Osprey approaching take-off. Photo Credit: Dave Sanders

Vision Statement

The Texas Mid-coast National Wildlife Refuge Complex will preserve and protect the wildlife and habitat of the Texas Mid-coast Region. The Complex will protect the diverse habitats typical to the Gulf Coast Prairies and Marshes ecoregion, including the estuaries and salt marshes, the prairies and freshwater wetlands and the Columbia Bottomlands forest ecosystem. The refuges will serve as a resilient source of natural evolving habitats and ecosystem processes even as structure and composition are altered due to climate change and adjacent areas are increasingly fragmented and altered by human development. The Complex will endeavor to protect habitats and the wildlife dependent on them by conserving, enhancing, and restoring a network of public lands and waters. These refuges will provide quality habitat for native plants and wildlife, with emphasis on threatened and endangered species, migratory birds and other species of concern. The Complex will continue to encourage visitors to participate in high quality programs for hunting, fishing, wildlife observation, photography, interpretation and environmental education. The Complex will provide facilities to help connect people to nature while building support for the refuge and enhancing the local community. The Complex will continue to work with partners including land-owners, local and regional organizations, and State and Federal agencies to achieve national and regional conservation goals for the benefit of present and future generations.

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1. Introduction

The Texas Mid-coast National Wildlife Refuge Complex (Complex) is comprised of three refuges: Brazoria National Wildlife Refuge (NWR), San Bernard NWR, and Big Boggy NWR that provides a vital complex of salt and freshwater marshes, sloughs, ponds, coastal prairies, and bottomland hardwood forests that provide habitat for a wide variety of resident and migratory wildlife. This document is a Comprehensive Conservation Plan (CCP) designed to guide management of the Complex for the next 15-years. The CCP provides a description of the desired future conditions and long-range guidance to accomplish the purposes for which each refuge was established. The CCP and accompanying Environmental Assessment (EA) address Service legal mandates, policies, goals, and National Environmental Policy Act (NEPA) compliance. The EA (Appendix B) presents a range of alternatives for habitat and wildlife management, visitor services, and facilities management that consider issues and opportunities on the Complex. It also identifies, describes, and compares the consequences (or impacts) of implementing three management alternatives (including current management) on the physical, biological, and human environments described in the CCP. The final CCP will be developed through modifications made after the public review process and will replace current management direction when it is completed.

The CCP is divided into five chapters. Chapter 1, Introduction, provides information about why the Service is developing this CCP, an overview of the refuges within the Complex, including the history of their establishment and management, authorizing legislation, description of their purposes and information on the National Wildlife Refuge System (Refuge System) and the laws, policies, and guidance that sets the stage for management direction. Chapter 2, The Planning Process, explains the process used to develop the CCP consistent with planning requirements. Chapter 3, Complex Resources and Current Management, explains the landscape setting; physical, biological, and socio-economic environment; and the current management programs on the Complex. Chapter 4, Management Direction, describes the goals, objectives, and strategies for the Service's preferred alternative (Alternative B). Finally, Chapter 5, Plan Implementation and Monitoring, describes the various tools the Complex will use to implement the management direction presented in this CCP.

1.1 Purpose and Need for the CCP

The purpose of comprehensive conservation planning is to provide long-range guidance for the management of national wildlife refuges, as mandated by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act). This CCP provides a vision for the Complex and offers management direction for conducting scientific research, habitat restoration, and maintenance and management of compatible public uses of refuge resources for the next 15 years.

The CCP will enhance the management of the Complex by:

- providing a clear statement of direction for the future management of the Complex;
- providing long-term continuity in refuge management throughout the Complex;

- communicating the Service's management priorities for the Complex to their partners, neighbors, visitors, and the general public;
- providing an opportunity for the public to help shape the future management of the Complex;
- ensuring that management programs on the Complex are consistent with the mandates of the Refuge System and the purposes for which the refuges were established;
- ensuring that the management of the Complex is consistent with Federal, State, and local plans; and
- providing a basis for budget requests to support the Complex's needs for staffing, operations, maintenance, and capital improvements.

The CCP is needed to provide guidance and rationale for management actions and will be used by the Project Leader and refuge staff as a reference document when developing work plans, step-down plans, and making management decisions. Through the development of goals, objectives, and strategies, this CCP describes how the Complex contributes to the overall mission of the Refuge System, fulfills the purposes designated for the refuges, and uses the best available science for adaptive management.

The goals established for the Complex, include the following:

- To contribute to conservation efforts and to foster the ecological integrity of the Gulf Coast Prairies and Marshes Ecoregion through proven and innovative management practices across the Complex.
- To conserve, restore, enhance, and protect Complex habitats by implementing appropriate management programs to benefit native flora and fauna, including threatened and endangered species and other species of concern.
- To protect, maintain, and enhance populations of migratory birds and resident fish and wildlife, including federal and state threatened and endangered species.
- To develop and implement quality wildlife dependent recreation programs that are compatible with each refuge's purposes and foster enjoyment and understanding of the Complex's unique wildlife and plant communities.
- To provide administrative and public use facilities needed to carry out each refuge's purposes and meet management objectives.

By preparing this CCP, documenting our goals and objectives, and involving our partners and the public in the process, we gain a better understanding of the issues-from all sides. Sustaining the nation's fish and wildlife resources is a task accomplished only through the combined efforts of governments, partners, and private citizens. This CCP will help explain how the Complex fits into the larger landscape and our role in protecting our natural resources for present and future generations. In addition, with sea-level rise (SLR) being one of the most predicted effects of climate change, the CCP will ensure that the Complex continues to conserve fish, wildlife, and ecosystems in the face of climate change and related stressors. Management of the Complex as outlined in the CCP will help to restore biodiversity to the landscape.

1.2 Complex Overview: History of Each Refuge's Establishment, Acquisition and Management

The need for establishing a waterfowl refuge along the upper mid-coast of Texas was recognized by both the Service (formerly the Bureau of Sport Fisheries and Wildlife) and the TPWD (formerly the Texas Game and Fish Commission) as early as the mid-1950s. For many years, the most important wintering area for migratory waterfowl along the upper Gulf Coast of Texas had been the area between the Sabine River on the Louisiana-Texas line southwesterly to Galveston Bay and, from Galveston Bay southwesterly to Port Lavaca. This strip of high and low coastal marsh, coupled with extensive rice farming, had been very attractive to migratory waterfowl. The area between the Galveston Bay and the Sabine River had been the principal wintering area for hundreds of thousands of snow geese as well as large numbers of white-front and Canada geese and large numbers of ducks. The zone between Galveston Bay and Port Lavaca had increased in importance since the late 1940s. There had been a general movement of wintering migratory waterfowl southwest along the Texas coast. By the 1950s, the zone between Galveston Bay and Port Lavaca was wintering a large number of migratory waterfowl. It was thought that a very conservative estimate of a million migratory waterfowl would utilize an established refuge in this region if ample food were provided (USFWS 1956).

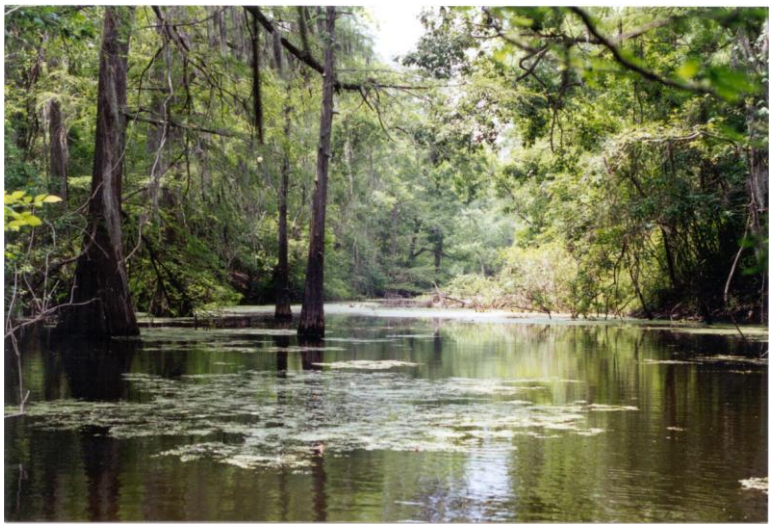
Another issue driving the need for a waterfowl refuge was that the land pattern along this section of the Gulf Coast was changing at a very rapid rate. Large areas of wetlands had been drained for farming, grazing, urbanization, industry, and the building of the Gulf Intracoastal Waterway (GIWW). The remaining marshlands along the Gulf Coast that had not been drained or that had been drained for other purposes, then found to be unsatisfactory, were being purchased by large companies or wealthy individuals and turned into private hunting clubs (USFWS 1956).

In mid-1956, the Service began to search for areas along the Texas coast that would be large enough to meet the needs of large numbers of wintering waterfowl. With assistance from the U.S. Geological Survey, the area identified that could potentially meet wildlife needs of this magnitude, was the abandoned 40,000-acre Hoskins Mound oil field owned by Texas Oil Company, in Brazoria County. By October, the Service had contacted representatives with Texas Oil Company to inquire about the possibility of purchasing lands owned by them for the purpose of establishing the proposed Hoskins Mound National Wildlife Refuge. While numerous meetings and negotiations between the Service and Texas Oil Company followed, the company decided in the end not to sell the property.

As the Service persisted in its search for suitable lands to acquire, the ever-increasing deterioration and destruction of the remaining marshes on the Texas Gulf Coast continued to remain a concern. The coastal habitat of Texas, so important to the welfare of the Central Flyway waterfowl and vital to many other species of water birds, was dwindling at a rapid pace and creating drastic adverse effects on the value and availability of waterfowl and other wildlife habitat (USFWS 1965). It became evident that in order to preserve and enhance sufficient coastal habitat to accommodate even a portion of the waterfowl population utilizing the Texas Gulf Coast, it would be necessary to establish two areas. The areas would

Brazoria NWR includes the largest contiguous salt marsh and coastal prairie habitats and managed fresh water wetlands on the Complex. Photo Credit: USFWS

San Bernard NWR includes more than 20,000 acres of bottomland hardwood forest in the Brazos and San Bernard River Basins. Photo Credit: USFWS



Although it is the smallest refuge, Big Boggy NWR includes important salt marsh and salty prairie habitat for migratory birds. Photo Credit: USFWS

need to be located between the existing Sabine NWR, located in Louisiana just east of the Texas state line and the Aransas NWR, located to the west along the mid-Gulf Coast. However, this was a challenge not easily met. In several instances when lands of highly valuable waterfowl habitat had been proposed for acquisition, the Service would find that the landowner was unwilling to negotiate. The economic boom on the Texas Gulf Coast had created keen competition in the land market and owners were well aware of the potential value of their lands for industrial and urban development purposes. By the 1960s, approximately 65 percent of the total Central Flyway waterfowl population was utilizing habitat along the Texas Gulf Coast during the winter months.

1.2.1 Establishment of Brazoria National Wildlife Refuge

The Service remained interested in identifying coastal marsh with high waterfowl potential as refuges and contacted landowners near the Texas Oil Co. lands. Several land owners, who grazed cattle on the prairie/marsh lands southwest of Bastrop Bayou became interested in the opportunity. Moving quickly, the Service began the necessary steps of the acquisition process. A biological reconnaissance revealed that the property identified for acquisition was a natural waterfowl area of significance to the resource containing three relatively large brackish lakes totaling approximately 950 acres. These lakes are surrounded by a pothole complex, dubbed the “Slop Bowl” by virtue of its extremely wet condition. To the north of the lakes, the land slopes gently upward to Bastrop Bayou. The north end of this area is bisected by a fresh water slough along which a series of ponds have been developed and contain lush growths of various aquatic plants (USFWS 1965).

On May 4, 1965, Service Director John C. Gatlin approved the proposal for the acquisition of lands suitable for the establishment of a new refuge in Texas to be known as the Brazoria National Wildlife Refuge. An option to purchase the property was accepted and approved by the Migratory Bird Conservation Commission on August 24, 1965. The following day, the newly authorized Brazoria NWR was announced by Secretary of the Interior, Stewart L. Udall. A little over a year later, the refuge was established on October 17, 1966, with the initial acquisition of approximately 6,398 acres in Brazoria County. Over the course of 36 years, additions to the refuge through a combination of fee-title land acquisitions, easements and gift donations, brought the total acreage to 44,413.88 acres. A large portion of this total acreage is from the addition of the approximately 28,655-acre Hoskins Mound Marsh. On December 28, 1990, the Service acquired in fee-title an initial 21,832.26 acres of the property, approximately 34 years after initial interest in the area. The remainder of the property was acquired over the following two years.

1.2.2 Establishment of San Bernard National Wildlife Refuge

In early 1963, in an attempt to preserve additional coastal habitat, the Service began initial investigations into the feasibility of acquiring the Poole Ranch in Brazoria County, for the establishment of another refuge along the Texas Gulf Coast. Originally, the ranch was identified in 1956 as an area that could possibly be used as an alternative refuge site in the event negotiations with Texas Oil Company were unsuccessful. The Service recognized a vital need for a national wildlife refuge along the mid-Texas Gulf Coast area near the mouth

of the San Bernard River in Brazoria County. This section of the Texas coast was situated near the center of the principal snow, blue and to a lesser extent, Canada goose wintering area in the Central Flyway, extending from the Louisiana marshes down the coast to San Antonio Bay and the Lissie Prairie region. In addition to preserving much needed wintering habitat, the refuge would also provide a concentration point for those species enroute to and from ancestral wintering locations further south (USFWS 1963).

In April 1963, the Service contacted the landowners to inquire of their interest to sell the property. With indications of willingness to sell from several family members, the Service initiated efforts to acquire the ranch for the establishment of the proposed San Bernard NWR. A biological reconnaissance revealed that the property was a natural waterfowl area heavily utilized by wintering birds and coastal migrants. Portions of the ranch consisted of isolated ridges of coastal prairie with small intermittent sloughs and coastal marsh. Scattered throughout the ranch were numerous swales and potholes, filled occasionally by rainfall.

On October 22 of the same year, Acting Director Abram V. Tunison approved recommendations for the establishment of the San Bernard NWR in Brazoria and Matagorda Counties, with acquisitions to begin in fiscal years 1967 and 1968 (USFWS 1963). The Migratory Bird Conservation Commission approved funding for land acquisitions on February 27, 1968. The San Bernard NWR was established with the initial purchase of approximately 14,906 acres from the Poole Ranch, on November 7, 1968. Subsequent purchases increased refuge acreage to 52,400 by May 3, 2012. This acreage includes lands acquired within Austin's Woods, which is discussed below.

Austin's Woods (Columbia Bottomlands)

During the 1990s, land acquisition activities began to focus on not only coastal prairie and marsh habitat, but on inland areas comprised of bottomland hardwood forest. The Service became interested in conserving floodplain habitat after a bird study conducted by Dr. Sidney Gauthreaux, a Clemson University scientist, revealed that large numbers of neotropical birds utilized floodplain forests and forested wetlands during their migrations. Using Doppler weather surveillance radar to detect bird migration movement along the northern Gulf Coast, Dr. Gauthreaux discovered that coastal woodlands served as important stopover areas during bad weather, but sites farther inland from the coastline where floodplain forests are present, were even more important. Soon after arriving on the northern Texas coast, most trans-Gulf migrants would land in the forested area of Brazoria County, the first extensive bottomland hardwood forests to the west of Galveston Bay and centered near West Columbia. It became evident early on in the study, that there were clear indications that the forested wetland (now referred to as Columbia Bottomlands or Austin's Woods) served as a major rest area for neotropical migrants.

The Service saw in Dr. Gauthreaux's findings the need to propose the protection of this important habitat through various land acquisition efforts and other conservation means. In mid-1995, the Service released for public review a proposal to establish the Columbia Bottomlands NWR. In an effort to address concerns about the extent of federal acquisition in the Austin's Woods area, a Four-County Task Force (Task Force) comprised of

representatives from Brazoria, Fort Bend, Matagorda and Wharton Counties, was established. At the request of local, state and federal officials, the Service delayed its refuge establishment to allow the Task Force to review the proposal further and consider local efforts in conserving habitat.

After the Task Force reviewed existing information on the wildlife resources of the bottomlands, it was determined that approximately 237 bird species totaling 29 million individuals, migrated through the area every year. They also estimated that 177,000 acres was all that remained of the 700,000 acres once present in Austin's Woods at the beginning of the century. With this information, the Task Force affirmed the natural resource values within the four county area and agreed to the designation of additional protected areas. It was recommended that a community-based conservation effort be implemented for habitat protection. The Service proposed a goal of 70,000 acres of habitat be conserved under the combined efforts of private, local, state and federal entities. This would ensure the protection of at least 10 percent of the original ecosystem. In August 1996, Acting Service Director John G. Rogers approved a Preliminary Project Proposal to expand the San Bernard NWR boundary by 28,000 acres. In 1997, the Service developed the Austin's Woods Conservation Plan, which proposed land acquisitions within the Austin's Woods area (also known as the Columbia Bottomlands) as its part of the combined effort. Lands acquired by the Service became part of the San Bernard NWR as a separate management unit. To date, the Service has acquired more than 24,500 acres of Columbia Bottomlands.

1.2.3 Establishment of Big Boggy National Wildlife Refuge

During the 1970s, land acquisition along the Texas coast was a high priority with the Service's Migratory Bird Habitat Preservation Program. In January 1976, a national priority system for ranking wetlands by their value to the Nation's waterfowl resource was initiated as part of the Migratory Bird Land Acquisition Program. Of the 33 categories identified, the Texas coast ranked eighth on the national scale. To ensure adequate acreage would be available for wintering migratory bird populations, the Service proposed a minimum acquisition of 100,000 acres for the Texas coast (Final EIS 1981).

In February 1980, representatives of 10 landowners of approximately 4,500 acres within Matagorda County approached the Service to inquire if there was still an interest in preserving waterfowl habitat through acquisition. The properties were within an area of interest to the Service known as Big Boggy Marsh, located approximately 20 miles south of Bay City, the county seat of Matagorda County. Big Boggy Marsh contained some of the finest remaining marshlands and was included in a Concept Plan in 1977 that identified a number of wetland areas along the Texas Gulf Coast as candidates for protection. Under this plan, Wetland Preservation Program Category 8 – Texas Coast, the proposed area had a biological ranking of 16 out of 25 key waterfowl areas. The State had identified Big Boggy Marsh as an area of concern. Approximately 80 percent of the proposed acquisition consisted of marsh, while the remainder of the property consisted primarily of coastal prairie (USFWS 1981).

The Service evaluated the proposal and soon met with county commissioners who went on record as supporting the acquisition of lands within Big Boggy Marsh. The Service initiated scoping in 1980 for the development of an Environmental Impact Statement (EIS) for the purchase of lands within Big Boggy Marsh for the establishment of a national wildlife refuge. In February 1981, the Service prepared an EIS for the proposed acquisition of approximately 4,500 acres of privately owned marshland within Matagorda County, for the creation of Big Boggy NWR. The acquisition of these lands for the establishment of a wildlife refuge would enable the Service to continue to meet its mandate under the Migratory Bird Conservation Act of providing and maintaining adequate and vital migration and wintering habitat for migratory waterfowl (USFWS 1981). As a new addition to the Refuge System, the refuge would not only preserve additional habitat for migratory waterfowl and native resident wildlife species dependent on the gulf coastal marshes, but would provide available lands for use by the public for recreational purposes.

The Big Boggy NWR was approved by the Migratory Bird Conservation Commission on October 7, 1981 (USFWS 1981). The refuge was established on July 8, 1983 with the initial acquisition of 1,271.15 acres. In the years that followed, additions to the refuge through a combination of fee-title land acquisitions and conservation easements would increase the acreage to the current total of approximately 4,526 acres.

1.2.4 Three Refuges – One Complex

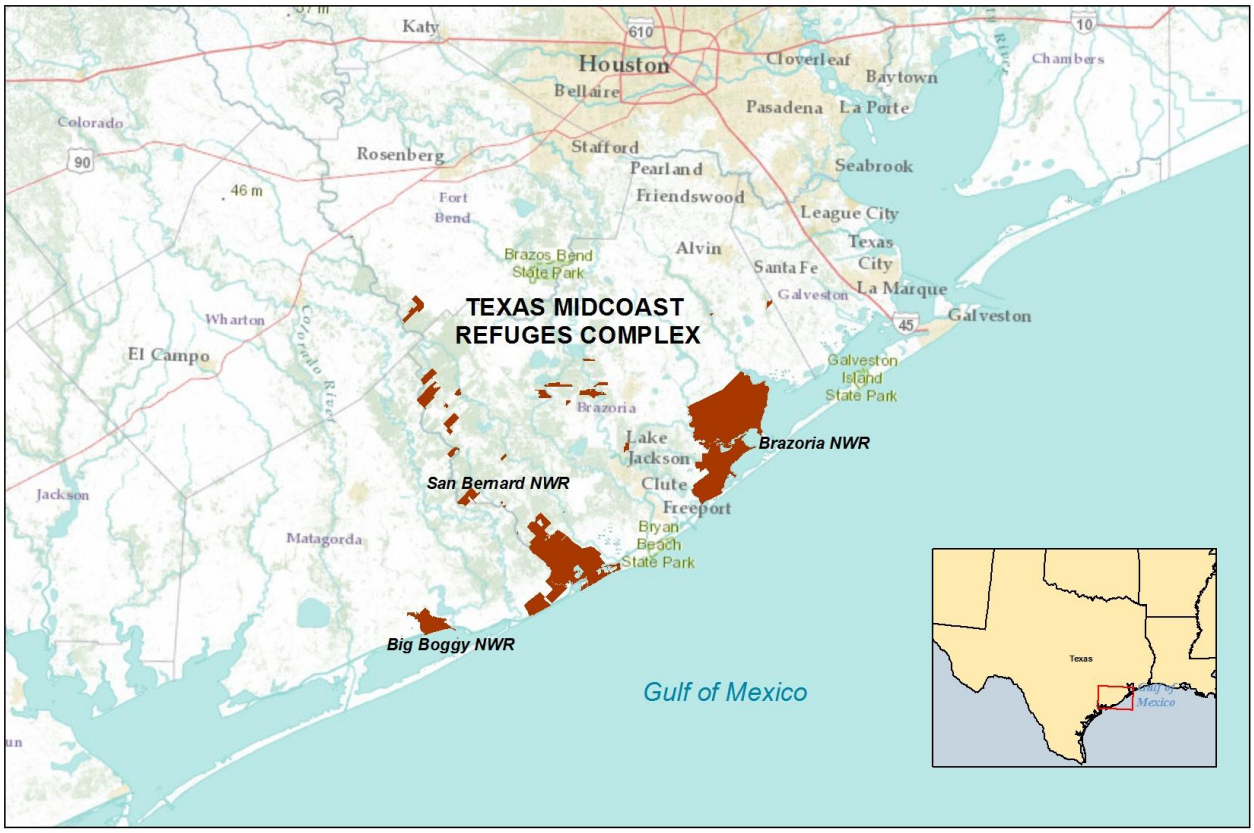
In the early days, there was no base for field operations at Brazoria NWR so all field work and equipment operations were based out of San Bernard NWR, which had some facilities remaining from the Poole Ranch and additional facilities added in 1982. With one project leader (Brazoria NWR manager) overseeing refuge operations on both refuges, Brazoria and San Bernard NWRs became loosely known as the Brazoria National Wildlife Refuge Complex. Big Boggy NWR was added to this complex during its establishment.

In the mid to late 1990s, the Service decided to officially complex the three refuges in an attempt to effectively manage the resources on each refuge. Since the refuges were situated within the Mid-Coast Initiative Area of the Gulf Coast Joint Venture under the North American Waterfowl Management Plan, the official name for the Complex became the Texas Mid-Coast National Wildlife Refuge Complex (Bisbee 2010), which is shown in Figure 1-1.

1.2.5 Refuge Purpose(s)

National wildlife refuges are established under a variety of legislative acts and administrative orders and authorities. These orders and authorities include one or more specific purposes for which the refuge lands are acquired. The purposes are of key importance in refuge planning, and are the foundation for management decisions. The purposes of a refuge are specified in, or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.

Figure 1-1 Texas Mid-Coast Refuge Complex Vicinity



Note: This map does not depict all units of the San Bernard NWR acquired after October 1, 2010.

By law, refuges are to be managed to achieve their purposes, and unless otherwise indicated by the establishing document the following rules apply:

- Purposes dealing with the conservation, management, and restoration of fish, wildlife, and plants, and their habitats take precedence over other management and administration purposes.
- When in conflict, the purpose of an individual refuge may supersede the Refuge System mission.
- Where a refuge has multiple purposes related to fish, wildlife, and plant conservation, the more specific purpose will take precedence in instances of conflict.
- When an additional unit is acquired under a different authority then that used to establish the original unit, the addition takes on the purpose(s) of the original unit, but the original unit does not take on the purpose(s) of the addition.

The establishing authorities and related purposes for the Brazoria NWR include:

- ... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds. 16 U.S.C. § 715d (Migratory Bird Conservation Act)
- "... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such

acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956)

- "... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1 "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

The establishing authorities and related purposes for San Bernard NWR include:

- ... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds. 16 U.S.C. § 715d (Migratory Bird Conservation Act)
- "... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1 "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).
- "... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956)

The establishing authorities and related purposes for Big Boggy NWR include:

- ... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds. 16 U.S.C. § 715d (Migratory Bird Conservation Act)
- "... suitable for— (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species ..." 16 U.S.C. § 460k-1 "... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors ..." 16 U.S.C. § 460k-2 (Refuge Recreation Act (16 U.S.C. § 460k-460k-4), as amended).

1.3 Planning Context

The Complex is part of a national system of more than 551 refuges. The Service manages individual refuges in a manner that reflects each refuge's purpose(s) while supporting the mission of the Refuge System.

1.3.1 The U.S. Fish and Wildlife Service

The 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. In addition to the Refuge System, the

Service also operates national fish hatcheries, fishery and wildlife conservation offices, and Ecological Services field stations. The Service enforces federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, administers the Endangered Species Act, conserves and restores wildlife habitat such as wetlands, and helps 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.

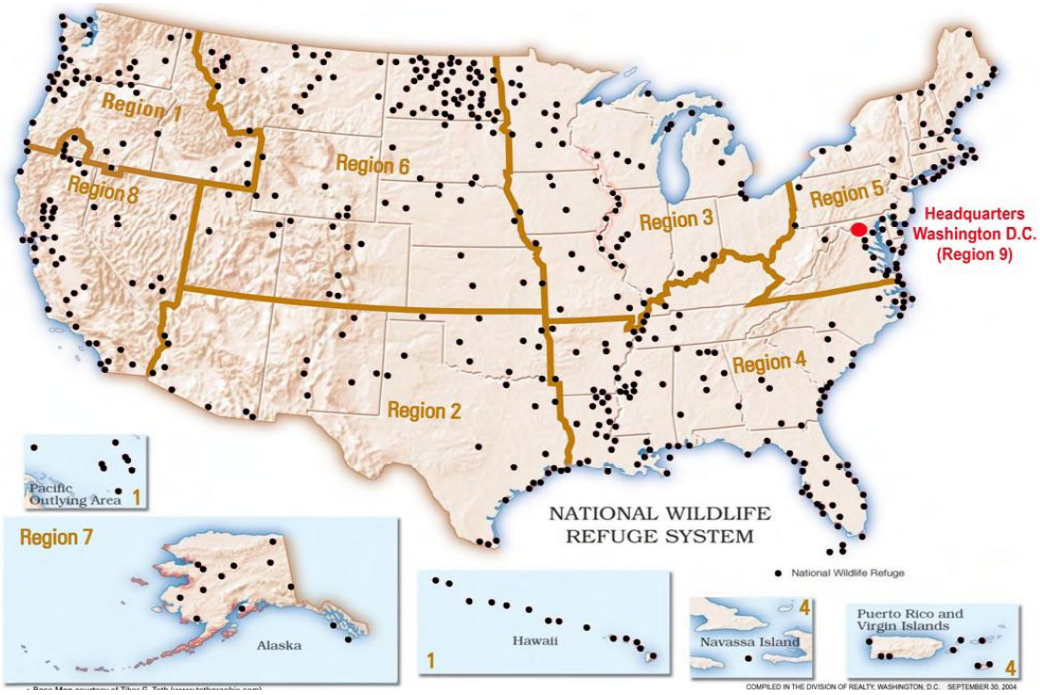
The mission of the U.S. Fish and Wildlife Service is:

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

1.3.2 The National Wildlife Refuge System

The Refuge System is the only 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 more than 551 refuges and 38 wetland management districts in all 50 states and U.S. territories (Figure 1-2). 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

Figure 1-2. National Wildlife Refuge System.



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 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.

1.3.2.1 Legal and Policy Guidance

Refuge management and administrative activities are dictated, in large part, by the legislation that created the unit and its purposes and goals. However, other laws, regulations, and policies also guide management. The mission and goals of the Refuge System, Service Policy, federal laws and executive orders, and international treaties guide the Complex. Appendix A provides a complete list of the laws, policies, treaties and executive orders that pertain to the conservation and protection of natural and cultural resources. Key laws and policies directly related to comprehensive conservation planning are discussed below.

National Wildlife Refuge System Improvement Act of 1997
The National Wildlife Refuge System Administration Act of 1966, as amended, states that each refuge shall be managed to fulfill both the mission of the Refuge System and the purposes for which the individual refuge was established. It also requires that any use of a refuge be a compatible use—a use that will not materially interfere with nor detract from, in

the sound professional judgment of the refuge manager, fulfillment of the mission of the Refuge System or the purposes of the refuge.

The 1997 amendments to the National Wildlife Refuge System Administration Act of 1966 identified a number of principles to guide management of the Refuge System. They include the following:

- Conserve fish, wildlife, and plants and their habitats within the Refuge System;
- Maintain the biological integrity, diversity, and environmental health of the Refuge System;
- Coordinate, interact, and cooperate with adjacent landowners and state fish and wildlife agencies;
- Maintain adequate water quantity and quality to meet Complex and Refuge System purposes and acquire necessary water rights;
- Maintain hunting, fishing, wildlife observation, wildlife photography, interpretation, and environmental education as the priority general public uses of the Refuge System;
- Provide opportunities for compatible priority wildlife-dependent public uses within the Refuge System;
- Provide enhanced consideration for priority wildlife-dependent public uses over the other general public uses in planning and management;
- Provide increased opportunities for families to experience priority general public uses, especially traditional outdoor activities such as fishing and hunting; and
- Monitor the status and trends of fish, wildlife, and plants in each refuge.

The Improvement Act establishes the responsibilities of the Secretary of the Interior for managing and protecting the Refuge System; requires a CCP for each refuge by the year 2012; and provides guidelines and directives for the administration and management of all areas in the Refuge System, which includes wildlife refuges, areas for the protection and conservation of fish and wildlife threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas.

To maintain the health of individual refuges and the Refuge System as a whole, managers must anticipate future conditions. Managers must endeavor to avoid adverse impacts and take positive actions to conserve and protect refuge resources. Effective management also depends on acknowledging resource relationships and acknowledging that refuges are parts of larger ecosystems. Refuge managers work together with partners, including other refuges, federal and state agencies, tribal and other governments, and nongovernmental organizations (NGOs) and groups—to protect, conserve, enhance, or restore all native fish, wildlife (including invertebrates), plants, and their habitats.

Appropriate Use Policy

This policy describes the initial decision process the refuge manager follows when first considering whether to allow a proposed use on a refuge. The refuge manager must find a use appropriate before undertaking a compatibility review of the use. An appropriate use as defined by the Appropriate Use Policy (603 FW 1 of the Service Manual) is a proposed or existing use on a refuge that meets at least one of the following four conditions:

- The use is a wildlife-dependant recreational use as identified in the Improvement Act.
- The use contributes to the fulfilling of 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.
- The use involves the take of fish and wildlife under State regulations.
- The use has been found to be appropriate as specified in Section 1.11 (603 FW 1 of the Service Manual).

Chapter 5 of this CCP includes additional information on appropriateness of refuge uses.

Compatibility Policy

Lands within the Refuge System are different from other multiple use public lands in that they are closed to all public uses unless specifically and legally opened. The Improvement Act states, "... the Secretary shall not initiate or permit a new use of a refuge or expand, renew, or extend an existing use of a refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety."

In accordance with the Improvement Act, the Service has adopted a Compatibility Policy (603 FW 2 of the Service Manual) that includes guidelines for determining if a use proposed on a national wildlife refuge is compatible with the purposes for which the refuge was established. A compatible use is defined in the policy 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 Refuge System mission or the purposes of the refuge. Sound professional judgment is defined as a finding, determination, or decision that is consistent with the principles of sound fish and wildlife management and administration, available science and resources (funding, personnel, facilities, and other infrastructure), and applicable laws.

The Service strives to provide priority public uses when they are compatible. If financial resources are not available to design, operate, and maintain a priority use, the refuge manager will take reasonable steps to obtain outside assistance from the State and other conservation interests. Additional information regarding compatibility determinations (CDs) is provided in Chapter 5, and the CDs prepared in association with this CCP are provided in Appendix C.

Biological Integrity, Diversity, and Environmental Health Policy

The Improvement Act directs the Service to "ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans..." To implement this directive, the Service has issued the Biological Integrity, Diversity, and Environmental Health Policy (601 FW 3 of the Service Manual), which provides policy for maintaining and restoring, where appropriate, the biological integrity, diversity, and environmental health of the Refuge System. The policy is an additional directive for refuge managers to follow while achieving the refuge purpose(s) and Refuge System mission. It provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuge and associated ecosystems. Further, 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 restore lost or severely degraded components where appropriate and in concert with refuge purposes and the Refuge System mission. When evaluating the appropriate management direction for refuges, refuge managers will use sound professional judgment to determine their refuges' contribution to biological integrity, diversity, and environmental health at multiple landscape scales.

1.3.3 Setting the Stage for Planning: Identifying the Landscape Context

1.3.3.1 Climate Change

Department of the Interior Secretarial Order 3226, signed on January 19, 2001, and reinstated on February 22, 2010, by Secretarial Order 3289 Amendment No. 1, states that "there is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making…" This Order ensures that climate change impacts are taken into account in connection with Departmental planning decision making." Additionally, it calls for the incorporation of climate change into long-term planning documents such as this CCP.

The U.N. Intergovernmental Panel on Climate Change (IPCC) reports that direct temperature measurements at weather stations world-wide suggest that the surface of Earth has warmed, on average, 1.0 °C (1.8 °F) in the last 100 years (IPCC 2007). Data for the Southwest show an increase in temperature between 1.1°C (2 °F) to 1.7°C (3.1 °F) during the past century and project an increase in temperature of 4.5°C (8.1 °F) to 6.1°C (11 °F) in the future (Sprigg and Hinkey 2000). Estimates for the 20th century show that global average sea level rose at a rate of about 1.7 mm per year, which equals 17.0 centimeters (6.7 inches) for those 100 years. The increase of carbon dioxide (CO2) within the earth's atmosphere has been linked to the gradual rise in surface temperature commonly referred to as global warming. The IPCC also concludes that substantial increases in global average temperatures will cause major changes in ecosystem structure and function, species' ecological interactions, and species' geographical ranges. These projected changes have enormous implications for management of fish, wildlife, and their habitats around the world.

The U.S. Department of Energy's (DOE) *"Carbon Sequestration Research and Development"* (USDE 1999) defines carbon sequestration as "…the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere." Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this plan would conserve or restore land and habitat, and would thus retain existing carbon sequestration on the Complex. This, in turn, contributes positively to efforts to mitigate human-induced global climate change. Vegetated land is a tremendous factor in carbon sequestration. Terrestrial biomes of all sorts—grasslands, forests, wetlands, tundra, and desert—are effective both in preventing carbon emission and in acting as a biological "scrubber" of atmospheric CO_2. The DOE report concludes that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere. One Service activity in particular—prescribed burning—releases CO_2 directly into the atmosphere from the biomass consumed during combustion. However, there is actually no net loss of carbon, since new vegetation quickly germinates and sprouts to

replace the burned-up biomass and sequesters or assimilates an approximately equal amount of carbon as was lost to the air (Boutton *et al.* 2006).

Climate change may accelerate and intensify existing stressors (pollution, invasive species, development, habitat fragmentation, loss and degradation, etc.), which could have a number of possible effects on the Complex. An increase in temperature may include: reduced rainfall and surface water supplies; deterioration of water quality; decreased habitat availability for many species; changes in vegetation communities; modification of migratory bird patterns; loss of breeding habitat for migratory forest dwelling land birds and resident wildlife species; loss of some species along with the introduction of new species; and significantly increased energy costs. Possible effects were a substantive consideration in the development of the objectives and strategies in this CCP. Implementation of all the strategies for monitoring and surveys will emphasize identification and analysis of the effects of climate change on the various habitats and species. In addition, implementation of all strategies will emphasize energy conservation and/or use of alternative energy sources when feasible. Chapter 3, Section 3.3.1.5 discusses possible climate change impacts to the Complex.

In September 2010, the Service released a strategic approach to climate change, *Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change*, found in Chapter 1, Section 1.3.3.2, National Plans and Initiatives.

1.3.3.2 Strategic Habitat Conservation and Gulf Coast Prairie Landscape Conservation Cooperative

Strategic Habitat Conservation (SHC) is a way of thinking and doing business that requires the Service to set biological goals for priority species. It allows for making strategic decision, and encourages constant reassessment and improvement of actions. These are critical steps in dealing with a range of landscape-scale resource threats such as urban development, invasive species, and water scarcity—all magnified by accelerating climate change.

SHC incorporates five key principles in an ongoing process that changes and evolves:

- Biological Planning (setting goals)
- Conservation Design (developing a plan to meet the goals)
- Conservation Delivery (implementing the plan)
- Monitoring and Adaptive Management (measuring success and improving results)
- Research (increasing our understanding)

To ensure that science entities are strategically placed, the Service and the U.S. Geological Survey (USGS) have developed a national geographic framework for implementing strategic habitat conservation at landscape scales. The framework provides a platform upon which the Service can work with partners to connect project- and site- specific efforts to larger biological goals and outcomes across the continent.

The framework serves as a base geography for Landscape Conservation Cooperatives (LCCs), which are management-science partnerships between the Service, federal agencies, states, tribes, NGOs universities, and other entities. These partnerships inform and assist integrated resource management actions by addressing climate change and other stressors within and across landscapes. LCCs are fundamental units of planning and science capable of carrying out the functional elements of SHC.

The Complex is located in the Gulf Coast Prairies LCC (see section 3.1.2), which consists of four Bird Conservation Regions (BCR): the Oaks and Prairies, Edwards Plateau, Tamaulipan Brushlands, and Gulf Coastal Prairie. The Complex is located in the Gulf Coastal Prairie BCR (described in Section 1.3.3.3).

1.3.3.3 National Conservation Plans and Initiatives

Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change (2010)

The Service's climate change strategy establishes a basic framework within which the Service will work as part of the larger conservation community to help ensure the sustainability of fish, wildlife, plants, and habitats in the face of accelerating climate change. It begins with a dynamic action plan that details specific steps the Service will take during the next five years to implement. The plan focuses on three key strategies to addressing climate change: *Adaptation*, *Mitigation*, and *Engagement*. For the Service, adaptations are planned, science-based management actions, including regulatory and policy changes, that we take to help reduce the impacts of climate change on fish, wildlife, and their habitats. *Adaptation* forms the core of the Service's response to climate change and is the centerpiece of our Strategic Plan (USFWS 2010). *Mitigation* involves reducing our "carbon footprint" by using less energy, consuming fewer materials, and appropriately altering our land management practices. Biological carbon sequestration—the process in which plants take up CO_2 from the atmosphere through photosynthesis and store it as carbon in tree trunks, branches, and roots—achieves mitigation. *Engagement* involves reaching out to Service employees; local, national, and international partners in the public and private sectors; key constituencies and stakeholders; and citizens to join forces and seek solutions to the challenges to fish and wildlife conservation posed by climate change.

Our goal is to achieve carbon neutrality as an organization by 2020 (USFWS 2010). By building knowledge and sharing information in a comprehensive and integrated manner, the Service, its partners, and stakeholders together will gain an understanding of global climate change impacts and with combined expertise, help wildlife resources adapt in a climate-changed world.

North American Landbird Conservation Plan (2004) (Partners in Flight)

The Partners in Flight (PIF) is a cooperative effort involving partnerships among federal, state, and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community, and private individuals. PIF was

created in 1990 in response to growing concerns about declining populations of many land bird species and to emphasize the conservation of birds not covered by existing conservation initiatives. Bird conservation plans, are developed in each region to identify species and habitats most in need of conservation, to establish objectives and strategies to provide needed conservation, to establish objectives and strategies to provide needed conservation activities, and to implement and monitor progress on the plans.

The North American Landbird Conservation Plan summarizes the conservation status of landbirds across North America, illustrating broad patterns based on a comprehensive, biologically-based species assessment. It identifies species most in need of attention at the continental scale, recognizing that additional species will need attention in each region and outlines ways in which continental scale issues and objectives relate to regional conservation efforts.

The Complex is within PIF Physiographic Area #6, the Coastal Prairies, which covers approximately 547 miles of coastal shoreline from Atchafalaya Basin, Louisiana to Baffin Bay, Texas, and consists of grasslands, bottomland hardwood forests, cheniers, and scrub-shrub habitats. Marsh vegetation is determines largely by the salt content of the water, with community types ranging from slat march to brackish or freshwater marsh. Nearly all grassland habitats have been converted to agriculture use, primarily pasture lands and rice farms. Forested areas occur primarily along major riverine systems and on coastal cheniers (ancient beachfront ridges), mottes and salt domes, and manmade levees and spoil bands. Bottomland hardwood forests along the major river systems that drain the coastal prairies range in composition from cypress-tupelo to hackberry-ash-elm to water oak-willow oak dominated forests. Priority bird populations and habitats in this physiographic area as well as the Complex include: Grasslands – Henslow's sparrow, short-eared owl, Sprague's pipit, and sedge wren; Bottomland hardwood forests – swallow tailed kite, Swainson's warbler, prothonotary warbler and American woodcock; and Scrub-shrub – painted bunting and Bell's vireo. These species are indicators of the condition of the natural communities of the coastal prairies. Their populations are identified as a priority for monitoring due to the tremendous alteration within this physiographic area.

The prothonotary warbler, which nests in wet forested habitats, is one of many priority species identified in the North American Landbird Conservation Plan and occurs on the Complex. Photo Credit: USFWS

North American Waterfowl Management Plan (2012)

The North American Waterfowl Management Plan (NAWMP) is an international plan to conserve waterfowl and migratory birds in North America. It was established in 1986 by Canada and the U.S. Previous plan updates – in 1994 (when Mexico became a signatory), 1998 and 2004 – described abundant waterfowl populations as the plan's ultimate goal, pursued through large-scale partnership-based habitat conservation. The 2012 plan renewal is termed a Revision to differentiate it from the previous updates because for the first time since its inception, we fundamentally reexamined the NAWMP's goals. The 2012 NAWMP Revision sets forth three overarching goals for waterfowl conservation: 1) abundant and resilient waterfowl populations to support hunting and other uses without imperiling habitat; 2) wetlands and related habitats sufficient to sustain waterfowl populations at desired levels, while providing places to recreate and ecological services that benefit society; and 3) growing numbers of waterfowl hunters, other conservationists and citizens who enjoy and actively support waterfowl and wetlands conservation. The first two goals have always been part of the NAWMP. The third goal underscores the importance of people to the success of waterfowl and wetlands conservation. The plan identifies continental population objectives and estimates for duck, goose, and swan species. Appendix B of the revised NAWMP identifies areas of greatest continental significance to North American ducks, geese, and swans – the Gulf Coast Region is one of the areas identified. More information about the revised NAWMP can be found at http://www.nawmprevision.org/. The NAWMP committee is developing an action plan for implementing the Revision.

The ability of the refuges to provide habitat for wintering migratory waterfowl is part of evaluating habitat management activities. Photo Credit: Dave Sanders

Regional partnerships, called Joint Ventures (JV), are the implementing mechanisms of the NAWMP. A JV is a collaborative, regional partnership of government agencies, non-profit organizations, corporations, tribes, and individuals that conserves habitat for priority bird species, other wildlife, and people. There are 18 habitat based and three species based JVs in the U.S. today. Cumulatively, they have conserved 17.3 million acres of habitat for waterfowl and migratory birds. Within the Gulf Coast JV are six initiative areas. The Complex occurs in the Texas Mid-coast Initiative Area, which is comprised of sixteen counties from San Patricio County to Harris County and inland. 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, and provide year-round habitat for mottled ducks (Wilson and Esslinger 2002).

Waterbird Conservation for the Americas: the North American Waterbird Conservation Plan (2002)

The North American Waterbird Conservation Plan (NAWCP) provides a continental-scale framework for the conservation and management of 210 species (23 families) of waterbirds, including seabirds, coastal waterbirds, wading birds, and marsh birds using aquatic habitats in 29 nations throughout North America, Central America, the islands and pelagic waters of the Caribbean Sea and western Atlantic, the U.S.-associated Pacific Islands, and pelagic waters of the Pacific. Eighty percent of the species identified in the plan are colonial nesters congregating at breeding sites in numbers ranging from many to hundreds of thousands of birds. The NAWCP considers one-third of these species to be at risk of serious population loss. Additional information is available on the NAWCP website at http://www.waterbirdconservation.org/nawcp.html.

U.S. Shorebird Conservation Plan (2001)

The U.S. Shorebird Conservation Plan (SCP) seeks to stabilize populations of all shorebirds that are in decline because of factors affecting habitat in the U.S. At a regional level, the plan's goal is to ensure that shorebird habitat is available in adequate quantity and quality to support shorebird populations in each region. Ultimately, the goal of the SCP is to restore and maintain shorebird populations throughout the western hemisphere through an international partnership. The SCP considers 53 species of shorebirds as special concern, of which 34 species occur within the Complex (see Appendix E for a complete list of shorebirds that have been documented on the Complex). More information about the SCP can be found at http://www.fws.gov/shorebirdplan/USShorebird/PlanDocuments.htm.

The Complex supports a large number of shorebirds throughout the year on freshwater wetlands, tidal marshes, and flats and beaches. Photo Credit: Dave Sanders

U.S. Ocean Action Plan (2004)

As part of the Oceans Act of 2000 and the U.S. Commission on Ocean Policy, the U.S. Ocean Action Plan (OAP) 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 OAP is to identify immediate, short-term actions that provide direction for ocean policy and to outline additional long-term actions that

provide direction for the future. The Service has established guiding principles (June 21, 2007 Memo) to implement relevant aspects of the plan through an ecosystem-based management approach. This CCP 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.

National Marine Protected Areas Center Strategic Plan 2010-2015

The U.S. has more than 1,600 Marine Protected Areas (MPAs) covering approximately 40 percent of U.S. marine waters. MPAs are "any areas of the marine environment established by individual federal, state, territorial, tribal, and local authorities for a wide range of purposes." However, there was a growing need to ensure that MPAs were coordinated within a larger ecosystem framework to effectively protect the nation's natural and cultural resources, and represent the diversity of U.S. marine ecosystems. In 2000, the National Marine Protected Areas Center (MPA Center) was established to meet this need. The mission of the MPA Center 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 MPA Center works in partnership with federal, state, tribal, and local governments, tribes, and stakeholders to develop and implement a science-based, comprehensive national system of MPAs. These collaborative efforts are intended to ensure more efficient, effective use of MPAs now and in the future to conserve and sustain the nation's vital marine resources. These efforts have assumed even greater importance as the nation and the world continue planning for the potential effects of climate change. In 2009, portions of all three refuges received MPA designation.

Guidance for MPAs is in the National MPA Center Strategic Plan. In 2009, the plan was revised to more accurately reflect the organization's evolving structure and priorities, with emphasis on further developing the national system of MPAs and its operational capabilities. Included within the plan are special interest areas of importance to the design and implementation of the national system over the next five years. The ongoing development and implementation of the national system of MPAs is a dynamic process requiring adaptive management. As the national system of MPAs matures, the plan will also evolve in recognition of accomplishments and future requirements (NMPAC 2009). The recently formed Gulf of Mexico MPA Network is beginning to implement coordinated activities. The vison of the Network is: *To improve coordination, cooperation, communication, and collaboration among Gulf Coast MPAs by creating opportunities for; collective response; information sharing and continuity; and collectively developing ideas, leveraging agreements, and conveying a common message.* The Complex will continue to work closely with the Gulf of Mexico MPA Network to implement management strategies and assist in meeting the challenge to build resilience within the Gulf of Mexico for natural and man-made disturbance.

1.3.3.4 Regional Plans and Initiatives

TNC Gulf Coast Prairies and Marshes Ecoregional Conservation Plan (2002)

The Nature Conservancy (TNC) developed an ecoregional approach to conservation in 1996 that stated biodiversity conservation required working at larger scales and along ecological instead of geopolitical lines. The TNC has historically been very involved in protecting coastal habitats in the Gulf Coast Prairies and Marshes (GCP&M) by means of habitat acquisition (e.g., 13 national wildlife refuges, 5 state wildlife areas, various county, other land trust organization and TNC preserves). However, recent estimates indicate that just a fraction of the biodiversity in the ecoregion has been documented on these managed areas. The development of the GCP&M Ecoregional Conservation Plan (plan) is an effort to identify the most important remaining, viable conservation areas and determine how to achieve lasting conservation results on the landscape. These sites, known as portfolio conservation areas, are a prioritization management tool for conservation action and resources. Portfolio conservation areas are designed to conserve conservation elements, defined as all viable native community types and all viable vulnerable native species. Protecting one population of each element is seldom adequate for the long-term survival of most species, so the goal of the GCP&M plan is to design areas that will conserve multiple, viable or recoverable occurrences of elements. The GCP&M plan contains supporting data for each site, as well as an ecoregional management strategy applicable to each management area. Management areas are prioritized by biodiversity and threats. Results and data may then be used to create site specific conservation plans like the CCP.

North American Bird Conservation Initiative: Bird Conservation Region Descriptions (2000)

The purpose of the North American Bird Conservation Initiative (NABCI) is to ensure the long-term health of North America's native bird populations by increasing the effectiveness of existing and new bird conservation initiatives, enhancing coordination among the initiatives, and fostering greater cooperation among the continent's three national governments and their people. In 1999, the NABCI approved a framework for delineating ecologically-based planning, implementation, and evaluation units for cooperative bird conservation in the U.S. and Canada known as Bird Conservation Regions (BCRs). BCRs are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues.

The Complex is located within the Gulf Coastal Prairie BCR #37. In this area, flat grasslands and marshes hug the coast of the Gulf of Mexico from northern Tamaulipas across the mouth of the Río Grande, up into the rice country of southeastern Texas and southwestern Louisiana and across the great Louisiana marshlands at the mouth of the Mississippi River. This BCR features one of the greatest concentrations of colonial waterbirds in the world, with breeding reddish egret, roseate spoonbill, brown pelican, and large numbers of herons, egrets, ibises, terns, and skimmers. The region provides critical in-transit habitat for migrating shorebirds, including buffbreasted sandpiper and Hudsonian godwit, and for most of the neotropical migrant forest birds of eastern North America. Mottled duck, fulvous whistling-duck, and purple gallinule also breed in wetlands, and winter numbers of waterfowl are among the

highest on the continent. These include dabbling ducks (especially pintail), gadwall, redhead, lesser scaup, and white-fronted geese from both the Central and the Mississippi flyways. The most important waterfowl habitats of the area are coastal marsh, shallow estuarine bays and lagoons, and wetlands on agricultural lands of the rice prairies. This BCR, as mentioned previously, features one of the greatest concentrations of colonial waterbirds in the world. Loss and degradation of wetland habitats due to subsidenece, SLR, shoreline erosion, freshwater and sediment deprivation, saltwater intrusion, oil and gas canals, and navigation channels and associated maintenance dredging are the most important problems facing the area's wetland wildlife. Find additional information on NABCI at http://www.nabci-us.org.

Partners In Flight Landbird Conservation Plan: Gulf Coastal Prairie Bird Conservation Region (2008)

This plan covers the U.S. BCR #37, the Gulf Coastal Prairie. The Service selected four species of concern, and one suite of species, and developed conservation recommendations for each with expectations that actions proposed would benefit a number of species with similar habitat requirements. The selected species are seaside sparrow, northern bobwhite, loggerhead shrike, LeConte's sparrow, and a suite of warblers (cerulean, Swainson's, and goldenwinged) that represent migrants that use the Gulf Coast as stopover habitat.

Gulf Coast Joint Venture: Mottled Duck Conservation Plan (2007)

This plan was developed by the GCJV Management Board to provide mottled duck conservation guidance to partners within the GCJV. This plan focuses on actions to increase nest success and brood survival and the habitat and land management actions necessary to allow for population expansion.

The refuges are striving to increase mottled duck population by providing a mosaic of freshwater wetlands and marsh habitats. Photo Credit Dave Sanders

Gulf Coast Joint Venture: Conservation Planning for the Reddish Egret (2009)

The reddish egret is among the priority species identified for habitat planning, implementation, and evaluation by the GCJV partnership. This plan describes protection and improvement actions to promote populations expansion of the reddish egret. It also describes specific habitat targets within the Texas Mid-Coast Initiative Area, that partners can utilize to promote this species.

More information on Gulf Coast Conservation Plans that are pertinent to the Complex, can be found at http://www.gcjv.org/documents.php. In addition to the mottled duck and reddish egret plans mentioned above, this website provides links to the *Gulf Coast Joint Venture: Texas Mid-Coast Initiative (2002),* the *Gulf Coast Joint Venture Shorebird Plan,* and a number of other plans/reports.

1.3.3.5 State and Local Plans and Designations

In administering the Refuge System, the Service will ensure that the CCP complements state efforts to conserve fish, 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 CCP, 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.

Texas Comprehensive Wildlife Conservation Strategy (2005)

The Texas Comprehensive Wildlife Conservation Strategy (TCWCS) is required to assess the condition of the state's wildlife and habitats, identify the problems they face, and outline the actions needed for long-term conservation within the state's 10 major ecoregions. The TCWCS identifies a variety of actions aimed at preventing wildlife from declining to the point of becoming endangered. Instead of focusing on single species in isolated areas, the TCWCS focuses on steps needed to protect, restore, and enhance habitat types, in addition to educating the public and private landowners about effective conservation practices.

As part of the State Wildlife Grant Program, the TCWCS was completed by TPWD to assist the agency and its conservation partners with the development of non-game initiatives and goals to address the needs of wildlife and habitats. The document provides detailed species and habitat information on 10 major ecoeregion in Texas. The Complex occurs within the GCP&M Ecoregion. The GCP&M Ecoregion ranks as a high terrestrial

conservation priority and is considered to be among the most threatened of the 10 ecoregions (TPWD 2005). Inland prairies, coastal woodlands, and beach habitats are specifically threatened by increased population growth and associated development. Approximately 297 priority species have been identified within this ecoregion, with several species occurring or nesting on the Complex.

Land and Water Resources Conservation and Recreation Plan (2010)

The TPWD 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 with a foundation for decision-making regarding the State's conservation and recreation needs. The following goals are addressed within the plan:

- Practice, encourage and enable science-based stewardship of natural and cultural resources. Various methods are outlined for achieving this goal, which include basing management decisions on best available science, becoming leaders in managing Sate lands, fostering conservation on private lands, and developing effective conservation partnerships;
- Increase access to and participation in the outdoors. This may be accomplished through actions like encouraging nature and heritage tourism or facilitating access to private and public lands and waters for recreation purposes;
- Educate, inform and engage Texas citizens in support of conservation and recreation; and
- Employ efficient, sustainable and sound business practices. This is accomplished through technology, professionalism, excellent customer service, financial resources, effective communication, and an organized culture.

The goals and objectives are intended to promote stewardship on public and private lands and waters; protect our unique natural and cultural resources; encourage partnerships with all stakeholders; utilize science as the backbone of decision-making; promote participation in the outdoors; instill appreciation of nature in our citizens, young and old; and promote business approach that leverage industry standards and best management practices to support TPWD's mission.

According to the original LWRCRP, *"…the high population growth and associated development along the coast have fragmented land, converted prairies, changed river flows, decreased water quality and increased sediment loads and pollutants on marshes and estuaries. Projections indicate continued high growth and increasing fragmentation in most parts of this ecoregion."* The LWRCRP recommends, *"…many beach areas and mud flats need additional protection."* The LWRCRP as well as the Complex incorporate many relevant strategies, such as monitoring species' status and trends, restoring coastal prairie, providing public outreach, protecting cultural and historical resources, maintaining and developing new partnerships, and managing invasive species.

Texas Wetlands Conservation Plan (1997)

The goal of the Texas Wetlands Conservation Plan (TWCP) is consistent with wetland conservation goals of the Complex and 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 TWCP focuses on a non-regulatory, incentive-based approach to wetlands management and conservation aimed mainly at private landowners. TWCP focuses on: 1) enhancing the landowner's ability to use existing incentive programs and other land use options through outreach and technical assistance; 2) developing and encouraging land management options that provide an economic incentive for conserving existing wetlands or restoring former ones; and, 3) coordinating regional wetlands conservation efforts.

Austin's Woods Conservation Plan (1997)

The Austin's Wood Conservation Plan describes the land acquisition and conservation activities by the Service within a four county area known as the Columbia Bottomlands (known locally as Austin's Woods). The Columbia Bottomlands is a southern floodplain forest formation on the upper Texas Gulf Coast that historically covered approximately 700,000 acres. The rapid destruction of bottomland hardwood forests in this area, and the concerns of conservationists about preserving a sustainable area of this habitat, gave rise to this plan (FWS 1997). An important aspect of the plan is emphasis on cooperation with local conservation partners. Any entity that can provide assistance to the conservation of this unique ecosystem is encouraged to contribute. An aim of the local effort is to give landowners, who might otherwise be forced to clear their lands, other land use options that will conserve the forest. The combined efforts and coordination among these entities could eliminate duplication of effort and optimize the use of financial resources in pursuit of the protection of Columbia Bottomlands. The purpose of Service efforts is to contribute to the protection and enhancement of the ecological integrity of the Columbia Bottomlands. In the 1997 Decision Document, the Service agreed to:

- Be a part of the long-term monitoring effort;
- Assist local agencies and other entities in protection efforts;
- Provide technical assistance and Partners for Wildlife funds;
- Hold conservation easements when other organizations are unable; and
- Acquire fee and easement interests in lands when other organizations are unable.

Under this project, the Service did not designate an all-encompassing "acquisition boundary" which is done with many projects so as not to affect non-refuge lands across the area. This strategy allows for promoting private conservation efforts but does not restrict development or other land uses on private lands adjacent to the refuge (FWS 2008). Therefore, non-Service lands do not receive a "refuge designation." It is anticipated that the eventual pattern of land acquisition would be characterized as a mosaic of land blocks that together, with conservation projects, protect the ecosystem and maintain essential ecological elements and functions.

The Texas Champion Live Oak, the San Bernard Oak on the McNeal/Stringfellow/Ducroz Unit of San Bernard is a 300 year old monument to the unique and diverse Columbia Bottomlands Ecosystem. Photo Credit: USFWS

Purchases are from willing sellers only and purchased at fair market value as determined by appraisals prepared by, or under contract with, the Service. Reservation of any surface or subsurface interests may be allowed as long as certain stipulations to protect habitat can be agreed upon. The Service evaluates each landowner's request to sell to the Service based on a number of criteria. These criteria are not in priority order and are used flexibly in relation to each other with an eye to the site's overall contribution to the conservation goal. The criteria are not weighted or ranked when evaluating sites. The criteria are:

1. Exceptional/unique plant communities (e.g., canebrakes, willow swamps, bald cypress swamps, Carolina cherry laurel stands, southern red cedar stands);

2. High quality undisturbed habitat;

3. No minimum size, but large tracts are preferred (recognizing that larger tracts maximize ecological integrity and are necessary for area-sensitive species);

4. Site complements, is adjacent to, or near other protected areas, particularly where natural links exist such as the same hydrologic system or seed dispersal corridors. Acquisition would establish linkage between other protected sites;

5. Expansion capability (will the acquisition of this site add to adjacent acquisitions or other protection strategies to build a larger unit?);

6. Number and kind of Heritage Program database elements contained (the Heritage Program database is maintained by TPWD and addresses element occurrence records, community descriptions/rankings and element rankings) and other known exceptional biological elements that are not currently in the database (an element is an exception biological occurrence such as an active bald eagle nest, a rare plant population, or a heron rookery);

7. Would acquisition maximize maintenance of natural ecological functions and processes (e.g., natural hydrological patterns);

8. Presence of intact natural biological diversity characteristic of healthy bottomland hardwood forest;

9. Degree of human-caused disturbance to the communities (e.g., roads, houses, utility corridors, etc);

10. Proximity to development (threat or vulnerability);

11. Degree of fragmentation of surrounding habitats;

12. Ease of restoration (enough of the basic ecological processes such as a hydrologic regime are present to support restoration so as to not require intensive restoration efforts);

13. Level and kind of current disturbance;

14. Hydrologic/watershed influences; and

15. Degree of structural (plant community and topographic) complexity.

Seagrass Conservation Plan for Texas (1999)

Having state management authority or jurisdiction where seagrasses occur, TPWD, Texas General Land Office, and the Texas Commission of Environmental Quality have taken the lead in development and implementation of this plan. The plan focuses on three separate issues categories: Seagrass Research, Management/Policy, and Education/Outreach, including cross-agency coordination and cooperation with federal agencies. Habitat management activities on the Complex that include protection and maintenance of natural habitats, as compared to increasing development along the Texas coast, indirectly helps maintain and protect the quality of seagrass beds that occur on adjoining state lands. The Complex will promote the value and protection of seagrasses through outreach and environmental education strategies.

Coastal Preserve

Under the Texas Coastal Management Program, coastal preserves are any lands owned by the state that are designated and used as parks, recreation areas, scientific areas, wildlife management areas, wildlife refuges, or historic sites and that are designated by the Texas Parks and Wildlife Department (TPWD) as being coastal in character.

Under the Texas Coastal Preserve Program, the Land Office leases coastal lands to the TPWD, which manages them as preserves. The Coastal Preserve Program is designed to protect unique coastal areas and fragile biological communities, including important colonial bird nesting sites. Currently, there are four coastal preserves.

The Christmas Bay Coastal Preserve (5,660 acres) is located in the southwestern portion of the Galveston Bay system in Brazoria County. The preserve is home to migratory and resident waterfowl and shorebirds. Christmas Bay, a small secondary bay at the southwestern extreme of the Galveston Bay system, is an important finfish and shellfish nursery area. Seagrasses are probably the most valuable and productive habitats in the bay. Four seagrass species occur in the bay; however, only widgeongrass is found elsewhere in the Galveston Bay system. Brazoria National Wildlife Refuge is adjacent to Christmas Bay and has been a major, positive influence on the health and maintenance of the Christmas Bay ecosystem.

1.3.3.6 Species-Specific Plans

Species-specific recovery plans identify site-specific management actions that, if completed, could lead to reclassification of a species to a less critical status or help them recover to the point of removal from Endangered Species Act protection. The Service drafted the following recovery plans for species that could potentially occur on the Complex:

Whooping Crane Recovery Plan (1994)

According to the recovery plan, two primary objectives and measurable criteria will allow species reclassification from “endangered” to “threatened”. The first objective is to establish and maintain wild self-sustaining populations of whooping cranes that are genetically stable and environmentally resilient. This will involve maintaining and allowing for a continued increase of the Aransas-Wood Buffalo Population (AWBP). Specifically, the AWBP will consist of a minimum of 40 productive pairs. In addition, the recovery plan calls for establishing a minimum of 25 productive pairs in separate self-sustaining populations at each of two other discrete locations. Downlisting to threatened status requires attaining or exceeding these breeding pair levels for 10 years. Population targets are 160 in the AWBP, and 100 each in the Florida non-migratory population and the eastern migratory population. An alternative criterion for this objective is as follows: if a second and third wild population cannot become self-sustaining, then the AWBP must be self-sustaining and remain above 1,000 individuals (USFWS 1994) i.e., 250 productive pairs for downlisting to occur. The Conservation of Whooping Cranes Memorandum of Understanding (MOU), approved by Canadian and U.S. officials, recognizes a goal of 1,000 individuals in the AWBP population.

The target of 1,000 is reasonable for downlisting given the historical growth of the AWBP, its low probability of extinction (Mirande *et al.* 1993), and theoretical considerations of minimum population viability (Salwasser *et al.* 1984). The Complex does not currently support a whooping crane population, but may play a future role in whooping crane recovery, particularly if recovery efforts need sufficient Texas Gulf Coast habitat to support 1,000 birds.

Attwater's Prairie Chicken Recovery Plan (Second Revision 2007)

The Attwater's prairie chicken was listed as endangered on March 11, 1967 (32 FR 4001), without critical habitat when approximately 1,070 birds were thought to remain in the wild in 13 Texas counties. Current recovery objectives for downlisting from endangered to threatened call for raising the overall population to at least 3,000 birds maintained annually over a 5-year period. De-listing may be appropriate when there is a minimum overall population of 6,000 breeding adults annually over a 10-year period occupying habitats along a linear distance of no less than 100 miles. The Brazoria NWR is located approximately 35 miles southwest of the Texas City population and 100 miles east of the Attwater Prairie Chicken NWR. The Brazoria NWR could be a possible location for future populations of Attwater's prairie chickens.

Piping Plover

Because of declines in numbers and breeding sites, piping plover populations became federally-listed in 1986 (50 FR 50726-50734). The Service listed piping plovers on the Great Lakes as endangered and Atlantic and Northern Great Plains populations as threatened. Piping plovers on migration and in wintering areas (such as at Matagorda Island) are classified as a threatened species. The Service proposed critical habitat along the Texas coast (74 FR 23476-23600; May 19, 2009), with a final ruling on June 18, 2009, revising designation of critical habitat for the wintering population of the piping plover in 18 specific units in Texas. In total, approximately 139,029 acres fall with the boundaries of the revised critical habitat designation (FWS 2009). Brazoria and Matagorda Counties are included.

Piping plovers winter primarily along beaches, sandflats, and algal flats on the Gulf of Mexico. Plovers mainly occur in and around the Cedar Lakes area on the San Bernard NWR. Some of the actions needed to recover the species include determining current distribution and population trends, and protecting, preserving and enhancing piping plover habitat. Strategies to help implement these recovery actions for the piping plover are included in Chapter 4, Management Direction of the CCP.

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 San Bernard NWR, the Kemp's ridley may nest on

the beach. The Kemp's ridley, loggerhead, hawksbill, green, and leatherback sea turtles occur within the Gulf of Mexico and may occur within bay waters.

The Complex contributes to recovery plan tasks for sea turtles primarily through monitoring nesting and stranding (turtles that wash ashore, dead or alive, or are found floating in shallow water dead or alive), patrolling beaches, protecting nest areas, participating in recovery work groups, and collaborating 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 San Bernard NWR beach (4 miles), as well as on 60 miles of non-refuge beach from Matagorda to Quintana. The Complex conducts patrols from April through June, which corresponds with the nesting season of the Kemp's ridley sea turtle. The Complex participates in the Sea Turtle Stranding and Salvage Network, as recommended in the recovery plans. This CCP incorporates habitat and monitoring strategies and other action items beneficial to sea turtles, as they apply to the Complex.

Refuge staff and volunteers monitor more than 80 miles of Texas beaches for sea turtle stranding and nesting. A Kemps ridley nest on Matagorda Peninsula is excavated and transported to Padre Island for incubation and release. Inset: A baby sea turtle makes its walk to the surf on the Quintana Beach. Photo Credit: USFWS

1.3.4 Coordination with the State of Texas

The Service is required to consult and coordinate with affected state conservation agencies, as well as adjoining federal, local, and private landowners. The Service ensures 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 are required to ensure the Refuge System regulations and management plans are to the extent practicable, consistent with state laws, regulations, and management plans. As such, the Service will ensure this CCP complements the State of Texas efforts to conserve fish, wildlife and their habitats, and to increase support for the Refuge System and participation from conservation partners and the public.

This CCP recognizes that both the Service and Texas Parks and Wildlife Department (TPWD) have authorities and responsibilities for management of fish and wildlife species on the Complex. The State's participation and contribution throughout this planning process has provided for ongoing opportunities and open dialogue to improve the ecological conservation of fish and wildlife species and their habitats in Texas. A key part of the planning process is the integration of common objectives, where appropriate.