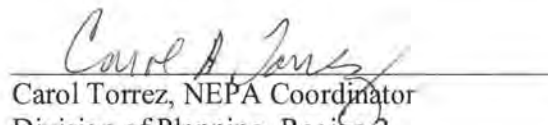
9/9/10
Date


Dan Alonso, Refuge Manager
Aransas National Wildlife Refuge Complex

9/9/10
Date


Chris Pease, Regional Chief
NWR System, Region 2

9-9-10
Date


Carol Torrez, NEPA Coordinator
Division of Planning, Region 2

9/9/10
Date

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1.2 Finding of No Significant Impact

ENVIRONMENTAL ASSESSMENT OF THE ARANSAS NATIONAL WILDLIFE REFUGE COMPLEX COMPREHENSIVE CONSERVATION PLAN U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife Service (Service) has developed a Comprehensive Conservation Plan (Plan) and Environmental Assessment (EA) for the Aransas National Wildlife Refuge Complex (NWRC) located in Aransas, Calhoun, and Refugio Counties, Texas. The Plan provides management direction to present and future Refuge managers for the next 15 years. It will achieve the Refuge's vision for the future and the purposes for which the Refuge was originally established. The Plan describes management activities that occur on the Refuge and provides management goals, measurable objectives, and specific management strategies designed to protect and restore wildlife habitats, conserve "trust resources" such as migratory birds and threatened and endangered species, enhance compatible wildlife-dependent recreation opportunities, and related facilities.

An Environmental Assessment (EA) was completed to fulfill the requirements of the National Environmental Policy Act (NEPA) of 1969 and to inform the public of the possible environmental consequences of implementing the Plan. A total of three alternatives were evaluated and analyzed for potential impacts on the human environment. The EA was prepared to provide a decision-making framework that 1) explores a reasonable range of alternatives to meet project objectives, 2) evaluates potential issues and impacts to the Refuge, resources and values, and 3) identifies mitigation measures to minimize the degree or extent of these impacts.

ALTERNATIVES CONSIDERED AND ANALYZED

Alternative A: Current Management (No Action Alternative)

Alternative A, the No Action Alternative, assumes no change from current management programs that have been in place, and/or have been initiated over time, since the Refuge's establishment. Alternative A is considered the baseline to compare other alternatives against. Under Alternative A, habitat management would continue under existing plans, with the emphasis remaining primarily on migratory birds, waterfowl, and Federally listed species; the status quo would prevail without the benefit of holistic, long-term, and comprehensive guidance. Management of invasive flora would continue with herbicide use and mechanical treatments. Exotic animal control measures would continue for the feral hog, using techniques that include aerial and ground gunning, public hunts, and trapping. Prescribed fire would continue as a management tool to improve habitat and to reduce the likelihood of a severe wildfire. All wildfires not within prescription parameters would be immediately suppressed. Grazing would be utilized on the Myrtle Foester Whitmire Unit as a grassland management tool to reduce the height and density of vegetative cover and make the area more attractive for waterfowl, shorebirds, and other migratory birds. The Refuge would continue management of organic rice farming on 154 acres on the Myrtle Foester Whitmire Unit through a cooperative farmer that harvests the first crop while the second is left for wildlife.

The Refuge would continue habitat management activities for threatened and endangered species, including 1) whooping cranes; 2) piping plover; 3) aplomado falcon; and 4) Kemp's ridley sea turtles. Protection of all threatened and endangered species would continue to be accomplished by purchasing land and protecting habitat. Priority Species monitoring would continue to occur on up to an annual basis, depending on the species; coordination would continue to occur with Texas Parks and Wildlife Department, US Geological Survey, and other academic institutions for research purposes.

Current public use under existing plans would continue; any expansions of uses would occur opportunistically. Public use would continue to occur primarily on the Aransas Unit, within the 5,000-acre Public Use Management Area, which is set aside for public uses. A 16-mile auto tour loop, seven self-guided walking trails, boardwalk, and viewing decks with telescopes would provide opportunities for nature study, wildlife photography, and observation. Matagorda Island would continue to be managed according to terms agreed to in the 1994 MOA with the State of Texas, where Texas Parks and Wildlife administers public uses (See Appendix F).

Currently, there is no active land acquisition or land protection plan. The Refuge would continue to acquire land on a case-by-case basis. However, any future acquisitions would be based on an approved land protection plan, developed as a step-down plan of the Plan.

The Refuge would continue to manage prehistoric and historic resources in accordance with the 1990 Comprehensive Management Plan (CMP), which recommends preserving cultural and historical sites "in place."

The Refuge would continue to receive requests for oil and gas exploration because the mineral interests are privately owned. Owners of these mineral rights have the right to develop, produce, and transport oil and gas resources located within a refuge (USGAO 2001). The Refuge, in compliance with applicable mandates, would continue to review permits for oil and gas activities on the Refuge and ensure special conditions are included in these permits such as mitigation for unavoidable habitat destruction, drilling fluids removal from the drilling site, and returning the site to as natural a condition as possible.

Base funding and staffing would continue at current levels, maintaining approximately 27 full-time staff and several temporary employees, with the budget evenly divided between staff and operation and maintenance. Facilities for administrative and public uses would remain at current numbers and would undergo only routine upkeep and maintenance.

Alternative B: Proposed Action

Under Alternative B, ecosystem-level management actions to better protect and preserve the natural diversity of unique habitats and sensitive wildlife would occur through a holistic, partnered, and publicly involved approach; current and future long-term benefits for migratory and resident birds, wildlife and their habitats, and the recovery of threatened and endangered species would be provided. This Alternative would emphasize the maintenance of contiguous mature coastal woodland and natural marsh, manage for grassland and barrier island integrity, and enhance degraded habitats where needed. It would also preserve and maintain habitats important to the unique species of the Texas Coastal Bend. By taking this

approach, the Refuge would contribute significantly to the State of Texas' Comprehensive Wildlife Conservation Strategy (2005–2010) and economically important species to the State, such as blue crabs, shrimp, oysters, and fish that use coastal wetlands for spawning, nursery, and rearing habitat. Treatments for invasive species would be the same as Alternative A; however, under this alternative, the Refuge would consider their abundance, density, and threat level, and react accordingly. Prescribed burning would be at the same level as Alternative A; however, under this alternative, the Refuge would consider vegetative density and fuel load, and react with the best professional judgment and available science. Grazing would be the same as Alternative A; however, under this alternative, the Refuge would more tightly manage the timing and duration of grazing and more closely monitor it to avoid overgrazing and its associated impacts. Management of organic farming would be the same as Alternative A; however, under this alternative, the Refuge would consider the needs of Federal trust species and other wildlife conditions and trends, and react with adaptive management techniques.

Management of all wildlife species, including migratory birds, Federal trust species, and priority species, would be the same as Alternative A, but the Refuge would also consider monitoring, observation, and other relevant information to ensure flexibility and adaptability in management to react to changing conditions.

An optimal, quality experience for the public would be emphasized through priority wildlife-dependent recreational opportunities, and other existing public uses would be allowed where appropriate and compatible. Public uses would continue to be managed as they are under Alternative A, but Alternative B would also improve and enhance the quality of the existing facilities and programs and provide for the expansion programs to improve the visitor's experience and understanding of protection of natural resources. A mix of existing uses and priority wildlife-dependent uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) would be allowed. Environmental education and outreach campaigns would occur to alert people to potential impacts to Gulf Coast ecosystems or to raise awareness about sensitive natural habitats.

Management of archaeological resources would be the same as Alternative A.

Management of oil and gas activities would be the same as Alternative A.

Additional land protection to address whooping crane flock expansion in the vicinity of the Refuge would be considered. The emphasis would remain on protecting whooping cranes and available acres of existing wetland or restorable wetland habitat and adjacent uplands in portions of Aransas, Calhoun, and Refugio Counties. Land acquisitions would be based on an approved Land Protection Plan, as a step-down plan of the Comprehensive Conservation Plan. This land would be acquired or purchased from donations or willing sellers as opportunities and funding arises.

Base funding and staffing would increase as determined by the Plan to fully implement this alternative. The Refuge would hire one more Law Enforcement Officer to increase patrol and presence over the 115,000-acre Refuge, and one more visitor services staff would be added to increase assistance to the Visitor Center. Facilities for administrative uses and for public uses would be upgraded or newly built based on the needs identified in the Plan.

Alternative C

Under Alternative C, the Refuge would implement intensive management to achieve a predetermined amount of woodlands, wetlands, croplands, grasslands, shrublands, and water impoundments to benefit the highest possible variety of plants and wildlife. The increase in intensive land management as compared with Alternative A would likely mean more opportunities for introduction of invasive species. Therefore, the emphasis on treatment of invasive plants would grow. Management of exotic wildlife species would likely remain the same as under Alternative A. Prescribed burning would largely remain the same as Alternative A, however, burning used to clean up brush and excess vegetative debris would likely increase due to more frequent mechanical treatments. Livestock grazing acreages and intensity would increase in this alternative as compared with Alternative A. Farming would likely increase to other units under Alternative C with the intent to benefit Federal trust species with a larger food source.

Management of migratory birds, Federal trust species, and priority species would be the same as Alternative A. The Refuge would, however, increase the intensity and the frequency of vegetative treatments. The objective would be to manage all of these (and all other wildlife) species' habitat needs in an effort to keep them on the Refuge rather than wandering in and around the general area. This alternative strives to maintain high population levels of all wildlife both for the benefit of the wildlife and people.

All priority public uses (hunting, fishing, wildlife observation, photography, and environmental education and interpretation) would be expanded significantly above current levels. Visitor facilities and interpretive and environmental education programs would be improved or developed. Recreational facilities such as new trails, auto tour routes, and other visitor facilities would be a priority. For example, on the Lamar and Myrtle Foester Whitmire Units, potential opportunities include adding viewing platforms with telescopes, which would involve adding public access roads (approximately one-half mile and two miles, respectively) with parking areas. A year-round auto tour would be provided, open seven days a week from dawn to dusk. The Refuge visitor center would be open seven days a week. Regularly scheduled interpretive programs would be conducted. Refuge walking trails would lead through all habitats and areas of the Refuge, except during critical times around whooping crane and priority resting waterfowl areas. Environmental education on the Refuge would include both staff-led and educator-led field trips, and the number of teacher workshops conducted each year would be increased.

Management of these archaeological resources would be the same as Alternative A.

Management of these oil and gas resources would be the same as Alternative A, with the exception of the roads built to access developments and associated facilities. Refuge staff would maintain these roads after leases have expired to provide for a public use opportunity to access parts of the Refuge previously inaccessible.

Refuge land protection would occur as in Alternative A. When opportunities are present, the Refuge would acquire adjacent or surrounding lands but would not pursue active land acquisition.

Base funding and staffing would increase (compared with Alternative A) to meet the needs of the increased habitat management and public use opportunities this alternative calls for. The expanded staff would include additions of Law Enforcement Officers on the Refuge, as this alternative would expand public use and access. New construction and maintenance would be increased over levels provided for under Alternative A. Facilities for administrative uses (and for public uses) would be upgraded or newly built to accommodate increased staffing and public use.

DECISION: THE SELECTED ALTERNATIVE

Alternative B was selected over the other alternatives because it best meets the Refuge's vision for the future, the purposes for which the Refuge was established, and the habitat, wildlife, and visitor services goals identified in the Plan. This alternative is the basis for the Comprehensive Conservation Plan and describes how habitat objectives will be accomplished through a combination of management activities to encourage ecological integrity, control invasive species, improve or maintain habitats for migratory waterfowl, and other resident wildlife. This alternative will not adversely impact trust resources, including threatened and endangered species or their habitat. Opportunities for wildlife-dependent recreation activities, such as hunting, fishing, wildlife observation, photography, environmental education, and interpretation will be enhanced. Future management actions will have a neutral or positive impact on the local economy and the recommendations in the Plan will ensure that Refuge management is consistent with the mission of the National Wildlife Refuge System.

SUMMARY OF EFFECTS

Implementation of the Service's decision would be expected to result in environmental, social and economic effects as described in the Comprehensive Conservation Plan/EA and summarized here. The Plan describes habitat management, wildlife management, and land conservation objectives that would result in increased migratory bird utilization and production; increased protection of threatened and endangered species; enhanced wildlife populations; and improved habitat conditions. The proposed visitor service management activities would result in enhanced prospects for wildlife-dependent recreational opportunities.

Refuge management activities (prescribed burning, invasive species control, farming, etc.) would result in short-term minor negative impacts to soils, air, water, habitat and wildlife as described in the EA; however, the long-term impacts are expected to be beneficial. These management activities would result in the creation and improvement of habitat to provide components such as nesting cover, loafing cover, and protection. The Refuge would also take a proactive approach to working with information provided through biological surveys, inventories, and monitoring to determine changing conditions and vegetative and associated wildlife needs.

Opportunities for wildlife-dependent activities such as wildlife observation, photography, environmental education, interpretation, fishing and hunting would be enhanced. Disturbance to wildlife at some level is an unavoidable consequence of any public use program, regardless of the activity involved. Obviously, some activities innately have the potential to cause greater disturbance than others. As currently proposed, the known and anticipated levels of disturbance associated with management actions are considered minimal and well within the tolerance levels of known wildlife species and populations present in the area. Implementation

of activities provided by the visitor services program would take place through carefully controlling timing and placement to avoid direct contact with sensitive areas, such as nesting habitat, or wildlife. All hunting activities would be streamlined, including the efficiency of check-in and the permitting process itself, and would be conducted within the constraints of sound biological principles for the management of herds. Monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized and visitor use programs would be adjusted as needed to limit disturbance.

The increased opportunities for wildlife dependent recreational opportunities on the Refuge would also have beneficial impacts on the local economy through increased visitation and revenue. Partnerships with county, state and federal agencies, private landowners, and conservation groups would enable the Refuge to achieve goals and objectives, minimize costs, and strengthen relationships.

Implementing the Service's management action is not expected to have any significant adverse effects on wetlands and floodplains, pursuant to Executive Order 11990 and 11988, because there would be no development of Refuge facilities within wetlands or floodplains. There would be no effect on threatened, endangered, proposed or candidate species and/or critical habitat, as documented in the intra-service Section 7 (Endangered Species) Consultation completed with the Ecological Services Field Office in Corpus Christi and signed on September 16, 2009. In addition, archeological and/or historical resources would not be impacted.

The Refuge is not aware of any other past, present, or reasonably foreseeable future planned actions that would result in a significant cumulative impact when added to the Refuge's proposed action, as outlined in Alternative B. The adverse direct and indirect effect of the proposed action on air, water, soil, habitat, wildlife and scenery resource values are expected to be minor and short term. The benefits to long-term ecosystem health that the proposed action will accomplish will outweigh any of the short-term impacts discussed in this document.

PUBLIC OUTREACH, REVIEW AND COMMENT

Development of the Aransas National Wildlife Refuge Complex Comprehensive Conservation Plan has been thoroughly coordinated with all interested and/or affected parties. Public scoping was initiated when a Notice of Intent to prepare a Comprehensive Conservation Plan was published in the Federal Register (67 FR 55862) on August 30, 2002. In January 2003, the Refuge held seven open-house-style meetings to solicit initial public input and involvement during the early stages of Plan development. The Refuge also invited the State of Texas (Texas Parks and Wildlife Department) to participate. A Notice of Availability for the Draft Plan and Environmental Assessment was published in the Federal Register (75 FR 6872) on February 12, 2010, making it available for review and comment for 60 days. Subsequently, the Refuge held two more public meetings to allow for comment and Refuge response on the Plan and Environmental Assessment. Approximately 150 comments were received during the 60-day comment period, submitted in writing, verbally at the meetings, emailed or phoned in to the Refuge/Regional Office. All comments were considered and addressed in Appendix J of the Plan.

FINDINGS

Based on the analysis documented in the Environmental Assessment and with due consideration given to comments from the public and through consultation with the State of Texas, it is my determination that the proposed action does not constitute a major Federal action that will have a significant effect on the quality of the human environment under the meaning of Section 102 (2) (C) of the National Environmental Policy Act of 1969 (as amended). As such it is my conclusion that an Environmental Impact Statement is not required for this Plan and the selected alternative may be implemented as soon as practicable. This determination is based on the following factors (40 C.F.R. 1508.27), as addressed in the attached Environmental Assessment.

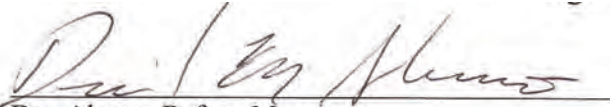
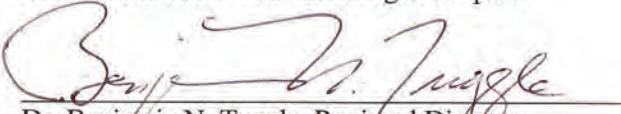
1. Both beneficial and adverse effects have been considered and this action will not have a significant effect on the environment (Environmental Assessment, pages I-30 – I-56).
2. The actions will not have a significant effect on public health and safety (Environmental Assessment, pages I-42 – I-48).
3. The project will not significantly affect any unique characteristics of the geographic area such as proximity to historical or cultural resources, wild and scenic rivers, or ecologically critical areas (Environmental Assessment, pages I-46 – I-48).
4. The effects on the quality of the human environment are not likely to be highly controversial (Environmental Assessment, pages I-42 – I-48).
5. The actions do not involve highly uncertain, unique, or unknown environmental risks to the human environment (Environmental Assessment, pages I-42 – I-48).
6. The actions do not establish a precedent for future actions with significant effects nor do they represent a decision in principle about a future consideration (Environmental Assessment).
7. There will be no cumulatively significant impacts on the environment. Cumulative impacts have been analyzed with consideration of other similar activities on adjacent lands, in past action, and in foreseeable future actions (Environmental Assessment, pages I-50 – I-56).
8. The actions will not significantly affect any site listed in, or eligible for listing in, the National Register of Historic Places, nor will they cause loss or destruction of significant scientific, cultural, or historic resources (Environmental Assessment, pages I-46 – I-47).
9. The actions are not likely to adversely affect threatened or endangered species, or their habitats (Environmental Assessment, pages I-36 – I-40; Appendix H).
10. The actions will not lead to a violation of federal, state, or local laws imposed for the protection of the environment (Environmental Assessment, pages I-4 – I-6).

It is the intent of the Service to revisit questions of significant environmental consequences in accordance with NEPA upon consideration of the implementation of site specific proposals call for and discussed in the final Plan.

SUPPORTING REFERENCES

Fish and Wildlife Service, 2009. Draft Comprehensive Conservation Plan and Environmental Assessment for the Aransas National Wildlife Refuge Complex, Aransas, Calhoun, and Refugio Counties, Texas. U.S Department of the Interior, Fish and Wildlife Service, Southwest Region.

Fish and Wildlife Service, 2010. Comprehensive Conservation Plan and Environmental Assessment for the Aransas National Wildlife Refuge Complex, Aransas, Calhoun, and Refugio Counties, Texas. U.S Department of the Interior, Fish and Wildlife Service, Southwest Region.

Recommended:	 Dan Alonso, Refuge Manager Aransas National Wildlife Refuge Complex	<u>9/9/10</u> Date
Approved:	 Dr. Benjamin N. Tuggle, Regional Director U.S. Fish and Wildlife Service, Region 2	<u>9/9/10</u> Date

J. Agency Response to Public Comment

This appendix identifies public comments received on the Aransas National Wildlife Refuge Complex Draft Comprehensive Conservation Plan (Draft Plan) and Environmental Assessment (EA) and the U.S. Fish and Wildlife Service's response to those comments.

The Notice of Availability for the Draft Plan/EA was published in the Federal Register on February 12, 2010 (Volume 75, Number 29, pp. 6872-6874). The public comment period was open for 60 days and closed on April 13, 2010. The Service received 73 written responses, along with many verbal comments made during two public open house meetings. All responses were analyzed using a process called content analysis. Content analysis organizes and groups comments made during the public comment period to reflect different resource issues. A number of issues were identified in the public's response to the Draft Plan/EA. Respondents were self-selected (i.e., they voluntarily provided comments); therefore, their comments do not necessarily represent the sentiments of the public as a whole.

J.1 Geographic Representation

Geographic representation was tracked for each respondent (Table J-1). Letters and comments received were received from four states.

Table J-1. Geographic Representation of Response by State

State	Number of Respondents
Texas	54
Unspecified	16
Maryland	1
New York	1
Idaho	1
Total	73

J.2 Organization Affiliation

Responses were received from various organizations and unaffiliated individuals. Organization types were tracked for each letter and email received. Organization types, and the number of respondents in each category, are identified in Table J-2.

Table J-2. Number of Responses by Organizational Affiliation

Organization Type	Number of Respondents
Business	3
Federal Agency	2
General Public	63
Preservation/Conservation Organization	3
Recreation Organization	1
State Government Agency	1
Total	73

J.3 Agency Response to Public Comments

The Service's responses to public comments are shown in the following two tables. The Service's responses to public comments that did not warrant changes to the Plan can be found in Table J-3. Public comments that warranted content or editorial changes in the Final Plan are addressed separately in Table J-4.

Table J-3. Agency's Response to Public Comments Not Warranting Changes in the Plan

Recreation Opportunities and Access	
General Public Use – Priority Public Uses	
Summary of Comments:	Keep the Refuge open to public use, especially fishing and hunting. Allow the public to enjoy their resources.
Agency Response:	<p>Section 5 (Administration of the System) of the National Wildlife Refuge System Improvement Act of 1997 states, "Compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System, directly related to the mission of the System and the purposes of many refuges, and which generally fosters refuge management and through which the American public can develop an appreciation for fish and wildlife." According to the act, accompanied by Executive Order 12996 issued on March 25, 1996, these wildlife-dependent recreational activities (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) are recognized as priority general public uses. In order to be considered compatible, wildlife-dependent uses must "not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the Refuge" as determined in a Compatibility Determination. As mentioned in Section 1.5 of the Plan, the mission of the National Wildlife Refuge System is:</p> <p><i>"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"</i></p> <p>Each of these six wildlife-dependent recreation uses has been determined to be compatible at the Aransas NWRC with use-specific stipulations (see Appendix G, Compatibility Determinations). To meet the Refuge purpose while allowing for priority public uses, the Refuge grants general access to all people in areas that are open to public use.</p>
General Public Use – Equipment Use	
Summary of Comments:	Aransas NWRC should severely restrict the use of ATVs on Refuge lands. Often, ATV users travel off established trails, which can damage habitats and jeopardize species.
Agency Response:	<p>ATVs are prohibited on the Refuge with very few exceptions. Hunters who have physician documentation of mobility impairment may be eligible for a Special Use Permit that allows the hunter to travel by ATV only to his or her hunting site. When the hunter is granted his or her permit, the Refuge supplies the individual with information on the allowable use. The Refuge never grants any ATV user free range of the Refuge. Special use permits occur on a strict as-needed basis, and the Refuge has only granted one or two each year.</p> <p>Any ATV use occurring outside of the permitted special uses is a law enforcement issue. Refuge staff does, however, use ATVs for Refuge management activities such as invasive species control, prescribed burn efforts, and monitoring of sea turtle nests.</p>

Comment:

In Section 2.4.3, the use of airboats and ATVs is mentioned as a possible disturbance. My observations are that the use of airboats is predominately associated with duck hunting, not fishing, so maybe this issue should be addressed in a different section. To the extent that airboats are a noise issue, the noise should be regulated directly such that other less obtrusive fishing approaches are not affected. Law enforcement visibility should be sufficient to deter any inappropriate use.

Agency Response:

Airboat use is discussed in Section 2.4.3 because this portion of the Plan is based on the public's wording of public use issues. According to the public, the issue was associated with fishing. Also, the Refuge is aware that fishing guides are increasing their use of airboats because airboats enable them to reach more remote areas. The Refuge believes that airboats are a disturbance factor in bird habitat. There are, however, ways to mitigate the disturbance while still allowing airboat use. Refuge staff is considering various ways (e.g., encouraging use in certain areas while closing other areas) to address this issue in the future. Law enforcement visibility would only be sufficient if the Refuge implemented strict regulations on airboat use.

Furthermore, the Refuge provides a Strategy under Wildlife Objective 8 (see Chapter 5) that states the intention to coordinate with Ecological Services on data collection, research, and monitoring for activities, including airboats, which may adversely affect whooping cranes.

Comment:

In Concern #5 of Section 2.4.3, the Plan states "Boat launching at the Cavasso Creek location is creating a disturbance issue..." In discussions of this issue at the Port Lavaca public meeting, it was indicated that the problem was foot traffic along the bank into the Preserve, not necessarily boat launches from the State's highway right-of-way. Please clarify this issue in the Final Plan. Is it boat launches from the ROW, noise from boats, or foot traffic onto the Preserve that is the issue?

Agency Response:

The issue at Cavasso Creek is multi-faceted. The area does not have an official public boat ramp, and it is not sanctioned by the State, TPWD, or FWS. The ramp is solely an area where the public has created an unofficial boat launch. Trucks hauling motorized boats along the highway pose a human safety issue, but the Refuge cannot regulate the launch site because it falls under the jurisdiction of Texas Department of Transportation (TXDOT) right-of-way. The launch site, however, lies within designated critical habitat for the whooping crane. Noise and human disturbance associated with the launching of motorized boats at this site may disrupt whooping cranes. Not only can the Refuge not regulate vehicles that are pulled over to launch boats, but also the Refuge cannot regulate boats in the water because FWS does not have jurisdiction over State (TPWD) waters. The Refuge can only regulate foot traffic along the shore, which is Refuge property.

Ultimately, the Refuge needs better law enforcement and coordination with TXDOT and TPWD to address this issue. In the best interest of the whooping crane, non-motorized boat traffic is probably the Refuge's most preferred use at Cavasso Creek. This would eliminate the noise disturbance to whooping cranes caused by motorized boat use while still allowing for public use via less obtrusive boats.

Hunting – General**Summary of Comments:**

Please continue to allow hunting on the Aransas NWRC.

Agency Response:

The National Wildlife Refuge System Improvement Act of 1997 states that “compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management.” Because hunting is listed as one of the six priority public uses (along with fishing, wildlife observation, photography, environmental education, and interpretation) and it does not interfere with meeting the Refuge purpose, hunting will remain authorized on Aransas NWRC as long as it remains “compatible and not inconsistent with public safety.”

Although there have been periods of time when hunting was prohibited on the Refuge, this use is currently allowed and remains compatible in the Tatton Unit, Aransas Unit, and Matagorda Island Unit based on the current compatibility determination (see Appendix G, Compatibility Determinations). The hunting CD outlines certain stipulations to ensure that hunting remains compatible; these stipulations include both that the Refuge “continue to assure that harvest rates are consistent with maintaining a viable herd size” and that “hunts have and may be suspended periodically for biological reasons.” In conjunction with these requirements, wildlife populations are monitored so that if a species experiences population decline, hunting will cease until populations are considered stable. The Refuge Manager is given the authority to make such decisions based on biology and consultation. Hunting bag limits and seasons are set by the State, and the Refuge allows their hunts in accordance with the State parameters.

Currently, there are various archery and rifle hunting opportunities that exist on the Refuge. For the archery hunt, Aransas NWRC has a maximum allocation of 400 permits. In 2009, the Refuge issued 240 of those 400 permits. For rifle hunting, the Refuge hosts four weekend hunts with 100 individuals allowed at each. There is high demand for the first weekend hunt, but the Refuge accommodates hunters by extending management up to the day of the hunt and by granting excess hunters access on upcoming hunts. To encourage that the hunting tradition be enjoyed by current *and future* generations, youth 17 and under are allowed to hunt at a reduced rate (half price). Also, youth accompanying permitted adult hunters are allowed to observe free of charge.

For more information on the hunting program offered by Aransas NWRC, please refer to the following Sections of the Plan:

- Section 4.6, Visitor Services, Infrastructure, and Wildlife-Dependent Recreational Activities
- Section 5.4, Public Use Goal, Objectives, and Strategies, Public Use Objective 4
- Appendix G, Compatibility Determinations

Hunting – Expansion

Summary of Comments:

Expand the opportunities for hunting on the Aransas NWRC.

Agency Response:

As covered in the response to the general hunting comments, hunting is an allowable use according to the Refuge Improvement Act. According to law, refuges are always closed to public uses, including hunting, until specifically opened for a use through the compatibility determination process. Hunting has been determined to be compatible on the Aransas NWRC. Therefore, hunting is a current use that will continue into the foreseeable future. The Refuge will continue to monitor the effects of the hunting program and re-evaluate this use through the annual Hunt Plan. The current hunting opportunities are outlined in the Hunting Compatibility Determination (see Appendix G, Compatibility Determinations), and justification for closed units are outlined in the following text.

There are 36,225 acres open to archery hunting and 19,668 acres open to rifle hunting. It is not feasible to open every acre of the Refuge to hunting and still meet the purpose of the Refuge. Closed areas include the Lamar Unit, which is small and near residential areas. The Myrtle Foester Whitmire Unit is also closed to hunting because it contains a high degree of moist soil manipulation and 3,400 acres that are utilized for nesting habitat for migratory birds. This unit is such a unique spot on the migration corridor for nesting, loafing, and feeding for migratory birds that opening this part of the Refuge to hunting would conflict with meeting the Refuge purpose.

Current demand for hunting is also not exceeding the available opportunities. In fact, hunting use, especially archery, on the Refuge has been declining since the 1960s. The Refuge encourages that the tradition of hunting continue by allowing children under the age of 17 to hunt for a discounted rate with an accompanying adult or to observe their parent hunting for free.

Hunting – Limits**Summary of Comments:**

Stricter limits should be placed on hunting. Texans have ample hunting opportunities elsewhere throughout the State, and hunting does not have a place on this unique and important wildlife refuge.

Agency Response:

As stated in the response to general hunting comments, the National Wildlife Refuge System Improvement Act of 1997 states that “compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management.” Because hunting is listed as one of the six priority public uses (along with fishing, wildlife observation, photography, environmental education, and interpretation) and it does not interfere with meeting the Refuge purpose, hunting will remain authorized on Aransas NWRC as long as it remains “compatible and not inconsistent with public safety.”

The Refuge evaluated whether hunting is compatible or not on Aransas NWRC through the Plan process (see Appendix G, Compatibility Determinations). The Compatibility Determination outlines certain stipulations to ensure that hunting remains a compatible Refuge use; these stipulations include both that the Refuge “continue to assure that harvest rates are consistent with maintaining a viable herd size” and that “hunts have and may be suspended periodically for biological reasons.” In fact, hunting aids the Refuge in managing certain wildlife populations. Such management is necessary because large herbivores can destruct habitat when populations are in excess. The deer herd at Aransas NWRC is large enough to support a hunt for these reasons. Also, hunting of feral hogs may aid in population control of this species as well.

The Refuge also acts to protect Federal trust species from human disturbance resulting from hunting through such acts as relocating hunting areas appropriately during whooping crane season (see Chapter 5, Public Use Objective 4). As long as hunting is determined to be compatible, Aransas NWRC will continue to allow it. The Refuge monitors wildlife populations and hunting use so that staff can modify regulations if and when populations decline. For example, the Refuge discontinued hunting of javelinas in the 1980s due to low population numbers.

Hunting – Methods and Rules**Comment:**

Proper hunting regulations and funding from hunting licenses can aid the preservation of this area.

Agency Response:

Current hunting regulations are outlined in the response to general hunting comments. The Refuge allows their hunts within the State of Texas' parameters, and bag limits and seasons are set by the State.

In order to hunt on the Aransas NWRC, hunters must possess both a State hunting license and an Aransas NWRC hunting permit. The State hunting license is administered by Texas Parks and Wildlife Department, which is a State agency. Revenues generated from the State hunting licenses are allocated to the State of Texas. Alternatively, the required Aransas NWRC hunting permit is administered by the Refuge, which is part of the National Wildlife Refuge System within the United States Fish and Wildlife Service. Nearly all Refuge funding stems from congressional appropriations delegated each year. Monies generated from Aransas NWRC hunting permits are added to the general National Wildlife Refuge System funds, and a portion of that money may eventually be re-allocated to the Refuge.

Comment:

I am especially concerned about expanding the hunting opportunities as I know first-hand as a south Texas land owner how feral hog population left unchecked can be destructive to the habitat and other species. I would encourage the adoption of a black powder hunting opportunity on this Refuge to run concurrently with the bow hunting opportunity for white-tail deer and feral hogs.

Agency Response:

The Refuge has very specific feral hog control measures. Last year, staff and hunters eliminated hundreds of hogs on the Refuge. Aransas NWRC currently allows and will continue to allow hunting of feral hogs, as this species is invasive and detrimental to wildlife habitat for Federal trust species. Each year, the Refuge is obligated to prepare a Hunt Plan that evaluates their hunting program. In the next revision of the Hunt Plan, the Refuge will consider black powder hunting as an option. This use may, however, conflict with bow hunting.

Comment:

Continued use of proper hunting techniques to keep animals under control in the Refuge is all part of our stewardship to help preserve the precious environment and its animals for ourselves and future generations. I strongly feel that all authorized hunting inside the Refuge should be monitored at all times by either Refuge staff or by trained volunteers.

Agency Response:

Current hunting regulations are outlined in the response to general hunting comments. Both the U.S. Fish and Wildlife Service mission and the National Wildlife Refuge System mission specifically direct efforts "for the benefit of present and future generations of Americans." All regulations, including those for hunting, are put in place with that guiding principle in mind.

Aransas NWRC does not have the staff to facilitate all hunts that occur on the Refuge. The Refuge, however, has strict guidelines for all individuals who hunt on Refuge lands, and facilitation of all hunts is unnecessary at this time. Hunters are required, however, to report their kill at the Refuge Hunter Check Station. The Refuge also promotes hunter education through various programs offered on the Refuge; more information on this can be found in the response to comments on hunter education.

Comment:

I would welcome any expansion of the hunter program as indicated by the possible expansion of the feral hog management activity. If the program were expanded, I would request building in more flexibility to accommodate Texas weather. That is, allowing hunters to change their hunt day if the weather turns bad rather than having to hunt or lose their slot. Why not just hold "day hunts" for hogs on a first 100, first in basis; \$35 at the gate.

Agency Response:

For information on requests for hunting program expansion, please review the response shared in the “Hunting – Expansion” category.

The Refuge, unfortunately, cannot prepare for or control the weather. The administrative burden associated with rearranging hunting opportunities due to inclement weather exceeds the need to offer such a solution. In regards to feral hog hunts, Aransas NWRC has considered expanding feral hog day hunts in the requested manner in the past. It is still a viable option for consideration in future Hunt Plans, which are revised annually and separately from the CCP process.

Comment:

As in previous discussion with Refuge staff, the Refuge should not allow the use of ammunition loaded with lead projectiles (bullets or shot) to control unwanted animals (feral hogs) or in hunting deer or other game. USDA Wildlife Services apparently already used lead shot for aerial shootings of hogs on Matagorda Island in April of 2009. As we all know lead is highly toxic to wildlife and there are now suitable non-toxic substitutes for lead bullets and shot.

Agency Response:

To respond to this comment, the U.S. Fish and Wildlife Service consulted with David J. Hayes, USDA Wildlife Services Environmental Coordinator. Wildlife Services assessed the impacts of aerial gunning and lead shot use in the Colorado Predator Damage Management Environmental Assessment, which is available on their website at:

<http://www.aphis.usda.gov/regulations/pdfs/nepa/CO%20PDM%20EA%202005.pdf>. Aransas NWRC concurs with the recommendations that the USDA has provided.

According to this consultation, USDA uses double-ought buckshot on feral hogs to enhance humaneness and specifically to minimize any lead issues associated with rifle bullets or smaller shot which might be ingested by scavengers. Double-ought (00) buckshot is 0.33” (8.4 mm) and is large enough for most scavengers to detect (with the exception of the California condor, which appears to be non-discriminatory in what it will swallow). While some alternatives may exist (e.g., Heavyshot), these alternatives do not perform as well and have not been found to be as humane as lead shot on feral hogs. Shot size less than 00 and all steel alternatives are not effective for the same reasons. Further, Wildlife Services intentionally shot feral hogs in the head to expedite the process in April of 2009.

Hunting – Education**Comment:**

As with allowing any program to include hiking/hunting in areas where some endangered wildlife species may be located, I do not oppose having any approved hunters review a 30-minute or less video and/or survey to familiarize them with these species and habitats in order to maintain the sanctity of those species and habitats.

Agency Response:

The Refuge addresses the administration of the hunting program in their Hunt Plan, which is revised annually and separately from the CCP process. As part of the next Hunt Plan revision, staff will consider the option of requiring hunters to undergo formal training or education prior to receiving a Refuge hunting permit.

Currently, the Refuge protects Federal trust species and species habitat by granting hunters access to hunt only in designated areas. Although Aransas NWRC agrees with educating the public on proper hunting techniques to protect certain habitats from disturbance, the Refuge will continue to close areas where endangered species occur in an effort to achieve the same outcome.

Comment:

I would like to voice my support to allow responsible hunting activities at the Aransas National Wildlife Refuge. Specifically, it would be nice to see people who have completed a hunter education program and possibly some sort of refuge orientation/volunteer program be able to use the resource in a sustainable manner.

Agency Response:

Aransas NWRC promotes hunter education in a variety of ways so that hunters are prepared and informed prior to accessing Refuge resources. First and foremost, the Refuge supports TPWD's Hunter Safety Program to ensure that visitors partaking in this recreational activity do so in a secure manner. The Refuge provides all permitted hunters with an up-to-date rifle or archery "Hunting Regulations and Information" brochure that explains current law, regulation, and policy, as well as information on endangered species. To protect various habitats throughout the Refuge, only biodegradable flagging is permitted; the use of any other non-biodegradable flagging is considered littering. Aransas NWRC also does not allow any nailing or bolting into trees. Before each year's archery season, the Refuge and the International Bowhunting Organization host the two-day International Bowhunters Education Program to educate interested individuals on bowhunter ethics and responsibilities, basic equipment knowledge, and hunter safety. The course also covers hunting techniques, anatomy, shot placement, blood trailing, survival, and basic first aid. As an incentive, the Refuge offers early access to hunt areas to individuals who have completed and passed the course. The Refuge occasionally pairs with their partners to offer special educational programs such as "Tips and Techniques for Hunting White-tailed Deer and Feral Hogs at Aransas NWRC."

Fishing – General

Comment:

The Plan should work to promote use of less obtrusive fishing approaches, e.g., kayaking, canoeing, wading, and piers.

Agency Response:

Aransas NWRC currently works to promote such fishing uses. In fact, the Refuge does not have any public boat ramps or access for motorized boats. Aransas NWRC has a newly established pier in addition to the existing five access points for the specified less obtrusive types of fishing. As the Aransas NWRC brochure illustrates, the Refuge offers wade fishing access to San Antonio Bay between April 15 and October 15 at Bay Overlook, Dagger Point, Bird Trail #2, and the Boardwalk. Also, year-round fishing is allowed from the fishing pier at the Picnic Area. With the exception of the fishing pier, the Refuge closes each of these fishing access areas when the whooping cranes are present on the Refuge so as to protect the endangered birds from human disturbance.

Refuge Access – Specialized Use

Comment:

As a property owner and resident, I feel a greater use of public properties should be allowed our senior citizens at NO or LOW cost. If we can still get out and enjoy the outdoors before we die, it shouldn't cost as much as our prescriptions. Nail the out-of-staters and poachers.

Agency Response:

All Federal managed lands, including Aransas National Wildlife Refuge Complex, are part of the America the Beautiful Senior Pass Program, in which senior citizens (62+) are given discounted rates to access public lands. The America the Beautiful lifetime senior pass is available for individuals over the age of 62 at a rate of \$10. Also, the Refuge waives their entrance fees at certain times throughout the year; these fee-free days are typically tied to nationally recognized migration days or special events. All Refuge visitors are then given the opportunity to access the Refuge at no cost.

Comment:

Visitor plans are important in building support for the Refuge and its programs. Those initiatives mentioned in the CCP will indeed be appreciated by first-timers and visitors from afar. However, for more local support, it is suggested that infrequent, but regular, visitation opportunities be provided for unique areas of the Refuge which are not now open to the public such as Matagorda Island, Burgentine Lake area, Myrtle Foester Whitmire Unit, etc.

Agency Response:

The Refuge contains a 5,000-acre area within the Aransas Unit that is open to the public where the Refuge encourages visitor uses. In addition, TPWD, rather than the U.S. Fish and Wildlife Service, manages the public use on Matagorda Island Unit, which is open to public use. It is not feasible to open every acre of the Refuge to public uses and still meet the purpose of the Refuge or fulfill the mission of the National Wildlife Refuge System. According to law, refuges are always closed to public uses until specifically opened for a use through the compatibility determination process. While the Burgentine Lake Area was open to the public in the past, this area is no longer open to the public because of safety considerations and lacking infrastructure. All compatible uses and the locations where they are allowed are outlined in Appendix G of the Plan, Compatibility Determinations.

In regards to the suggestion about the Myrtle Foester Whitmire Unit, the Plan states in Section 4.6 “Visitor Services, Infrastructure, and Wildlife-Dependent Recreational Activities” the Myrtle Foester Whitmire Unit is closed to public use. The area is closed because it contains a high degree of moist soil manipulation and 3,400 acres that are utilized for nesting habitat for migratory birds. This unit is such a unique spot on the migration corridor for nesting, loafing, and feeding for migratory birds that opening this part of the Refuge to public use would conflict with meeting the Refuge purpose. The Refuge, however, is currently working to offer limited tours by appointment on the MFW Unit. This is included as a strategy in Chapter 5, Public Use Objective 2.

Refuge Access – Matagorda Island**Comment:**

The Calhoun County Historical Commission made the following requests regarding public use of Matagorda Island:

- The Historical Commission requests regular pre-planned access to the Matagorda Island boat docks, park, and restroom facilities.
- We request transportation from the dock area to the lighthouse for pre-planned historical tours.
- We request that the lighthouse area be mowed periodically in order to allow historical tour visitors safe access.
- We request that pre-planned access and transportation be provided to the public beach on the Gulf side.
- We request that a publicly operated ferry route be re-established to allow the public access to the lighthouse and the public beach on a regular basis.

Agency Response:

In 1994, Texas Parks and Wildlife Department (TPWD), Texas General Land Office (GLO), and U.S. Fish and Wildlife Service entered into a Memorandum of Agreement (MOA) that states TPWD assumes management of all public uses on Matagorda Island. The MOA is included in Appendix F. TPWD is currently doing what it can to support public use on Matagorda Island, including light maintenance to the access road and mowing of the land on lighthouse property. Any further requests regarding public uses and access to Matagorda Island for such uses should be directed to TPWD.

Aransas NWRC is committed to working with the local historical commission to determine the best possible way to provide historical tours. In regards to public access of the beach on the Gulf side, Aransas NWRC is ready and willing to work with partners to achieve this.

The Plan includes a strategy in Chapter 5, Public Use Objective 9 (Partnerships), to “continue to honor and support the 1994 MOA.”

Comment:

The northern half of Matagorda Island would be a great place to make accessible to the public without infringing on the whooping cranes. The northern part of the island is only accessible to people with a scooter boat and four-wheeler. This is unacceptable. The public owns Matagorda Island. They need to be given access.

Agency Response:

As mentioned previously, Texas Parks and Wildlife Department (TPWD), Texas General Land Office (GLO), and the U.S. Fish and Wildlife Service entered into a legally binding Memorandum of Agreement (MOA) in 1994 that states TPWD assumes management of all public uses on Matagorda Island. The MOA is included in Appendix F. TPWD is currently doing what they can to support public use on Matagorda Island, whereas the U.S. Fish and Wildlife Service is responsible for habitat management on the island. Any further requests regarding public uses and access to Matagorda Island for such uses should be directed to TPWD.

The Plan includes a strategy in Chapter 5, Public Use Objective 9 (Partnerships), to “continue to honor and support the 1994 MOA.”

Infrastructure

Public Use Facilities – Roads and Trails

Comment:

We request that the road [on Matagorda Island] from the dock to the lighthouse be maintained and mowed to enable trucks and/or bus traffic to travel to and from the lighthouse.

Agency Response:

In 1994, Texas Parks and Wildlife Department (TPWD), Texas General Land Office (GLO), and Aransas National Wildlife Refuge Complex (NWRC) entered into a Memorandum Of Agreement (MOA) that states TPWD assumes management of all public uses on Matagorda Island. The MOA is included in Appendix F. TPWD is currently doing what they can to support public use on Matagorda Island, including light maintenance to this road. Further maintenance requests should be taken to TPWD.

The Plan includes a strategy in Chapter 5, Public Use Objective 9 (Partnerships), to “continue to honor and support the 1994 MOA.”

Comment:

What is available to describe the four trails on the south end of Matagorda Island? Is similar material available for the north end? To what degree are they maintained?

Agency Response:

The trails on the south end of Matagorda Island are primitive and are used less in the Refuge’s environmental education program because fewer groups are able to travel to Matagorda Island today. There is not material available for the north end. The primary public use that TPWD conducts on Matagorda Island is hunting, and their visitor material is focused on this use. All trails on Matagorda Island are minimally maintained by mowing. Such maintenance falls under the jurisdiction of TPWD per the 1994 Memorandum of Agreement, available in Appendix F.

Public Use Facilities – Campgrounds

Comment:

Expand or provide camping areas where users can camp or at least park so that they do not impede the safety of traffic using the highways that surround the Wildlife Refuge. Please keep Texas a state where all Texans and visitors can enjoy the beauty of nature and the benefits of fishing and hunting along with just looking at what has been created for us.

Agency Response:

The Refuge's current camping opportunities are outlined in Appendix G, Compatibility Determinations. As the CD illustrates, the Refuge allows supervised youth camping in the Youth Environmental Training Center (YETA). Also, public camping is available on the northern part of Matagorda Island in a Public Camping Area managed by TPWD.

Camping, however, is not a priority public use according to the Refuge Improvement Act, which is outlined in the response to priority public use comments. The Refuge encourages the public to use the nearby campgrounds at Hoppers Landing and at the City of Austwell.

It is not within the jurisdiction of the FWS to build parking lots or pull outs on State highways.

Therefore, Aransas NWRC does not have the power to add parking lots or pullouts on the highways that surround the Refuge. On the Refuge itself, the 16-mile tour loop is the responsibility of the Refuge, and the Refuge has made visitor accommodations for priority public uses where experience has deemed it possible.

Staffing and Funding – General**Comment:**

Regarding "Restore Coastal Prairie (Myrtle Foester Whitmire Unit)" under Section 6.1, are the costs listed here just for work on the 250 acres of old rice paddies? If so, the costs seem exorbitant.

Agency Response:

In the past, the Refuge has worked with partners to restore the land at Myrtle Foester Whitmire Unit, but they have realized the need to increase restoration efforts. The costs represented are the costs (comprised of staff, equipment, and mobilization) for the work on the 250 acres. The start-up costs include not only the needed staffing, but also the seed, equipment, fuel, and other goods necessary to perform the work. Maintenance costs after the start-up are not included in this budget; rather, they will be included in the maintenance operating costs. The recurring \$34,677 cost will be allocated to fund the restoration staff members' salary.

Comment:

Will one of the new Refuge Biologist positions outlined in Section 6.5 be designated for a raptor biologist? As noted in the Plan, the Refuge is an important area for a variety of focal raptor species as well as for the endangered Aplomado falcon, and these species need the attention of at least one, full-time professional biologist/manager.

Agency Response:

The incoming biologist will be a General Refuge Biologist skilled enough to work with migratory birds and endangered species as needed by the Refuge. The biologist's work will aid in achieving the purpose of Aransas NWRC, and this person will work on a variety of subjects to meet Refuge needs rather than focusing on any one topic specifically. Therefore, the Refuge Biologist's time will vary according to species' needs. For example, if the Refuge determines that the Aplomado falcon requires additional time and support, then the Biologist's work will shift in that direction.

Comment:

The Plan calls for adding one law enforcement officer to the current staff of one but only identifies a 50 percent increase in coverage. It is not clear how the additional half person will be utilized.

Agency Response:

The percentage is referring to the portion of the Refuge that is patrolled—not the amount of coverage by people. Currently, there is only one law enforcement officer who can only cover either the Island or the mainland. With two officers, the Refuge can have one on the Island and one on the mainland.

Land Acquisition – General
<p>Comment:</p> <p>Under Concern #2 in Section 2.4.2, the Texas Coast is undergoing rapid development and if the habitat is not acquired soon, the opportunity may be lost. The objective may be daunting, but the Final Plan must provide the vision and strategy for accomplishing it. Habitat protection, restoration, and acquisitions should be your highest priority.</p>
<p>Agency Response:</p> <p>Thank you for your comment. Habitat protection, restoration, and acquisitions are our highest priorities. The Land Protection Plan proposed in the CCP will address these priorities, and the Land Protection Plan (LPP) is moving along as fast as it can. Under Wildlife Objective 8 addressing Whooping Crane Conservation (Chapter 5), a strategy states: “Any future acquisitions outside the Refuge boundaries would be accomplished under an approved Land Protection Plan, which will be developed as a Comprehensive Conservation Plan step-down plan within five years of Plan implementation.”</p> <p>Also, in Chapter 6 (New and Existing Projects), there is information on Habitat Protection and/or Restoration on Acquired Lands stating:</p> <p><i>“Currently, 245 acres have been added to the Refuge and another 729 acres are expected to be added within the next few years. Newly acquired parcels will require habitat restorations, baseline biological surveys, monitoring, and boundary posting. Wetlands will be restored where possible, and upland areas will be restored to habitat types as outlined in the Plan. This project will dovetail with a proposed Land Protection Plan, as part of the Plan.”</i></p>
Pollution – Contaminants
<p>Summary of Comments:</p> <p>The Plan states that Aransas NWRC needs to address the dumping of trash and hazardous materials at sea, but there is little that can be done in regards to this. Perhaps near term efforts should be focused on removing hazardous materials that are explicitly dangerous to wildlife. Efforts beyond this should focus on surveys that could identify sources of trash and develop solutions that address trash from its source. Volunteers or non-profit organizations could be pursued to aid in this effort and to minimize staff distraction from more important and immediate conservation goals.</p>

Agency Response:

Clean up of contaminants is a priority for the Refuge. For the last two years, the Refuge has implemented a clean up twice a year (once in the spring and fall) in which staff now controls cleanup methods and materials. In the past, hazardous materials cleanups have varied. Now, the Refuge has the regularly occurring cleanups to fulfill some of these efforts. Aransas NWRC also performs cleanups with local youth groups.

The Regional Office intends on doing a Contaminant Assessment Process, which assesses the Refuge in relation to environmental contaminants, in the coming years as well. In the past, the U.S. Fish and Wildlife Service had done surveys to identify the sources of the trash. The National Park Service took the lead on this surveying initiative to determine sources of trash across the area.

The Plan includes multiple strategies regarding the accumulation of contaminants and debris under Habitat Objective 5, Gulf Beach and Dune Habitat, that state:

- The Texas Beach Cleanup and Adopt-A-Beach Programs will be encouraged on Matagorda Island with GLO and TPWD. **Ongoing**
- Cooperate and coordinate with appropriate agencies (e.g., TCEQ, Environmental Protection Agency, and GLO) to address the accumulation of debris and hazardous materials that wash up on the beaches of Matagorda Island through increased vigilance, enforcement, and industry compliance. **Ongoing**
- Remove hazardous waste and materials, oil spills, and illegal drugs washed up on the beach and dunes. Standard procedures for removal and disposal of these materials will be followed in cooperation with the U.S. Coast Guard, Texas General Land Office, TCEQ, EPA, and local officials. **Ongoing**
- Large artificial structures stranded near shore or washed ashore will be removed to restore and maintain the visual esthetics and integrity of this habitat as necessary. **Ongoing**
- Within five years of Plan approval, develop and seek funding for a quarterly (per year) Refuge beach cleanup program to address the volume and types of trash, debris, and contaminants, primarily on Matagorda Island beaches. This may include two additional staff positions.
- Coordinate with EPA and TCEQ regarding follow-up studies and assessing potential hazards for making informed management decisions on radiation levels detected on Matagorda Island during a preliminary 2002 survey. **2011**

Wildlife**Wildlife Management – Trust Species****Summary of Comments:**

In Section 2.4.9.1, it is stated that Matagorda Island is unique in the respect of low human disturbance, and it is suggested that sea turtle patrols be minimized and Kemp's ridley nests be left to incubate in situ. While the long-term goal should be to return to nature's way, the current number of nests on Matagorda Island suggests that it is premature to leave eggs in situ given the higher risks of so doing. Leaving nests in situ is also in direct opposition to recommendations by the Kemp's Ridley Sea Turtle Working Group and the approved Kemp's Ridley Sea Turtle Recovery Plan. For decades, the Kemp's Ridley Sea Turtle Working Group has agreed that most eggs from Kemp's ridley sea turtle nests found in Texas should be brought to Padre Island National Seashore for protected incubation within their facility. Studies are first needed to ensure protection of the eggs in situ and to fully understand the differences in success of in situ hatching versus incubation and release, especially given that predators like the feral pig are now in the mix. If egg translocation to Padre Island National Seashore is not undertaken, the most prudent egg protection strategy would be corral incubation and not in situ incubation.

Agency Response:

Relocation of Kemp's ridley sea turtles to Padre Island National Seashore may be feasible for other nesting sites on the Texas coast, but this action would create a significant disturbance if implemented on Matagorda Island. Due to the lack of vehicular access to Matagorda Island, relocating nests from the island to Padre Island National Seashore would require staff to travel by boat, which could disturb the nests. Due to this disturbance factor, such relocation efforts may cause more harm than benefit to sea turtle populations on Matagorda Island and are not a feasible recovery strategy at this nesting site.

Matagorda Island is a barrier island that, as a national wildlife refuge, has the potential to serve as a natural nesting site for sea turtles, including the Kemp's ridley. The island offers a relatively undisturbed beach where little to no public use occurs, driving is restricted, and feral hogs are controlled through various means. Also, there are at least two regularly scheduled large-scale Matagorda Island beach cleanups every year that help the Refuge to remove hazardous debris and trash from the island. As Section 2.4.9.1 of the Plan states, these management activities and the relatively undisturbed habitat prevalent on Matagorda Island present a unique opportunity to allow for the natural establishment of an additional nesting location for sea turtles. Therefore, the Refuge has deemed it appropriate and feasible to allow for natural sea turtle reproduction on Matagorda Island.

The Refuge actively monitors for sea turtle nests on the island. ATV riding for the purpose of sea turtle patrols currently occurs five days a week from 7:00 a.m. to 4:30 p.m., April through June, across the entire 35 mile long Matagorda Island. The Plan proposes that Refuge staff seek a more balanced approach to monitoring. This is not to say that the Refuge will completely cease all monitoring of the Kemp's ridley sea turtle nests. In fact, a strategy within Wildlife Objective 2 specifically states that the Refuge will:

Consult with local and regional experts within the Service, other cooperating agencies, and appropriate recovery plans to establish sound monitoring protocols. For example, a balanced monitoring approach is needed with respect to sea turtle patrols to ensure such monitoring activities are not adversely affecting habitats or other sensitive species.

Furthermore, the Kemp's ridley sea turtle was chosen as a Refuge focal species. Because this turtle is both a focal species and an endangered species, both Wildlife Objective 2 and 3 are relevant regarding its monitoring efforts.

In accordance with Section 7 of the Endangered Species Act, the Refuge underwent an intra-service endangered species consultation, which is included in Appendix H of the Plan. The consultation assessed the effects of the Plan on sea turtles, including the Kemp's ridley, and found that the proposed management of the Draft Plan is not likely to adversely affect species or critical habitats.

Comment:

Section 2.4.9.1 of the Draft Plan also states that the sea turtle patrols ("intense use of ATVs and human presence") is detrimental to other species and detracts from the natural character of the beach. However, during my review of the Draft Plan, I was unable to find documented evidence of harm to other species from sea turtle patrols. The draft suggested that monitoring for nesting Kemp's ridley sea turtles and nests be minimized on Matagorda Island to remedy this concern. Nests undoubtedly would go undetected and unprotected. The tracks and nest signs from this lightweight turtle would blow away in the strong winds these nesting turtles prefer, and tides would wash away the tracks on the low beach. Enumeration of nests would be impossible and hence there would be no means to evaluate the effectiveness or progress of this "natural establishment of an additional nesting location for this species." Human intervention must be continued to help recover this species.

Agency Response:

ATV riding for the purpose of sea turtle patrols currently occurs five days a week from 7:00 a.m. to 4:30 p.m., April through June, across the entire 35 mile long island. The noise and the tracks produced by ATVs may disturb birds and other wildlife. In the past, the Refuge had ATV sea turtle patrols seven days a week. Due to the staffing and equipment needs of the sea turtle program, accompanied by ATV maintenance and replacement, the cost of monitoring for these nests is disproportionately high when the number of nests found is considered.

In Chapter 5, the Plan states that "a balanced monitoring approach is needed with respect to sea turtle patrols to ensure such monitoring activities are not adversely affecting habitats or other sensitive species." The Refuge is not proposing to end monitoring but rather to achieve a more balanced monitoring approach by working with species experts and cooperating agencies. The number of turtle nests documented by sea turtle patrollers over the past five years is illustrated in the following table. The information presented regarding sea turtle nests and the use of ATVs is based on personal observation and sound professional judgment.

Year	Number of Nests	Average Hatching Success Rate
2005	3	69.56
2006	4	84.7
2007	8	94.97
2008	13	80.07
2009	8	77.24

Comment:

With Matagorda Island beach likely to be the only nesting area that will remain essentially undisturbed by human activities over the long term, it is essential that Aransas NWRC maintain an active, aggressive program to support nesting of Kemp's ridleys (and other sea turtle species) on this beach area. While the CCP mentions this work (and includes \$33,828 for the effort,) there is no description of the plan for this species or the reasons for the expenditures.

Agency Response:

The budget shown in the table is referring to the cost of continuing operations as they stand today. There is no start-up fee associated with the continued sea turtle management efforts because this program was initiated previously. The management direction that addresses recovery of the Kemp's ridley sea turtle is outlined in the following text.

Wildlife Objective 2, Monitoring Endangered and Threatened Species (Chapter 5), states: "Annually monitor all endangered and threatened species such as the whooping crane, Kemp's ridley sea turtle, piping plover, and Aplomado falcon populations which occur on the Aransas NWRC to understand current population levels, trends, and responses to management." Strategies to achieve this objective are outlined in Chapter 5 and include surveying, monitoring, and working with species experts.

The Plan also includes Wildlife Objective 5, Invasive and Exotic Species Management (Chapter 5), which states: "By 2024, reduce the number of feral hogs to the point that five percent (5,797 acres) or less of the areal extent of the Refuge is affected by hog-rooting activities." Included in the rationale for this objective is the damage that feral hogs do to endangered sea turtle habitats. This objective, therefore, will help to protect the Kemp's ridley sea turtle by protecting their habitat.

Habitat Objective 5 (Chapter 5) seeks to continue to protect and preserve the Gulf beach and dune habitat on the Refuge Complex (Matagorda Island) for the primary benefit of threatened and endangered species (e.g., sea turtles, piping plovers, brown pelican), migratory birds, and other wildlife but also to serve as the primary buffer protecting the landward areas of the Island, bays, and the mainland from the full impact of storm surges and hurricanes. The strategies outlined under this objective will help to protect the habitat where sea turtles, including the Kemp's ridley, nest.

<p>Comment:</p> <p>Guadalupe-Blanco River Authority is concerned about many statements in the Plan that relate to the issue of "adequate freshwater inflows". As just one example, page 4-15 includes the statement: "the whooping cranes' primary food source (blue crabs), are directly affected by lack of freshwater inflows, which in turn may affect whooping crane survival." It will be important as we move forward to determine the freshwater needs of the whooping crane that decisions be based on sound science. This is consistent with the intent of the Plan that management decisions move away from being "based on personal opinions" (page 5-13).</p>
<p>Agency Response:</p> <p>Thank you for your comment. We will strive to put more science in our decision making process.</p>
<p>Comment:</p> <p>In Section 3.2.3.6, the aplomado falcon should be mentioned among the endangered species.</p>
<p>Agency Response:</p> <p>The aplomado falcon is listed on the endangered species list in Section 3.2.3.5, Threatened and Endangered Species. Section 3.2.3.6, Priority Fish, Wildlife, and Plant Species, includes information focusing on priority species. Not all of the priority species are listed in this section; only examples are given. The glossary defines priority species as: <i>Wildlife or plants that may be federally listed species but also include rare, declining, or species of management concern that are on lists maintained by natural heritage programs, landscape-level plans, State wildlife agencies, other Federal agencies, or professional academic and/or scientific societies. Further research and field study are needed to resolve the conservation status of these species.</i></p> <p>The aplomado falcon is also mentioned in Wildlife Objectives 6 and 7, where specific strategies are included that reflect on its recovery.</p>
<p>Comment:</p> <p>The aplomado falcon should be mentioned among the endangered species in Section 3.2.3.7 and in Table 4.</p>
<p>Agency Response:</p> <p>Section 3.2.3.7 is about Refuge focal species. Focal species, which the Refuge selects, are a subset of the priority species. The formal definition of focal species, which is included in the glossary, is: <i>Wildlife species that are a subset of priority species and that represent larger guilds of species that use habitats in a similar way.</i></p> <p>Refuge staff did not choose the aplomado falcon as a focal species because monitoring of this species is limited. Limited monitoring of this species would prevent the falcon from effectively representing the larger guild of species that use the same or similar habitat. The Peregrine Fund monitors falcon production on the Refuge twice a year. Their goal for off-Refuge dispersal appears to be progressing. If the falcon's numbers decrease in the future, the Refuge would increase efforts to continue recovery.</p>
<p>Monitoring – Focal Species</p>
<p>Comment:</p> <p>The first four Wildlife Objectives involve ongoing monitoring. Monitoring is of little value unless the results are used for some purpose. Therefore, the CCP should include the protocols used for monitoring (techniques and frequencies), historical results in general, and most importantly levels of concern, i.e., what results will trigger additional action.</p>
<p>Agency Response:</p> <p>The Plan states that Aransas NWRC will develop a Biological Inventory and Monitoring Plan by 2011. This future monitoring plan will include all of the specific details.</p>
<p>Comment:</p> <p>Wildlife Objective 4 – “Monitoring Other Wildlife Species” states that monitoring of these species is ongoing but does not detail what the species are or what the historical variance has been. What results will dictate that active management is required?</p>

Agency Response:

The Plan states that Aransas NWRC will develop a Biological Inventory and Monitoring Plan by 2011. This future monitoring plan will include all of the specific details. The species to be monitored will be those deemed necessary based on Refuge needs (adaptive management). The category title, “Monitoring Other Wildlife Species” is a result of the wording used in the Refuge purpose, which states that the Refuge was established for migratory birds, threatened and endangered species, and other wildlife.

Habitat**Habitat Management – Methods****Comment:**

In response to wildlife having the first priority (Section 1.3), this is not the case on Matagorda Island. Producing grass has first priority and wildlife is of much lower priority.

Agency Response:

Section 1.3 describes the Purpose and Need of the Plan. The statement, “wildlife has first priority in the management of refuges,” comes from a legislative mandate issued in the National Wildlife Refuge System Improvement Act of 1997. The National Wildlife Refuge System is obligated to follow this management directive.

Comment:

This comment is written in response to the statement, “Specific responsibilities include enforcing Federal wildlife laws, managing migratory bird populations, restoring nationally significant fisheries, administering the Endangered Species Act, conserving and restoring wildlife habitat such as wetlands, and helps Native American tribal governments and foreign governments with their conservation efforts (Section 1.4, Fish and Wildlife Service Mission).” Growing more grass is not restoring wildlife habitat. Take plant succession the opposite direction. Revert back to forbs and some bare ground to develop plant diversity, especially if wildlife has first priority. If the management practices of the 1960s, 1970s, and 1980s (which produced a magnificent wildlife area) were still in use, there would be no need for restoration at this time.

Agency Response:

Section 1.4 explains the purpose, mission, and responsibilities of the U.S. Fish and Wildlife Service in general, which includes conserving and restoring wildlife habitat. Efforts to grow more grass on Matagorda Island are conducted in order to restore the habitat conditions that occur there naturally as a barrier island.

Comment:

In response to Goal A of Section 1.5 of the Plan, include the word ‘develop’ along with conserve. Should have much more plant diversity resulting in improved wildlife diversity and density. In response to Goal B of the same section, developing a network of habitats is not being done. A network of habitats is not and cannot be developed by the current burning plan.

Agency Response:

The goals included in the section are goals of the National Wildlife Refuge System as a whole, not only Aransas NWRC. The goals are quoted from U.S. Fish and Wildlife Service policy, 601 FW 1, National Wildlife Refuge System Mission and Goals and Refuge Purposes.

Across the entire Refuge System, the Fish and Wildlife Service is making strides to fulfill their mission, which is reflected in the goals listed in Section 1.5. Through burning, Aransas is maintaining the habitat. The U.S. Fish and Wildlife Service is developing a network of habitats across the entire 115,000 acres of the Refuge, as opposed to isolated units that may exist on individual refuges. Across the entire Refuge acreage, Aransas NWRC contains a natural diversity of habitats. Likewise, it is within the scale of the entire Refuge System that the FWS is establishing a diversity of habitats.

Comment:

How can grazing be compatible under one Refuge Manager and incompatible under his replacement? I never heard one good reason for removing livestock from Matagorda Island—scientific or otherwise—except that cattle were not "natural." Therefore, I must assume that the elimination of cattle was an ideology, a psychology, a mindset. The overall result of this action was the reduction of the island from a magnificent source of wildlife habitat to what is there today: not much, mostly grass. This involves a lot of acres out of quality production for wildlife because of ideology.

Agency Response:

In accordance with the mission of the U.S. Fish and Wildlife Service and the National Wildlife Refuge System and with the purpose of Aransas NWRC, the Refuge manages habitats and takes efforts to restore habitats to their natural conditions. Eliminating cattle grazing from an island where these alien species are not naturally occurring is part of the effort to restore natural habitat. Also, the logistics of transporting cattle to an island with limited access by boat produce a safety hazard and excessive infrastructure costs with little to no benefit to the Refuge or its management goals and objectives.

Comment:

Develop more short grass sites using grazing or mechanical means to provide "grazing" or "grubbing" areas for whooping cranes and other wildlife.

Agency Response:

The Refuge provides short grass habitat through prescribed burning. The fires open up areas to short grass where whooping cranes feed on grubs, other vertebrates, and acorns.

Comment:

Get with TPWD biologists and develop a plan to experiment with various methods to improve wildlife habitat on Matagorda Island. Methods might include burning, disking, mowing, plowing, and perhaps grazing on the north end of the island. TPWD personnel are managers and are not averse to using mechanical and grazing methods to improve wildlife habitat.

Agency Response:

According to the 1994 Memorandum of Agreement (see Appendix F) between TPWD, Texas General Land Office, and the U.S. Fish and Wildlife Service, TPWD is responsible for managing only public uses on Matagorda Island, whereas the Fish and Wildlife Service is responsible for habitat management on the island. The Plan includes a strategy in Chapter 5, Public Use Objective 9 (Partnerships), to "continue to honor and support the 1994 MOA." Per this strategy, the Refuge will continue to use the best available science to determine proper habitat management on the island and will continue to rely on TPWD for management of public uses.

Comment:

The exclusion of specific habitat management practices from the CCP, such as cattle grazing and disking, could limit the adaptability of current and future Refuge managers. Although we would not suggest that the FWS implement practices deemed impractical or cost-ineffective, we do contend that practices such as grazing and disking can produce an often beneficial plant community response.

Agency Response:

Refuge staff agrees that grazing and disking can produce beneficial plant community responses, but it is not feasible or cost-effective for the Refuge to do this at the scale at which Aransas operates. It is also not feasible or cost-effective for the Refuge to invest in a livestock herd on Matagorda Island.

Comment:

The original part of the Refuge and the southern part of the Island have to be managed in a different manner than I would encourage you to manage the northern part. The northern part of the island has never been, for whatever reason, very attractive to the whooping crane.

Agency Response:

The original part of the Refuge is the upper two-thirds (northern 28 miles) of Matagorda Island, which the U.S. Fish and Wildlife Service received from the U.S. Air Force (Chapter 1). The southern part of the Island was added in the late 1980s. For a multitude of possible reasons, the whooping cranes are currently expanding northward on Matagorda Island. As such, the Island will be managed for its intended purposes of migratory birds, endangered species, and other wildlife. The Refuge practices adaptive management so that abilities to protect and enhance wildlife populations and their ecology are improved through more efficient uses of resources as knowledge and understanding of ecosystem interactions is further developed.

Habitat Management – Invasive Species**Comment:**

It is stated that "...invasive exotic species control...will follow specific guidance established in the specific consultations and guidelines for these actions." Sorry, but this is not specific enough. When dealing with the USDA Animal Services people or when contracting with any other entity, it will be important for the FWS to specify in the work order or other contractual instrument that no ammunition with lead projectiles will be used to shoot unwanted animals.

Agency Response:

Aransas NWRC specifies terms and conditions when contracting work out with all other entities. Refuge staff agrees with the comment and is working to move in that direction to the full extent as fast as we can. Currently, the use of green bullets is not readily available and is cost-prohibitive. As this technology becomes more advanced, the Refuge may implement the use of green bullets.

To respond to this comment, the U.S. Fish and Wildlife Service consulted with David J. Hayes, USDA Wildlife Services Environmental Coordinator. WS assessed the impacts of aerial gunning and lead shot use in the Colorado Predator Damage Management Environmental Assessment, which is available on their website at <http://www.aphis.usda.gov/regulations/pdfs/nepa/CO%20PDM%20EA%202005.pdf>. Aransas NWRC concurs with the recommendations that the USDA has provided.

As mentioned in the response to hunting methods and rules comments, USDA Wildlife Service uses double-ought buckshot on feral hogs to enhance humaneness and specifically to minimize any lead issues associated with rifle bullets or smaller shot, which might be ingested by scavengers. Double-ought (00) buckshot is 0.33" (8.4 mm) and is large enough for most scavengers to detect (with the exception of the California condor, which appears to be non-discriminatory in what it will swallow). While some alternatives may exist (e.g., Heavyshot), these alternatives do not perform as well and have not been found to be as humane as lead shot on feral hogs. Shot size less than 00, and all steel alternatives, are not effective for the same reasons.

Comment:

In Section 5.2, Wildlife Objective #5 should be divided into two objectives – "Feral hog Management" and "Invasive and Exotic Species Management." Most of the plan included in this CCP pertains to feral hogs and describes this important objective clearly. Consideration should be given to identifying interim objectives for feral hog levels. Because plans for other invasive and exotic species are much less specific, they should be established as a separate objective.

Agency Response:

This objective is combined because the feral hog is the predominant exotic species of concern on the Refuge. The management effort is directly correlated to the impact of the species, which is measured by the amount of destruction caused by the invasive and exotic species. If other species become equal or greater in their impact, the Refuge would refocus management efforts towards that species and develop strategies accordingly. The Plan includes a strategy under Wildlife Objective 5 that states that Aransas NWRC will develop an Integrated Pest and Invasive Species Management Plan by 2011, which will address the issue of invasive species in further detail.

Comment:

The Refuge should continue its efforts to control the feral pig on the Island to reduce the risks to in situ nests.

Agency Response:

Aransas NWRC agrees that feral hog control should be a management priority across the Refuge, including on Matagorda Island where endangered sea turtles nest. This was incorporated into an objective in the Draft and Final Plans (see Chapter 5, Wildlife Objective 5).

Wildlife Objective 5, in Chapter 5, states that the Refuge will: *By 2024, reduce the number of feral hogs to the point that five percent (5,797 acres) or less of the areal extent of the Refuge is affected by hog-rooting activities.* Details on such efforts will be outlined in the Integrated Pest and Invasive Species Management Plan to be completed in 2011.

Water Resources

Water Management – Groundwater

Comment:

Water use and management description in Section 4.1.2 does not include the use of ground water (windmills) to maintain various ponds/wet areas. What are the management plans for application of ground water? What are the current and expected future State laws pertaining to this use? What are the quality parameters considerations?

Agency Response and Action Taken:

The Refuge has developed wind-powered, solar-powered, and generator-powered (where needed) groundwater wells specifically for wildlife and human consumption on all Refuge units with the exception of the Lamar Unit. Currently, the Refuge is converting some of the wind-powered wells to solar power. Not all of the existing windmills are functional.

According to State law, all wells must be inventoried and their use must be documented with Texas Commission on Environmental Quality (TCEQ) and Texas Water Development Board (TWDB). The Refuge is currently working with TCEQ Water Division and TWDB to comply with regulations on groundwater use and the production of drinking water at Headquarters. Aransas NWRC undergoes periodic water quality testing to remain within compliance, and the Refuge sends monthly drinking water quality samples to an approved commercial water lab called B-Environmental in Victoria, Texas. For wildlife, there are no water quality parameters.

Legal and Regulatory

Planning Process – General

Comment:

The draft specifies that the CCP would be in force for 15 years. As it took nine years to this point to produce a draft, I comment that the planning procedure was (is) too drawn out. The draft contains an incredible amount of information that will not need to be repeated. As such, it will remain a valuable document even after 15 years. Presumably, when the next CCP is done, it will not take as long to do as this one.

Agency Response:

Staff changes, priority changes, and other delays have unfortunately slowed the CCP process this time around. As this is the first comprehensive conservation planning effort taken by the Refuge that considers all aspects of management, it was expected to take multiple years. Aransas NWRC does not see the future revisions taking as long as the first plan and will do everything in staff power to expedite the process.

Comment:

Read the entire proposal with keen interest after reading about it in my National Rifle Association email. Please convey my favorable complements to everyone who devoted their time to this proposal. It appears to me that every issue has been considered and thoroughly addressed. Thank you for your excellent work.

Agency Response:

Aransas NWRC thanks you for your interest and support.

Comment:

There are six Habitat Objectives in the plan. All consist only of continuing present activities plus creating a Habitat Management Plan by 2013. It is disappointing that this CCP, which has been under development at least since it was originally issued for comments in March 2003, does not include more detail about habitat management.

Agency Response:

The habitat management efforts that the Refuge is proposing in the Plan are not a drastic change from the current management. This is because the Refuge practices adaptive management. Strategies within the various habitat objectives include some detail, which will be expanded on in the Habitat Management Plan (HMP). The 2013 HMP will likely include a more detailed history of management, plans for future management at a prescribed burn unit scale, and monitoring plans for each land unit. Although the CCP process is lengthy, the Plan must cover the long-term management of a broad range of topics varying from habitat management to allowance of public uses. Therefore, the purpose of the step-down plans (including the HMP) is to address each component of the CCP in greater detail.

Comment:

The “background information sections” of this report are generally well done and demonstrate considerable effort. However, the sections describing plans are pretty superficial. That is the sections detailing “Goals, Objectives and Strategies” in general contain little detail because the intent is to describe more fully in “step-down plans,” which are to be issued in the future. Use of “step-down plans” for details is appropriate. Nevertheless, additional information should be included in the CCP.

Agency Response:

Thank you for your comment. The Comprehensive Conservation Plan is the guiding document that shapes the direction of Refuge management. The details of many specific actions will be determined in focused step-down plans. The Plan is only a starting point that outlines the big picture; the Refuge needs monitoring, information, and time to fine-tune details of management direction based on sound science.

Comment:

As the draft was put together from input by different authors, there are some problems that need attention from a professional writer. One such is the use of the transitive verb comprise. Correct usage is, as in 3.1, “Aransas NWRC comprises...”: incorrect usage is a number of places, “...is currently comprised of....” The verb compose should be used in this construction. Although a matter of style and taste, the tendency in the draft is to overuse the comma.

Updated Text:

Thank you for your comment. Every plan is edited and formatted by a professional editor who has checked for writing errors, including verb usage.

Planning Process – Environmental Assessment
<p>Comment:</p> <p>On pages I-40 of the EA and in regards to the analysis of Alternative C: Grazing is one of the most successful and cheapest assets for managing wildlife habitat if utilized properly. In order to accomplish this, a highly qualified grazing and wildlife manager is a necessity. The ideology that grazing is not compatible on Aransas Refuge needs to be discontinued. Many thousands of acres within the Aransas Complex have been severely adversely affected by the anti-grazing ideology.</p>
<p>Agency Response:</p> <p>Thank you for your comment. In accordance with the mission of the U.S. Fish and Wildlife Service and the National Wildlife Refuge System and with the purpose of Aransas NWRC, the Refuge manages habitats and takes efforts to restore habitats to their natural conditions. Livestock grazing occurs only on the Myrtle Foester Whitmire Unit, where it has been deemed a compatible use. Eliminating cattle grazing from areas where livestock does not naturally occur is part of the effort to restore natural habitat. If cattle grazing were deemed a beneficial management action and evidence was provided based on sound science, Aransas NWRC staff would re-evaluate its compatibility. At this time, however, cattle grazing is not an appropriate and compatible use on the majority of the Refuge.</p>
<p>Comment:</p> <p>We note that the Plan included an EA, which we assume reflects the FWS expectation that the final decision document will be a FONSI. For the record, should a FONSI be issued, Guadalupe-Blanco River Authority (GBRA) will take it as FWS acknowledging that while the issues of freshwater inflows (and other management actions set forth in the plan) are important, they do not now rise to the level of causing significant impacts to the whooping crane. Such a conclusion seems to be reasonable given the long-term substantial growth in the population of the Aransas-Wood Buffalo flock.</p>
<p>Agency Response and Action Taken:</p> <p>The EA and FONSI cover only the Refuge management actions proposed in the Plan. Additional studies on freshwater inflows and their effect to whooping cranes will be included in the Land Protection Plan, Recovery Plan, and other facets of coastal conservation. The Plan does not state that freshwater inflows do not have an impact on whooping crane habitat. Instead, the EA includes the statements that freshwater inflows are impacted by users upstream and are an issue of concern on the Refuge. Specifically, Section 3.1 states:</p> <p style="padding-left: 40px;"><i>Aside from water quality, one of the Refuge's largest concerns involves freshwater inflows. Gulf coastal habitats are influenced by actions off- Refuge that affect the quantity and quality of freshwater inflows into the San Antonio Bay and Aransas Bay ecosystems. Several rivers converge and empty into the bays surrounding the Refuge that affect the health and populations of the blue crab, a primary food source for the whooping crane.</i></p> <p>Furthermore, in Section 5.1 of the EA (Cumulative Impacts on Physical Resources), the Refuge states:</p> <p style="padding-left: 40px;"><i>These freshwater inflows, a major habitat component for some sealife such as the blue crab, are controlled by river authorities upstream from the Refuge.</i></p> <p>The purpose of the EA is to evaluate the impact of the management actions taken only by the FWS on the Refuge. The Finding of No Significant Impact (FONSI) is a concurrence that no significant impact would occur based on the Refuge's proposed action. Issuance of a FONSI in no way means that the issue of freshwater inflows has no impact on whooping cranes. In fact, the EA acknowledges that freshwater inflows are a very big issue despite crane population increases. The Refuge expects that this will become an even bigger issue in the future because of increasing demands of human use.</p>

Planning Process – Vision Statement**Summary of Comments:**

The vision reads, "Refuge plays a critical role in coastal habitat preservation and management." The vision also states, "Refuge will provide vital habitat for thousands of migratory birds..." and "Refuge envisions building native coastal habitat diversity."

The type of habitat being preserved is grass, when it should be and could be diverse plant communities. Burning, which only produces more grass, is the primary management technique when there are others available for the benefit of wildlife. There are other, better methods that would provide diversity. Burning on a pre-planned schedule for selected sites is far from being "natural." Burning also provides birds with very limited habitat compared to what it could and should be. The most beneficial result from this type of burning is the vegetation diversity occurring on disked fire lanes.

Agency Response:

Currently the use of fire, along with mechanical treatment of woody invasive species and chemical treatment of exotics, meets the needs of native wildlife species that are present today. The Refuge is preserving a portion of the coastal ecosystem. Although prescribed fire may not completely replicate the natural processes, it is the best and most cost effective method that the Refuge can use for management purposes. The grasslands on the Refuge have historically burned in short fire regimes, typically with a three- to five-year return interval. To better mimic natural processes, the Refuge has attempted to consider the management of larger units of land (whole ecosystems) rather than disjointed portions.

The Refuge is not attempting to build diversity by intensively managing the land. Rather, the Refuge envisions building native coastal habitat diversity by incorporating into management the restoration of ecosystems such as the Myrtle Foester Whitmire Unit. The Refuge is using the ecosystem approach to management to provide, as they exist naturally, to meet the purpose of the Refuge, which is to say to meet the needs of migratory birds.

Furthermore, the Vision Statement is meant to provide a vision of the state of affairs at the Refuge many years in the future. In the planning process, these broad statements are then used to create overarching goal statements that shape more specific objectives, strategies, and individual projects. The goals, objectives, and strategies are statements that the Refuge believes will help staff to achieve their vision of Aransas NWRC in the future.

Planning Process – Partnerships**Summary of Comments:**

The Refuge should consider establishing 'peer review' or 'objective advisory' teams—groups of specific individuals from the appropriate agencies plus knowledgeable individuals from academia, industry, retired agency employees, and perhaps even amateurs. These teams would be assigned to specifically oversee their respective responsibilities. In addition to bringing greater diversity of thought and approaches, increased support for the Refuge is likely since experience says that "greater involvement tends to create greater active support".

Agency Response:

Land managers are hired by FWS to manage the land in accordance with best available science. The Federal Advisory Committee Act (FACA) of 1972 is the legal foundation that describes how Federal agencies, including the U.S. Fish and Wildlife Service, are obligated to form advisory committees. Provisions of FACA include that new advisory committees should be established only when they are determined to be essential and their number should be kept to the minimum necessary. FACA provides strict guidelines on establishing and maintaining such committees. It is likely that FACA would not allow for committee establishment in the manner described. The Refuge currently consults other agencies, both Federal and State, when needed to achieve a well-rounded approach to management based on sound science.

Also, the U.S. Fish and Wildlife Service is leading in an initiative known as Landscape Conservation Cooperatives (LCCs). LCCs are applied conservation science partnerships focused on a defined geographic area that informs on-the-ground strategic conservation efforts at landscape scales. Each LCC brings together partners from Department of Interior agencies, other Federal agencies, states, tribes, non-governmental organizations, universities, and others. Aransas lies within the Gulf Coast LCC. More information on LCCs can be obtained at the FWS landscape conservation website: <http://www.fws.gov/science/shc/lcc.html>.

Comment:

The public involvement process for the Plan and EA appears to focus entirely on areas immediately surrounding the Refuge. Given that the Plan cites cooperative relationships with Guadalupe-Blanco River Authority and that the issue of freshwater inflows requires further research, it is clear that GBRA does have an interest in any and all management actions at Aransas NWRC. We request that henceforth a copy of any and all public notifications regarding Aransas NWRC be sent directly to GBRA so that we can determine whether and to what extent we wish to respond.

Agency Response:

Thank you for your interest, comment, and support. We will keep you on the mailing list.

Comment:

The Calhoun County Historical Commission requests the opportunity to place signs or to otherwise highlight the Civil War trenches along the road as a historical attraction.

Agency Response:

The FWS is ready and willing to work with partners to highlight the historical sites on the Island for the benefit of the public. This would be accomplished through a Memorandum of Understanding between the two (or multiple) groups.

Under Public Use Objective 10, Cultural Resources (Chapter 5), the Refuge states: “Within five years of Plan approval, complete a Cultural Resources Management Plan to improve protection and interpretation of the cultural, historical, and archeological sites on the Refuge.” A strategy within this objective is to develop exhibits and interpret history. The Refuge will consider feasible interpretive programs, including historical commission’s suggestion, as part of the Cultural Resources Management Plan.

Comment:

As an aside, I am president of the Port Aransas Boatmen and would like for you to consider us a nearby resource for outreach and support should we be able to be of service to the Refuge.

Agency Response:

Thank you for your interest, comment, and support. The Refuge will keep you on the mailing list.

Comment:

TPWD agrees that it is time to renegotiate the MOA between TPWD, Texas General Land Office, and FWS due to the fact the Wildlife Division now manages public access on the north end of Matagorda Island.

Agency Response and Action Taken:

Any revisions to the MOA will be done outside of the Plan process. The Refuge is willing to consider revising the original 1994 MOA in accordance with the previously mentioned comments. Specifically, a new MOA, addressing the use of facilities at the Port O'Connor Dock Annex, could be drafted to include coastal fisheries and law enforcement but not comingle with the original intent for the management of Matagorda Island.

Comment:

In regards to strategies under Wildlife Objective 8 (Chapter 5), Guadalupe-Blanco River Authority is ready, willing, and able to cooperate with the Refuge on this matter. GBRA appreciates past cooperation, such as allowing access of researchers from Texas A&M University onto active crane territories in 2003–2006. We look forward to similar cooperation for the next round of studies. GBRA would like to establish a far more formal and structured program for cooperation with Aransas NWRC and FWS for the purpose of ensuring that the best science is used in making decisions about protection of the whooping crane. We also wish to better understand the Refuge's various conservation initiatives and how GBRA might provide support to those in which there is a common interest. We hope to meet with the FWS Regional Director and the Aransas NWRC Refuge Manager this spring or summer to get that dialogue underway.

Agency Response:

Thank you for your interest, comment, and support.

Comment:

Guadalupe-Blanco River Authority believes that cooperative relationships serve the public interest far more than litigation. GBRA considers the recent litigation by The Aransas Project, which aims to have the issue of freshwater inflows adjudicated in Federal court, to be inappropriate, especially as the cooperative strategy is making good progress.

Agency Response:

Thank you for your interest, comment, and support. The Refuge does not take a stand on The Aransas Project issue.

Alternative C – General**Summary of Comments:**

I support Alternative C of the Draft Plan.

Agency Response:

Thank you for your input. Alternative C was not selected for a number of reasons determined by the Environmental Assessment (Appendix I). The EA evaluates the environmental consequences of three alternatives for future Refuge management. As stated in the Environmental Assessment, Alternative C would result in greater adverse environmental impacts, both temporary and long-term. For example, the increase in visitors to the Refuge caused by Alternative C would result in heightened disturbance to wildlife and habitats.

Alternative B, on the other hand, provides adequate and sustainable public use while giving management an emphasis on wildlife, consistent with the National Wildlife Refuge System Improvement Act of 1997. Alternative B also better meets the purpose of the Aransas NWRC, the National Wildlife Refuge System, and the U.S. Fish and Wildlife Service, while simultaneously keeping public use at appropriate and manageable levels. For details on all of the potential adverse and beneficial impacts of each alternative, please refer to the Environmental Assessment in Appendix I.

Alternative C – Management of Wildlife, Habitat, and Public Use

Summary of Comments:

Alternative C is the best alternative for the future management of Aransas NWRC because this choice expands priority public uses, including hunting, while simultaneously maintaining habitat for wildlife. Because the public funds the operations of Federal lands through Federal taxes, it seems fair that the public should have the opportunity to maximize their use of the land. It is also important to continue to foster hunting and fishing in our State for this and future generations.

Agency Response:

Thank you for your input. Alternative C was not selected for a number of reasons determined by the Environmental Assessment (Appendix I). The EA evaluates the environmental consequences of three alternatives for future Refuge management to assess how management actions will meet the purpose of Aransas NWRC and the missions of the National Wildlife Refuge System and the U.S. Fish and Wildlife Service. The Refuge purpose is outlined in Section 1.2, Refuge Purposes and Authorizing Legislation (Chapter 1). As noted, the mission of the U.S. Fish and Wildlife Service is

“working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.”

The mission of the National Wildlife 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”

As stated in the Environmental Assessment, Alternative C would result in greater adverse short- and long-term environmental impacts, detracting from fulfilling the Refuge purpose and the National Wildlife Refuge System and FWS missions. Alternative C proposes maximal habitat management emphasizing increased Refuge System priority public uses. Aside from the environmental impacts of this action, the increase in public use proposed by Alternative C would require a drastic increase in Refuge infrastructure, staff, and budget.

Alternative B, on the other hand, provides adequate and sustainable public use while giving emphasis to wildlife consistent with the National Wildlife Refuge System Improvement Act of 1997. Alternative B in no way detracts from hunting opportunities as this alternative aims to manage public uses consistently with current management while increasing the quality of the programs and the visitor’s experience. The current public use opportunities of the Refuge are not being fully utilized as it stands, and an increase in public uses is unnecessary. The focus of Alternative B is improving the condition of the existing uses rather than to add new uses. Overall, Alternative B better meets the purpose of Aransas NWRC and the missions of National Wildlife Refuge System and FWS.

For details on all of the potential adverse and beneficial impacts of each alternative, please refer to the Environmental Assessment in Appendix I.

Table J-4. Agency's Response to Public Comments that Warrant Changes in the Plan and Description of Action Taken

Wildlife
Wildlife Management – Trust Species
<p>Comment:</p> <p>In regards to achieving the whooping crane recovery plan and its goal of 1,000 whooping cranes, the draft plan does not adequately describe the strategy and approach for achieving this essential goal. What is the longer term strategy and outlook, who are your partners, where is the prospective habitat, what is the ultimate cost, when will the LPP be prepared?</p>
<p>Agency Response and Action Taken:</p> <p>First and foremost, the Refuge's Plan was updated to include a summary of information from the most recent (2007) revision of the recovery plan as opposed to the 1994 version. The Whooping Crane Recovery Plan guides the strategies and approaches for achieving the 1,000-bird recovery goal. The new summary is as follows:</p> <p><i>In the U.S., the whooping crane (Grus americana) was listed as "threatened with extinction" in 1967 and endangered in 1970 – both listings were "grandfathered" into the Endangered Species Act of 1973. Critical Habitat for this species was designated in 1978 and much of the Refuge is part of this designation (43 FR 20938). The Aransas-Wood Buffalo Population (AWBP) is the only remaining natural population of whooping cranes. This population breeds at the Wood Buffalo National Park in Canada and winters at Aransas NWRC. Therefore, much of the Refuge wildlife and habitat management is geared towards protection of the whooping crane, as directed by the Whooping Crane Recovery Plan. Aransas NWRC implements a variety of recovery actions involving protecting and managing their wintering habitat, maintaining freshwater inflows, and monitoring the birds during the wintering months. Habitat management actions proposed in the Plan closely coordinate with important whooping crane recovery items and known crane requirements, as per the recovery plan. The recovery goal is to protect the whooping crane and its habitat and to allow the overall population to reach a level of ecological and genetic stability so that it can be downlisted to threatened status and eventually removed from the lists of Threatened and Endangered Species.</i></p> <p><i>According to the recovery plan, two primary objectives and measurable criteria will help achieve the goal of reclassifying this species as threatened. The first objective is to establish and maintain self-sustaining populations of whooping cranes in the wild that are genetically stable and resilient to stochastic environmental events. The second objective is to maintain a genetically stable captive population to ensure against extinction of the species. In order for these objectives to be met, recovery actions are outlined in the recovery plan with the intent of reducing threats to the whooping cranes and their habitat. One such action is to protect whooping crane habitat, and the recovery plan specifically discusses the importance of the Aransas NWRC in providing cranes with winter habitat. Other actions described in the recovery plan are to maintain the Aransas NWRC, to prevent erosion and other disturbances to the quality of habitat available at the Refuge, and to maintain freshwater inflows. The recovery plan also includes an implementation schedule that prioritizes management as well as a list of individuals who are actively involved in the whooping crane recovery efforts.</i></p> <p>Next, many of these specific details on achieving this goal on the Refuge will be part of the Land Protection Plan which is to be developed by 2015 (Chapter 6). The main emphasis for land acquisition efforts by Aransas NWRC is to protect whooping crane habitat. When the LPP is developed, it will address the areas where management will occur. The Refuge has worked in partnership with others, including Ecological Services, the Canadian Wildlife Service, and other non-governmental organizations</p>

interested in crane recovery. The Refuge is also not the only entity reviewing land acquisition measures to aid in whooping crane recovery. As stated in Chapter 4, the Nature Conservancy of Texas in 2006 applied for a \$3,000,000 Coastal Impacts Assessment Program grant and a \$600,000 Section 6 grant to purchase conservation easements on lands needed by whooping cranes.

Legal and Regulatory

Planning Process – Environmental Assessment

Comment:

Potential impacts to air quality from oil and gas operations are not addressed in the EA. Depending on the number and type of operations that occur; there could be potential direct and cumulative impacts to the environment. Oil and gas operations may impact water quality if accidental releases have occurred. Mitigation for these types of potential impacts (past, present, and future) is not addressed except in very general terms. Additionally, it is difficult to determine the extent of oil and gas operations since no map was provided in the Plan or EA.

Agency Response and Action Taken:

Potential site-specific effects attributed to oil and gas operations on the Aransas National Wildlife Refuge Complex are considered under separate NEPA documents that evaluate construction or use of those developments. (Examples of these documents include Environmental Assessment Mesquite Bay Project, 1977, Aransas County, Texas; Operations Plan and Environmental Assessment for a Proposed 3-D Seismic Program on the Myrtle Foester-Whitmire Division of the Aransas National Wildlife Refuge Calhoun County, TX., 2003; and Operations Plan and Environmental Assessment for a Proposed 3-D Seismic Program on the Matagorda Island Unit of the Aransas National Wildlife Refuge Calhoun County, TX.). This Plan and associated EA does not permit any new construction or use of oil and gas developments. However, some potential effects to air and water quality and associated mitigation measures were not adequately described in the Plan's Environmental Assessment (EA). Accidental spills do occur, and they can contaminate soils and vegetation, and may affect wildlife that land on or come in contact with spill sites. If an accidental spill occurs, the operator is wholly responsible for cleanup efforts. Cleanup and restoration of these sites occurs according to the Refuge's *Oil Spill Contingency Plan for Aransas National Wildlife Refuge* (1993) and the *Spill Prevention, Control, and Countermeasures Plan* (2005 and currently being revised), both of which are on file at the Refuge Headquarters. In addition, each operator must develop an oil spill prevention plan; if they do not have this on hand, operations are ceased. Because the Refuge does not own the subsurface mineral rights, there is little more the Refuge can do to address air and water quality issues presented by oil and gas operations. However, these potential impacts should have been addressed in this EA. The EA will be revised to reflect these considerations.

The Draft Plan did include a map on Oil and Gas easements (Chapter 4), and the Final Plan will also include this map with the addition of Active Wells and Separators (see Figure 4-1).

Comment:

The potential impacts of impaired water segments are not addressed. According to the 2004 Clean Water Act 303(d) report, segments TX-2462 (San Antonio Bay/Hynes Bay/Guadalupe Bay), TX-2472 (Copano Bay/Port Bay/Mission Bay), and TX-2473 (St. Charles Bay) are listed and are adjacent to the Aransas NWRC.

Agency Response and Action Taken:

Upon reviewing the 2008 Texas Water Quality Inventory and 303(d) list and the Draft 2010 303(d) list, both segments TX-2462 and TX-2472 are listed as impaired. These water bodies may cause adverse impacts to Refuge resources, and mention of this can be added to the EA. Segment TX-2473 (St. Charles Bay), however, does not appear on either of the impaired water body lists. Therefore, mention of this segment will not be added to the EA. The Refuge can only affect water quality within its jurisdiction, so water bodies that flow into or adjacent to the Refuge cannot be controlled by the Refuge. Refuge management activities, such as herbicide and fertilizer use and construction activities, and their potential effects to water quality were mentioned throughout the EA (Appendix I) in addition to

mitigation measures to minimize these effects. For the most part, the Refuge works as a filter to potentially improve water quality before water moves seaward. Thank you for this information. The two impaired water bodies that appear on the Texas 303(d) list will be mentioned in the EA and the Plan as having potential impacts to the Refuge's water quality.

Comment:

The cumulative impacts section does not address the proposed nuclear power plant near Victoria or facilities that are within 0.5 miles of the Aransas NWRC (e.g., Mitchell Energy Corp. and Exxon Corporation).

Agency Response and Action Taken:

The proposed power plant is approximately 40 miles from the Refuge, as the crow flies. This could potentially affect the Refuge when the north wind blows. We can add the proposed power plant as a "reasonably foreseeable future activity or impact" to the Refuge's air quality. The facilities by Chapparral and Exxon may have impacts on groundwater, plant communities, and wildlife. While impacts from these facilities are mentioned generally, we can add the names of the facilities immediately adjacent to the Refuge.

Comment:

The second paragraph on page I-27 of the EA should be re-worded to read that four firearms youth hunts for white-tailed deer and feral hogs are held on the Refuge. TPWD conducts two youth hunts for white-tailed deer annually on Matagorda Island.

Updated Text:

Four firearms youth hunts for white-tailed deer and feral hogs are held on the Refuge. One, in which local kids participate, is hosted by the Refuge and the Texas Wildlife Association on the Tatton Unit. A second hunt is held on Matagorda Island and co-sponsored by the Refuge and the Texas Wildlife Association as part of the Texas Youth Hunting Program. A third hunt is held on Matagorda Island twice annually and hosted by TPWD. The Youth Hunting Program was established to increase youth participation in safe and ethical hunting and to promote the hunting heritage of Texas.

Comment:

The second paragraph under Wildlife (page I-52 of EA) states, "The TPWD manages some State Parks and Wildlife Management Areas around the Aransas NWRC, but their management objectives are geared toward managing game species." The statement is not entirely accurate. TPWD requests that the sentence be reworded as follows to adequately reflect the goals of the Central Coast Wildlife Management Areas: "Finally, Texas Parks and Wildlife Department manages several State Parks and Wildlife Management Areas around the Aransas NWRC for the purpose of public use as well as development and management of habitat for indigenous and migratory wildlife species with special emphasis on waterfowl."

Updated Text:

The Texas Department of Parks and Wildlife manages some State Parks and Wildlife Management Areas around the Aransas NWRC for the purpose of public use as well as development and management of habitat for indigenous and migratory wildlife species with special emphasis on waterfowl.

Planning Process – Partnerships

Comment:

A "People Objective" in Section 5.4 is suggested, which would involve creating and maintaining specific "citizen science projects/groups." Refuge biologists could leverage their efforts to a great extent by (1) establishing these teams, (2) training those involved in detail, and then (3) allowing them freedom to accomplish, with minimal oversight by the biologist.

Agency Response and Action Taken:

Volunteer groups provide assistance in meeting Refuge needs and purposes as the comment suggests. Public Use Objective 9 specifically states that "Over the term of this Plan, we will continually promote and maintain excellent partnerships with agencies, groups, neighboring landowners, and other interested parties to help achieve Plan vision, goals, objectives, and strategies." Under this objective, the Refuge added a strategy that it will continue the Refuge volunteer program to help meet Refuge needs. This is how the Refuge utilizes citizen science groups.

Infrastructure**Staffing and Funding – General****Comment:**

It is difficult to relate the costs and activities detailed in Chapter 6 (Plan Implementation) with the descriptions provided in Section 5 (Goals, Strategies, and Objectives). As an example, funds are required for "Invasive Plant Control (Control Invasive Species)"; however, no new program is defined. There are several mentions of invasive plant control, but in each case the control is "ongoing," and all the CCP offers is a Habitat Management Plan, which is to be developed over the next three years. Funding should not be provided without definition of their use. Other examples could be given.

Agency Response and Action Taken:

The Refuge added statements that relate projects in Chapter 6 to their corresponding management direction (pertinent objectives and strategies) in Chapter 5.

For example, under the project titled, "Improve Ability to Survey Whooping Cranes," the following statement was added: *This project will help to accomplish Wildlife Objectives 2 and 8 as well as Habitat Objective 6.*

Please refer to Chapter 6 to see where these edits were made so that projects and the goals and objectives they target are more clearly connected.

General Edits Incorporated in Draft Plan**Comment:**

In the Matagorda Island Unit section of Section 1.1, the statement "There is no causeway, highway access, or other access to the Island" is misleading. There is public access via boat, which is frequently used by the public. This is then covered appropriately on in Chapter 4.

Updated Text:

There is no causeway, highway access, or other vehicular access to the Island.

Comment:

In the second paragraph of Section 1.7, please remove "Resource Protection" from the list. TPWD no longer has a Resource Protection Division.

Updated Text:

The Refuge's longstanding and extensive partnership with TPWD includes working with virtually all divisions of this State agency: Law Enforcement, Coastal Fisheries, Parks, Infrastructure, Communications, and Wildlife.

Comment:

In Section 2.3.1, the statement "The Aransas-Wood Buffalo Population (AWBP) is the only natural population of whooping cranes that breed at the Wood Buffalo National Park in Canada and winter at Aransas NWRC" is misleading. Better would be "The Aransas-Wood Buffalo Population (AWBP) is the only remaining natural population of Whooping cranes. This population breeds at the Wood Buffalo National Park in Canada and winters at Aransas NWRC."

Updated Text:

The Aransas-Wood Buffalo Population (AWBP) is the only remaining natural population of whooping cranes. This population breeds at the Wood Buffalo National Park in Canada and winters at Aransas NWRC.

Comment:

The information in 2.3.3 regarding the Land and Water Conservation and Recreation Plan (LWCRP) is outdated. The 2010 LWCRP was published and became effective in January 2010 with revised goals that will direct TPWD's operating plans and decisions regarding the State's natural conservation and recreation needs. The plan is available on the TPWD website (<http://www.tpwd.state.tx.us>) identified as "Land and Water Plan" under the Quick Links tab.

Updated Text:

Texas Parks and Wildlife Department developed the Land and Water Resources Conservation and Recreation Plan to aid the agency in conserving the natural and cultural resources of Texas for future generations. The criteria outlined in the plan will provide TPWD a foundation for decision making regarding the State's conservation and recreation needs. The first goal discussed in the plan is to "practice, encourage, and enable science-based stewardship of natural and cultural resources." The plan outlines various methods for achieving this goal, which include basing management decisions on best available science, becoming leaders in managing state lands, fostering conservation on private lands, and developing effective conservation partnerships. The Land and Water Resources Conservation and Recreation Plan explains a second goal of increasing access to and participation in the outdoors through actions such as encouraging nature and heritage tourism or facilitating access to private and public lands and waters for recreation purposes. Another goal for TPWD is to "educate, inform, and engage Texas citizens in support of conservation and recreation." The fourth goal is to "employ efficient, sustainable, and sound business practices," which TPWD plans to do using means such as technology, professionalism, excellent customer service, financial resources, effective communication, and an organized culture. The plan culminates with a call to action directed at members of the public, motivating them to join in the conservation effort.

Comment:

In the third paragraph of Section 2.5, Planning Process and Public Involvement, use the complete name of the nature club, i.e. Golden Crescent Nature Club.

Updated Text:

Four TPWD staff attended a Partners meeting held January 23, 2003, and 12 people attended the Golden Crescent Nature Club meeting.

Comment:

Section 2.4, Public Involvement: Issues, Concerns, and Opportunities, begins with the statement, "A wide range of issues, concerns, and opportunities were expressed during the planning process." This paragraph lands on the reader without adequate explanation. The paragraph cites discussions, but the reader does not know where from? Then, the paragraph at the end of Section 2.5, Planning Process & Public Involvement, finally explains where all this came from. Either the introduction should be expanded to provide some background, or the end paragraph(s) should be moved to the beginning.

Updated Text/Agency Response and Action Taken:

"Planning Process and Public Involvement" is now Section 2.4 (Planning Process) so that the reader understands the planning process before diving into specific issues and concerns brought up during public meetings. Therefore, "Public Involvement: Issues, Concerns, and Opportunities" is now Section 2.4.9.

Comment:

The wintering waterfowl graph, Table 3, needs a source. Is this the FWS survey result? These counts may be questioned by some.

Updated Text:

Table 3-3. Waterfowl Abundance Trends Based on USFWS Southwest Region Annual Waterfowl Census.

Comment:

It is not clear what a “trust species” is as applied to Section 4.1. Is this the same as the “focal species” delineated on page 3-32? If so, suggest using a consistent terminology. The Glossary provides no clarity.

Updated Text/Agency Response and Action Taken:

Trust species is in the glossary, under "Federal Trust Species" in the Glossary. The provided definition is:

“Important fish and wildlife resources that the U.S. Fish and Wildlife Service is specifically mandated to protect, including migratory birds, threatened species, endangered species, inter-jurisdictional fish, marine mammals, and other species of concern.”

Focal Species is also defined in the glossary. The provided definition is:

“Wildlife species that are a subset of priority species and that represent larger guilds of species that use habitats in a similar way.”

In other words, focal species are species whose presence is an indicator of the well-being of other species in that habitat type. We monitor focal species to better understand the larger guild that the species represents.

Also, throughout the entire document, wording was updated for consistency. Anywhere ‘trust species’ occurred was changed so that it now reads ‘Federal trust species’.

Comment:

The last paragraph on page 4-29 should be reworded to read that four firearms youth hunts for white-tailed deer and feral hogs are held on the Refuge. TPWD conducts two youth hunts for white-tailed deer annually on Matagorda Island.

Updated Text:

Four firearms youth hunts for white-tailed deer and feral hogs are held on the Refuge. One, in which local kids participate, is hosted by the Refuge on the Tatton Unit. The Refuge provides the hunt site and facilities for training, sighting in firearms, and cleaning game. A second hunt is held on Matagorda Island. Both of these two hunts are co-sponsored by the Refuge and the Texas Wildlife Association as part of the Texas Youth Hunting Program. Youth for both hunts, accompanied by a parent, come from all over the State for these weekend hunts on the Island and the Tatton Unit. Up to 10 youth participate, along with parents, employees, presenters, and several volunteers. These youth are chosen by the Texas Wildlife Association through a lottery system. Two additional youth hunts are held on the north end of Matagorda Island and hosted by TPWD. The youth for these hunts are chosen by the TPWD application process. The Youth Hunting Program was established to increase youth participation in safe and ethical hunting and to promote the hunting heritage of Texas.

Comment:

There are several examples of the use of the word “should” in the specific plans. There is no place for this word in a plan. The alternate is “will” (will not) and/or “will not be allowed to”. If such statements cannot be made, then it is appropriate to drop the entire thought.

Updated Text/Agency Response and Action Taken:

Thank you for your comment. The Refuge made these changes to the Plan where appropriate. For example, in Section 4.4.1 (Threatened and Endangered Species), in the section about aplomado falcons, the Plan stated: Populations of aplomado falcons *should* continue to be monitored as part of the recovery plan. This was edited to read: *Populations of aplomado falcons will continue to be monitored as part of the recovery plan.*

Where the Refuge needs continued flexibility, however, staff will continue to use the word ‘should’. The Refuge is considering actions that will guide the management of Aransas NWRC for the next 15 years, and it is hard to predict developments in science or developments in technology that may lead to better managing practices. Therefore, use of the word ‘should’ allows for flexibility to determine which methods will be used during the creation of project-specific step-down plans.

Comment:

FAMI is not defined or described until Section 4.6, page 4-25, in spite of earlier references. For example, Chapter 2, there is a reference to ‘Friends group’. Should not FAMI be included early in the CCP as a volunteer organization?

Updated Text/Agency Response and Action Taken:

The first reference to Friends of Aransas and Matagorda Island now occurs in Section 1.7, where FAMI is listed as an existing partnership. Additionally, the statement in Section 2.4.9.3 reads: *Additionally, the Refuge has been effective in the use of volunteers and Friends of Aransas and Matagorda Island (FAMI) to enhance and supplement the programs offered.*

Comment:

Chapter 3 and Appendix I refer to the Black-shouldered kite by its former name rather than the current name, White-tailed kite.

Updated Text/Agency Response and Action Taken:

Thank you for your comment. The current accepted name is white-tailed kite. Every reference to black-shouldered kite (which primarily occur in Chapter 3) was updated to *white-tailed kite*.

Comment:

In Section 4.4, data presented for endangered species seems stale. Certainly, in 2010, more recent data is available than for years 2002 and 2003.

Updated Text/Agency Response and Action Taken:

After consultation with Paul Juergens of the Peregrine Fund, the following text was added on the aplomado falcon:

In 2008, three falcon pairs nested on Matagorda Island and fledged nine young falcons. Nest success and productivity that year, however, was low and was attributed to nest depredation by other raptors. Efforts have been made to improve on nest structure design to more effectively exclude predators (Paul Juergens, pers. comm.). In 2009, the Peregrine Fund surveyed falcon territories and found that all 13 were occupied by falcons. In 2010, 12 of the 13 territories were found to be occupied by aplomado falcons.

After reviewing the Refuge’s monitoring data on Kemp’s ridley sea turtles, the following text was added on the sea turtles and marine mammals:

In 2007, eight nests were found. Then, 13 nests were documented in 2008 and 8 in 2009.

Comment:

Bird species list should include Green Jay, a recently documented visitor to the Refuge.

Updated Text/Agency Response and Action Taken:

Thank you for the information. *Green jay* was added to the species list in Appendix B.

Comment:

TPWD's current Annotated County List of Rare Species for Aransas, Refugio, and Calhoun counties includes the federally endangered Smalltooth sawfish (*Pristis pectinata*), and the Refugio County list includes the federally endangered plant, Black lace cactus (*Echinocereus reichenbachii* var *albertii*). These species were not included in either Appendix B or Appendix C of the Draft CCP. TPWD continually updates the Annotated County list of Rare Species. The current TPWD county lists for rare species may be obtained from the following link:
<http://gis.tpwd.state.tx.us/TpwEndangeredSpecies/DesktopDefault.aspx>

Updated Text/Agency Response and Action Taken:

Each of the species lists were updated during production of the Final Plan. Please refer to Appendix B, which reflects all of the updates.

The black lace cactus was added to the plant list that appears in Appendix B.

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Whooping Cranes
Photograph by Steve Sykes

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