

APPENDIX D: COMPREHENSIVE CONSERVATION PLAN (CCP) WITH GOALS, OBJECTIVES, AND STRATEGIES

Management Focus

Under this Comprehensive Conservation Plan, the Refuge Complex would continue and expand current habitat management and native habitat restoration programs, with increased monitoring and research to assess management actions and facilitate a more effective adaptive management approach. Wetland habitat management activities for waterfowl, shorebirds and other wetland-dependent migratory birds including structural water management in marshes, prescribed burning, controlled grazing, and rice farming and moist soil management would be refined and enhanced, and in some cases expanded through development of new infrastructure. Concurrently, additional restoration of native habitats including wetlands, prairie and woodlots would be undertaken to benefit a variety of native fauna, with a focus on priority species identified as in need of conservation through national and international conservation initiatives, including the North American Waterfowl Management Plan, the National Shorebird Conservation Plan, the National Water bird Conservation Plan, and the Partners in Flight Regional Conservation Plan.

Efforts to address coastal habitat loss and degradation resulting from shoreline erosion along the Gulf, Galveston Bay and the GIWW and to restore emergent marshes would be intensified by increasing coordination among agencies and other stakeholders. Goals would include implementing large-scale partnership projects including barrier beach/dune restoration on McFaddin NWR, marsh and shoreline restoration on Texas Point NWR through the beneficial use of dredge material, and structural shoreline protection along the GIWW and East Galveston Bay. Ongoing interior marsh loss would be addressed by working with agencies and other stakeholders on watershed-scale hydrologic restoration projects that restore freshwater inflows and further restrict saltwater intrusion and increased beneficial use of dredge material to restore mineral sediment supply to marshes. The USFWS would also implement several smaller hydrologic restoration and shoreline protection projects on the Refuge Complex. Control and monitoring programs for exotic and invasive species would be intensified, and additional efforts to monitor and reduce impacts of contaminants implemented.

Through new partnerships with universities and other agencies, additional research and monitoring would be conducted to better assess impacts of relative sea level rise and to support future conservation planning to address these impacts. Additional monitoring of exotic/invasive plant species, including research to assess the efficacy of ongoing and new control techniques, would be conducted. Additional baseline data on fish and wildlife populations and habitat use would also be collected, with an emphasis on documenting the status of several sensitive or declining species.

USFWS habitat management and restoration and biological program activities on the Refuge Complex under this Alternative will support conservation objectives and informational needs for priority species identified in regional, national and international avian conservation plans. These include plans for waterfowl and avian conservation under the North American Waterfowl Management Plan (the Gulf Coast Joint Venture's Chenier Plain Initiative Plan, Mottled Duck Conservation Plan and all-bird conservation initiative), the U.S. Shorebird Conservation Plan and step-down Lower Mississippi/Western Gulf Coast Regional Shorebird Plan, the North American Waterbird Conservation Plan, and the Partners in Flight Regional Conservation Plan.

The Refuge Complex would also continue to provide and promote opportunities for all six of the National Wildlife Refuge System's priority wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. The Refuge Complex would seek to provide additional recreational opportunities and improve the quality of visitor services and of the visitor experience through construction of additional public use facilities including a Refuge Complex Administrative Headquarters and Wildlife Interpretive Center in Chambers County, expanding law enforcement efforts to protect public safety and natural resources, providing additional hunting and fishing

opportunities, and developing additional educational programs. Expanded outreach to local communities and private landowners would be aimed at developing new partnerships to further conservation and promote awareness of the region's natural resources.

Staffing on the Refuge Complex would be expanded by seven positions during the 15-year planning horizon the CCP. This would include six positions previously established by the USFWS as Essential Staffing on the Refuge Complex: 1) Wildlife Biologist; 2) Plant Ecologist; 3) Geographic Information Systems - Computer Specialist; 4) Natural Resource Specialist - Oil and Gas Management; 5) Refuge Operations Specialist; and 6) Heavy Equipment Operator. In addition, one Refuge Law Enforcement Officer position would be established to increase protection of refuge resources and public safety.

Rationale for this Management Focus: The coastal marshes, prairies and woodlots of the Chenier Plain region of southwestern Louisiana and southeast Texas comprise a hemispherically important biological area. The Texas Gulf Coast is the primary site for ducks wintering in the Central Flyway, with an average of 1.3-4.5 million birds, or 30-71% of the total flyway population (Stutzenbaker and Weller 1989). This area also winters 90% of the snow, Canada, and greater white-fronted geese in the Central Flyway (Buller 1964). Additionally, the coastal marshes, prairies and prairie wetlands of the Chenier Plain region of the Texas Gulf Coast serve as a critical staging area for Central Flyway waterfowl migrating to and from Mexico and Central and South America. Hundreds of thousands shorebirds, wading birds, and other marsh and waterbirds also winter or migrate through the region, including several now identified by the USFWS as avian Species of Conservation Concern. Coastal prairie and coastal woodlots support over 150 migratory and resident land bird species, including 9 species of grassland birds and 7 species utilizing woodland habitats listed as Rare and Declining within the Coastal Prairies Region of Texas (Texas Parks and Wildlife Department 2000). Overall, wetland, prairie and woodland habitats on the Refuge Complex provide habitat for 33 avian Species of Conservation Concern in the Gulf Prairies Bird Conservation Region. (USFWS 2005).

The high degree of alteration in this ecosystem has resulted in loss and degradation of native habitats, loss of biological diversity, and decreased habitat quality for migratory birds and other native wildlife. Alterations of historic hydrology including loss of freshwater inflows and increased saltwater intrusion, coastal erosion, land subsidence and sea level rise are contributing to ongoing coastal land loss and marsh degradation. Almost all of the region's historic native tall grass coastal prairie and its associated prairie wetlands have disappeared, and remaining coastal woodlots are imminently threatened by development and other land use changes. Several highly invasive exotic plant species are replacing native habitats and severely impacting native biological diversity. Air and water quality issues in the region pose a potential contaminant threat to fish and wildlife, as do accidental spills and discharges from the major petrochemical shipping, storage and processing facilities located in close proximity to sensitive Refuge Complex habitats. Habitat losses to date and ongoing threats in this ecosystem are such that intensive management of remaining habitats, in combination with habitat restoration where feasible, is required to conserve fish and wildlife resources.

The Refuge Complex provides over 172,000 annual visitors opportunities to waterfowl hunt, fish for fresh and saltwater species, observe and photograph wildlife, and learn about this coastal ecosystem through interpretive and environmental education programs. Southeast Texas has a long and rich tradition of outdoor recreation. Demand for these recreational opportunities on public lands and water is increasing. The human population in the 8-county area surrounding Houston now exceeds 6 million people. The Texas Gulf Coast has become a popular destination for national and international nature tourists. Improving visitor services and the quality of the visitor experience on these refuges is a critical component of future management.

GOAL 1. Conserve, enhance, and restore the Texas Chenier Plain region’s coastal wetlands to provide wintering, migrational, and nesting / brood-rearing habitat for waterfowl, shorebirds, marshbirds, wading birds, and other wetland-dependent migratory birds and habitat for native fish and wildlife.

Note: The following RONS Projects are Essential Staffing Positions which support coastal wetlands restoration, enhancement and management strategies:

Anahuac NWR RONS Project #98004 - Essential Staffing - GIS Computer Specialist
Anahuac NWR RONS Project #98034 - Essential Staffing - Plant Ecologist
Anahuac NWR RONS Project #97058 - Essential Staffing - Wildlife Biologist
Anahuac NWR RONS Project #00007 - Essential Staffing - Refuge Operations Specialist
Texas Point NWR RONS Project #00001 - Essential Staffing - Heavy Equipment Operator

Objective A. Coastal Marshes - Emergent Wetlands (Estuarine and Palustrine Wetlands).

On an annual basis, manage and maintain 30 to 40% of fresh and intermediate emergent coastal marshes on the Refuge Complex in target plant communities which contain several early and mid-successional emergent plant species.

Rationale for Objective

Meeting the habitat needs of the region’s diversity of wetland dependent resident and migratory birds requires maintaining a range of coastal marsh habitat types and plant community successional stages within these marsh types. Providing freshwater inflows and restricting saltwater intrusion are critical to maintaining the Chenier Plain’s historic continuum of fresh, intermediate, brackish saline marshes. Habitat values for waterfowl, shorebirds and many wading bird species are greatly enhanced in intermediate marshes with early successional plant communities containing several perennial and annual plant species (primarily grasses and sedges) which provide important food resources, and where disturbance reduces the height and/or density of vegetation. Perennial emergent plants important to wintering waterfowl include seashore paspalum (*Paspalum vaginatum*) and Olney bulrush (*Scirpus olneyi*). Early successional emergent plant species important to waterfowl include annual grasses such as millet (*Echinochloa* spp.) and sprangle-top (*Leptichloa fascicularis*) and forbs such as water hyssop (*Bacopa monnieri*) and purple ammania (*Ammania coccinea*). Migratory bird species such as rails require denser vegetation and plant species composition typical of later successional stages (Fredrickson and Taylor 1982). Coastal marshes have evolved with disturbance regime which includes fire, herbivory by native wildlife, and infusion of saline waters during tidal surges associated with tropical storms. Natural fire and herbivory by native species now occur less frequently or at reduced levels due to human influences on the ecosystem (Stutzenbaker and Weller 1989). Water level and salinity management, prescribed burning and controlled grazing are available tools for influencing plant communities (species composition and physical structure) in marsh habitats.

Strategies

Throughout the Life of the Plan and Refuge Complex-wide:

- **Strategy 1** - Actively manage water levels and salinities in managed marsh units (approximately 30,000 acres of semi-impoundments and impoundments) utilizing water control structures, levees and water delivery and drainage infrastructure to maintain a continuum of brackish to fresh conditions and desirable marsh hydroperiods (wetting and drying cycles). On Texas Point NWR, utilize passive water management with rock weirs to reduce saltwater intrusion and restore hydrology.

- **Strategy 2** - Conduct a rotational prescribed burning program in marsh units on the Refuge Complex with an annual burning objective of 12,000 to 15,000 acres, burning from late September to late-November (to the extent permitted by environmental/climatic conditions and air quality parameters) to maximize the benefits of integrated burning/grazing/water management programs.
- **Strategy 3** - Initiate limited summer prescribed burning to control invasive woody vegetation including Baccharis (*Baccharis halimifolia*) and big-leaf sumpweed (*Iva frutescens*) in portions of targeted marsh management units.
- **Strategy 4** - Initiate and conduct short and long-term ecological fire effects monitoring and use results to guide an adaptive approach to implementing the prescribed burning program.
- **Strategy 5** - Conduct a rotational cool season grazing program on approximately 41,000 acres of marsh habitats on the Refuge Complex.
- **Strategy 6** - Modify controlled grazing program during the initial period of the CCP's implementation by increasing (given favorable forage and water conditions) grazing intensity in several marsh units on the Anahuac, McFaddin and Texas Point NWRs.
- **Strategy 7** - Reconfigure grazing units through additional fencing and development of additional watering sites to increase the effectiveness and efficiency of the control grazing program. (Anahuac NWR RONS Project #99055 - Enhance grazing program, McFaddin NWR RONS Project #00006 - Enhance grazing program)
- **Strategy 8** - Manage muskrat and nutria populations utilizing trapping under Special Use Permits for nuisance animal control when necessary to prevent damage to emergent marsh habitats.
- **Strategy 9** - Increase herbivory by native wildlife by developing new grit sites and maintaining sanctuary areas for geese through the special white goose conservation season (in effect since 1999) which follows the regular waterfowl season.
- **Strategy 10** - Facilitate and support ongoing and new research studies to determine fire effects on marsh accretion, soils, vegetation, and wildlife (Anahuac NWR RONS Project# 97021- Monitor marsh elevation change, McFaddin NWR RONS Project #00013 - Conduct fire effects study)
- Monitor conservation easements on Moody and McFaddin NWRs.

Objective B. Open Water Wetlands (Estuarine and Palustrine Wetlands). Increase species diversity and production of submerged aquatic vegetation in marsh habitats and increase open water habitat by 10% in fresh and intermediate marshes on the Refuge Complex.

Rationale for Objective

Open water wetlands that contain submerged aquatic vegetation provide valuable habitat for resident and migratory waterfowl and numerous other waterbirds. The submerged aquatic plant community serves as a direct source of important waterfowl foods (e.g., seeds and tubers), and indirectly, as a rich environment for aquatic macroinvertebrates, which are heavily utilized by waterfowl and many other wetland birds (Baldassarre and Bolen 1994). These habitats are extremely important for brood-rearing and molting Mottled Ducks (Stutzenbaker 1988). Open water habitats supporting submerged aquatic vegetation within estuarine marshes also provide vital nursery habitat for many species of marine fish and shellfish (Stutzenbaker and Weller 1989).

Hydrological alterations through activities such as channelization and restriction of freshwater inflows have resulted in saltwater intrusion, accelerated dewatering and drying, and/or excessive and prolonged flooding in the region's coastal marshes. All of these have reduced both production and species diversity

of submerged aquatic vegetation in open water habitats. The diversity and productivity of aquatic plant communities are also dependent upon maintenance of the historic continuum of fresh to saline marsh types. Water level and salinity management within marsh semi-impoundments are important tools for restoring and maintaining submerged aquatic vegetation production and species diversity. Conversion of emergent wetlands to open water through erosion of shorelines has enlarged some lakes and ponds to the point that wave fetch increases turbidity, which precludes the establishment and growth of submerged aquatic vegetation in these habitats. Construction of marsh terraces in larger open water wetlands to reduce wave fetch and turbidity can promote the establishment and growth of submerged aquatic vegetation.

Common reed (*Phragmites communis*) has become established within a large proportion of open water wetlands within intermediate marshes on the Refuge Complex. This plant is an aggressive invader which establishes along a pond periphery, and if not controlled, encroaches into open water where it forms dense homogeneous stands. Cattail (*Typha spp.*) and California bulrush (*Scirpus californicus*) are also aggressive plant invaders which form dense homogeneous stands in open water habitats in fresh and intermediate marshes. In fresh marsh environments such as the North Unit of McFaddin NWR, expansion of maiden cane (*Panicum hemitomen*) and giant cutgrass (*Zizaniopsis miliacea*) are also resulting in loss of open water habitats. Submerged aquatic vegetation production is substantially reduced due to shading and loss of substrate when extensive encroachment by these species occurs. Pond closure results in decreased habitat quality for waterfowl and other migratory bird species and fishery resources which utilize open water habitats. Pond closure has reduced availability of important breeding pair and brood rearing habitat for Mottled Ducks. Prescribed burning controlled grazing, water level and salinity management, mechanical removal and spot herbicide application are available tools for controlling these invasive species.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Manage water levels and salinities in managed marsh (semi-impoundments and impoundments) to maximize the annual production of desirable submerged aquatic plants.
- **Strategy 2** - Implement a control program for common reed, cattail and other invasive emergent plants which encroach into open water habitats, using integrated pest management (combining salinity control, prescribed burning, controlled grazing, mechanical removal and spot herbicide application) on selected units including the Deep Marsh, East Unit and Middleton Tract units of Anahuac NWR, and the White's Fee, Wild Cow Bayou, White's Pasture and North Unit of McFaddin NWR. Expand control efforts over the life of the CCP using the most effective strategies. (Anahuac NWR RONS Project #02001 - Control invasive plants to restore open water wetland habitats, McFaddin NWR RONS Project #02002 - Control invasive plants to restore open water wetland habitats, Anahuac NWR RONS Project #00002 - Improve coastal marsh management)
- **Strategy 3** - Install marsh terraces in large open water habitats to reduce marsh loss and enhance submerged aquatic plant production and diversity.
- **Strategy 4** - Develop enhanced on-site Geographic Information System capabilities to monitor status and trends of Refuge Complex wetlands on all four refuges in the Refuge Complex. Use GIS technology, remote sensing, radar surveys and other tools to map micro-topography and define watersheds, quantify water usage, and detect trends in open water to emergent marsh ratios and large-scale vegetative changes.
- **Strategy 5** - Facilitate and support a research study to identify causative factors of the "blackwater phenomenon" which negatively impacts submerged aquatic vegetation production in marsh habitats, and to guide development of adaptive management strategies to prevent or

minimize these impacts. (Anahuac NWR RONS Project #97022 - Conduct blackwater study)

1-5 Years - Anahuac NWR:

- **Strategy 1** - Improve water level management capabilities in Shoveler Pond, the 480 Unit, Rail Reservoir, Moccasin Pond, Otter Pond, and East Unit South Reservoir by modifying existing and installing new water control structures. (Anahuac NWR RONS Project #97008 - Restore coastal freshwater wetlands)

1-5 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Enhance water management in Wild Cow Bayou Management Unit by installing additional water control structures along the GIWW and rehabilitating levees (LeBlanc's Reservoir, Pond 11, and Pond 13). (McFaddin NWR RONS Project # 97004 - Restore and manage coastal wetlands)
- **Strategy 2** - Install marsh terraces to reduce fetch and turbidity and increase production of submerged aquatic vegetation in Willow Lake, LeBlanc's Reservoir, Pond 28 and Pond 29 on McFaddin NWR. (McFaddin NWR RONS Project #97004 - Restore and manage coastal wetlands).
- **Strategy 3** - Enhance water management on the North Unit through design and construction of new water control structures/spillways and associated infrastructure. (McFaddin NWR RONS Project #97004 - Restore and manage coastal wetlands)
- **Strategy 4** - Enhance water management in Willow and Barnett Lake units of McFaddin NWR through design and construction of new water control structures along the GIWW. (McFaddin NWR RONS Project #97004 - Restore and manage coastal wetlands)

6-10 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Improve water level and salinity management in the Wild Cow Bayou Management Unit by modifying the existing western levee system to fully enclose this 5000-acre unit.

Objective C. Freshwater Prairie Wetlands (Palustrine). By Year 15 of the CCP's implementation, maintain and manage approximately 1,900 acres of managed and natural shallow freshwater wetlands on the Refuge Complex and manage adjacent prairie habitats to improve nesting habitat for Mottled Ducks and other ground nesting migratory birds.

Rationale for the Objective: Nationwide, ninety-eight percent of all wetland losses during 1986-1997 were to freshwater wetlands (Dahl 1997). Losses of this habitat type have been substantial along the Texas Coast (Moulton *et al.* 1997). Native prairie habitats and their associated shallow prairie wetlands have been severely impacted. Over 95% of the native Gulf Coast prairies have been lost due mainly to development and agriculture (Stutzenbaker 1988), and these land use changes resulted in a major loss of prairie wetlands in Texas (Moulton *et al.*, 1997). Mottled ducks heavily utilize prairie habitats adjacent to freshwater wetlands for nesting (Stutzenbaker 1998), and the current decline in the Texas Gulf Coast population of this species is likely indicative of the loss and changing conditions of these habitats (Neaville 2001). A large portion of the upper Texas Coast prairie habitats have been cultivated for rice production, which provides valuable habitat for waterfowl, shorebirds, and many other migratory birds (Hobaugh *et al.* 1989, Wilson 2001). However, rice production has declined significantly during the last decade in counties surrounding the Refuge Complex, reducing available prairie wetland habitat for waterfowl, shorebirds and other wetland-dependent species.

Strategies

Throughout the Life of the CCP - Anahuac NWR:

- **Strategy 1** - Maintain annual cooperative rice farming acreage at 500-700 acres per year, while trying to increase the percentage of that acreage which is organically farmed.
- **Strategy 2** - Increase moist soil management acreage to 1,100 acres annually from the current 500 acres annually by developing 590 of new moist soil management units on the Old Anahuac, East Unit and Middleton Tract units. (Anahuac NWR RONS Project #97008 - Restore and enhance coastal freshwater wetlands, Anahuac NWR RONS Project 99001 - Enhance coastal wetlands management)
- **Strategy 3** - Restore 100 acres of shallow depressional prairie wetlands on the Granberry Tract Unit and the East Unit. (Anahuac NWR RONS Project #97008 - Restore and enhance coastal freshwater wetlands, Anahuac NWR RONS Project #99001 - Enhance coastal wetlands management)
- **Strategy 4** - Mow and/or hay 100 acres of transitional wet prairie annually to enhance migrational and wintering habitat for waterfowl and shorebirds.

1-5 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Restore 100 acres of shallow freshwater wetland habitat on McFaddin NWR by developing moist soil units using water wells, levees and water control structures. (McFaddin NWR RONS Project #98004 - Restore and enhance coastal freshwater wetlands)

.6-15 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Create shallow freshwater wetland habitat in dredge material disposal sites along the GIWW on McFaddin NWR by installing levees and water control structures during future maintenance dredging cycles. This will involve development of cooperative projects with the U.S. Army Corps of Engineers.

GOAL 2. Conserve, enhance, and restore the Texas Chenier Plain region's coastal prairies and coastal woodlands to provide wintering, migrational, and nesting habitat for resident and migratory landbirds, including neotropical / nearctic migratory birds, and habitat for other native wildlife species.

Note: The following RONS Projects are Essential Staffing Positions which support coastal prairie and woodlands restoration, enhancement and management strategies:

Anahuac NWR RONS Project #98034 - Essential Staffing - Plant Ecologist
Anahuac NWR RONS Project #97058 - Essential Staffing - Wildlife Biologist
Anahuac NWR RONS Project #00007 - Essential Staffing - Refuge Operations Specialist
Anahuac NWR RONS Project #98004 - Essential Staffing - GIS Computer Specialist
Texas Point NWR RONS Project #00001 - Essential Staffing - Heavy Equipment Operator

Objective A. Native Prairie and other Grasslands. By Year 15 of the CCP's implementation, protect and manage all of the 5,744 acres of non-saline grassland habitats on the Refuge Complex, including "native prairie remnants", permanently fallowed croplands which are naturally revegetating, and sites previously restored to native prairie using intensive restoration techniques. Prescribed burning, controlled grazing, mowing (and haying) and exotic / invasive plant control would be the primarily management tools employed. A second objective is to, within 15 years, restore an additional 2,223 acres of fallowed former cropland to native prairie on Anahuac NWR using intensive restoration techniques.

Rationale for the Objective

Over 9 million acres of native tall grass prairie once occurred along the Gulf Coast in Texas and Louisiana. It is now estimated that 99.8% and 99.6 % of little bluestem and eastern gamma grass/switch grass prairies, respectfully, have been lost in Texas (McFarland 1995). Grassland birds have exhibited steeper and more consistent population declines during the last 25 years than any other group of North American species (Knopf 1995). Nine out of the 13 avian species listed as Rare and Declining with the Coastal Prairies Region in Texas (Texas Parks and Wildlife Department 2000) are present in grasslands on the Refuge Complex. In 2005, the USFWS listed 7 avian species occurring in prairie habitats on the Refuge Complex as Species of Conservation Concern in the Gulf Prairies Bird Conservation Region.

Topography, soils, fire and grazing and trampling actions of herbivores, all in association with climate, are natural functions controlling grassland development (Ryan 1990). Fire in upland prairie prior to human occupation of the continent was started by lightning storms, primarily in mid-summer (Komarek 1964, Brag 1982, Higgins 1984, Gabrey *et al.*, 1999). The use of prescribed fire, grazing, mowing, and herbicides at different sites with varying soil moisture can produce the variety of habitats needed to support a diverse prairie avifauna (Ryan 1990). Restoration of native prairie, and an integrated management approach utilizing prescribed fire, exotic plant control and controlled grazing in upland grassland habitats is needed on the Refuge Complex to provide large blocks of nesting and wintering habitat for prairie-dependent avian and other wildlife species.

Strategies

Note: All of the native prairie restoration strategies to be implemented on the Refuge Complex during the 15-year planning horizon of the CCP are supported by the following RONS projects:

Anahuac NWR RONS Project #97009 - Restore native prairie
Anahuac NWR RONS Project #98059 - Acquire equipment used in prairie restoration
McFaddin RONS Project #03003 - Restore native prairie

Note: The prairie restoration and enhancement efforts described below will be implemented through partnerships with conservation organizations and volunteers.

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Utilize spring prescribed burning, rotational grazing, mowing/haying, and exotic plant control to maintain and enhance existing native prairie and other grassland habitats.
- **Strategy 2** - Revise the controlled grazing program on upland prairie units to include more short-duration/high-stocking rate grazing episodes.
- **Strategy 3** - Continue to conduct prescribed burns in prairie units in the spring, and initiate limited summer burning to help control invasive and exotic woody vegetation.
- **Strategy 4** - Enhance native plant diversity on existing grasslands by sprigging and seeding with native grasses and forbs.

Throughout the Life of the CCP - Anahuac NWR:

- **Strategy 1** - Restore an additional 2,223 acres of native prairie using intensive restoration techniques on the following management units: Gator Marsh – 97 acres, North Gator Marsh – 204 acres, Longtom Prairie – 186 acres, Pintail Marsh – 120 acres, Airstrip Prairie and East Bay Bayou Marsh – 1000 acres, Middleton Tract – 370 acres.
- **Strategy 2** - Construct a 5-acre native prairie propagation area on the East Unit to increase native grass seed production for future restoration efforts.

Objective B. Coastal Woodlands. By Year 15 of the CCP's implementation, create 29 acres of new coastal woodlots on the Refuge Complex, and protect and diversify the 127 acres of existing woodlots and riparian woodlands.

Rationale for the Objective

Coastal woodlots in the Chenier Plain region are extremely important to migrating songbirds. During the spring migration these woodlots provide essential feeding and resting areas for numerous neo-tropical migratory birds crossing the Gulf of Mexico (Rappole 1974, Sprunt 1975, Mueller 1981). Refuge Complex woodlands mark the first landfall for hundreds of thousands neo-tropical migratory birds making the trans-Gulf flights from Mexico, Central and South America during spring migration. These birds spend one to several days in these woodlands, resting and foraging to help replenish fat reserves before continuing their migration to breeding habitats. During the fall migration, coastal woodlots provide the last opportunity for trans-Gulf migrants to increase their fat levels necessary for crossing the Gulf of Mexico (Caldwell *et al.* 1963).

Six of the 7 avian species listed as Rare and Declining within the Coastal Prairies Region in Texas (Texas Parks and Wildlife Department 2000) are present in Refuge Complex woodlands. In 2005, the USFWS listed 4 species that occur in Refuge Complex woodlands as avian Species of Conservation Concern in the Gulf Prairies Bird Conservation Region.

In pre-settlement times, coastal upland habitats in the Chenier Plain region were dominated by bluestem prairies and trees were restricted to riparian areas (Diamond and Smeins 1984, Smeins *et al.* 1991) and the more elevated chenier ridges. Woody habitat has significantly increased in the region with the rapid expansion exotic Chinese tallow trees. However, these new woodlands provide poor habitat for migrant songbirds (Barrow 2001). The amount of native coastal woodlot habitat in the Chenier Plain region has been reduced mainly through development, conversion to pasture and logging of bottomland hardwoods. Mueller (1981) estimated that only 22 woodlots of an acre or larger remain on the upper Texas Gulf Coast. Migrant landbirds made greater use of woodlots with larger trees and denser under stories (Mueller and Sears 1987). Increasing the quality of habitat in Refuge Complex woodlots for migratory landbirds requires removing exotic plants and increasing under story density and species diversity.

Note: All of the strategies for woodlot restoration and enhancement to be implemented on the Refuge Complex during the 15-year planning horizon of the CCP are supported by the following RONS Projects:

Anahuac NWR RONS Project #98035 - Restore and enhance coastal woodlots
Texas Point NWR RONS Project #95005 - Restore and enhance coastal woodlots
McFaddin NWR RONS Project #03004 - Restore and enhance coastal woodlots

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Utilize fencing and exotic plant control to protect existing woodland habitats; and,

plant native trees and shrubs to diversify woodlots and create additional understory.

- **Strategy 2** - Increase feral hog control efforts.

1-5 Years - Anahuac NWR:

- **Strategy 1** - Diversify “The Willows” woodlot through plantings of native trees and under story shrubs.
- **Strategy 2** - Create a 1-acre woodlot on the East Unit (volunteer housing area).
- **Strategy 3** - Plant 1 acre of native trees around the new Visitor Information Station and enhance nearby woodlot with plantings of native trees, shrubs and wildflowers.

6-10 Years - Anahuac NWR:

- **Strategy 1** - Create a 27-acre woodlot (green tree reservoir) on the East Unit along East Bay Bayou.

GOAL 3. A comprehensive biological program will guide and support conservation efforts for all species of native fish, wildlife, and plants on the Texas Chenier Plain Refuge Complex.

Note: The following RONS Projects are Essential Staffing Positions which support an expanded biological program:

Anahuac NWR RONS Project #97058 - Essential Staffing - Wildlife Biologist
Anahuac NWR RONS Project #98004 - Essential Staffing - GIS Computer Specialist
Anahuac NWR RONS Project #98034 - Essential Staffing - Plant Ecologist
Anahuac NWR RONS Project #00007 - Essential Staffing - Refuge Operations Specialist

Objective A. Waterfowl, Shorebirds, and other Wetland-Dependent Migratory Birds. The objective is to help maintain healthy populations of species utilizing the Refuge Complex and to document population status and trends and habitat utilization of priority species.

Rationale for the Objective: Coastal habitats of the Texas Chenier Plain region provide important wintering and migrating habitat for waterfowl of the Central Flyway, and for millions of shorebirds, wading birds, colonial nesting waterbirds, and other wetland-dependent migratory birds. Monitoring and studies of population trends and habitat utilization provide information to assess management activities on the Refuge Complex. Data are also used in support of international, national and regional migratory bird conservation initiatives.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Conduct monthly aerial surveys of wintering and migrating waterfowl (September through March), on all four refuges in the Refuge Complex and annual breeding pair surveys to monitor Mottled Duck populations.
- **Strategy 2** - Conduct periodic spring and fall shorebird surveys in various representative wetland habitats.
- **Strategy 3** - Conduct annual nesting survey for colonial nesting waterbirds on Gulf shoreline of

Texas Point NWR.

- **Strategy 4** - Participate in national, regional and local banding studies of migratory waterfowl and other migratory birds, including ongoing banding studies of Mottled Ducks and Snow Geese.
- **Strategy 5** - Facilitate and support occasional research studies on priority species through partnerships with universities and the USGS Biological Resources Division.
- **Strategy 6** - Collect data from harvested waterfowl at check stations including body condition indices and lead shot ingestion rates.
- **Strategy 7** - Participate in the annual Audubon Society Christmas Bird Count.
- **Strategy 8** - Conduct new surveys and studies for sensitive/declining species (see Objective , Threatened and Endangered Species, below).
- **Strategy 9** - Provide migrational habitat for shorebirds annually during March/April/May on 300 acres of the refuge's moist soil units. (Anahuac NWR RONS Project #97008 - Restore and enhance coastal freshwater wetlands, Anahuac NWR RONS Project #99001 - Enhance coastal wetlands management)
- **Strategy 10** - Maintain existing nesting habitat site for Least Terns on McFaddin NWR.
- **Strategy 11** - Establish nesting habitat for Least Terns and Black Skimmers by restoring an abandoned well pad on the Roberts-Mueller Tract.
- **Strategy 12** - Restore freshwater wetland and wooded habitat to reestablish a heron and egret rookery on the Roberts-Mueller Tract dredge disposal area.
- **Strategy 13** - Coordinate with the U.S. Army Corps of Engineers to evaluate and develop opportunities for creating colonial waterbird habitat through the beneficial use of dredge material.

The objective for Mottled Ducks is, by Year 15 of the CCP's implementation, breeding pair densities in suitable habitats on the Refuge Complex will increase to at least 11 breeding pairs per square mile (15-year average, 1988-2002). Additional information on the factors impacting Mottled Duck populations in the Texas Chenier Plain region will be gathered through applied research and monitoring.

Rationale for Objective: Recent data indicate that Mottled Duck populations are declining both on the Refuge Complex and on coastal refuges statewide (U.S. Fish and Wildlife Service 2001). Both spring breeding pair and September aerial surveys conducted by the USFWS indicate a steady decline in Mottled Duck populations on coastal national wildlife refuges in Texas over the last 16 years. Drought conditions along much of the Texas Coast during the mid- to late 1990's undoubtedly contributed to this decline. Other potential causative factors include loss of freshwater wetlands and upland nesting habitat due to land use changes, loss of pair bond, brood rearing and molting habitats due to invasive plant encroachment in open water habitats, brush encroachment in nesting habitats, increased predation by alligators, mammalian predators and fire ants, and lead shot ingestion rates that have remained high in some areas.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Utilize water level and salinity management, prescribed burning, and rotational grazing in managed marsh units (semi-impoundments and impoundments) to provide quality Mottled Duck brood-rearing, molting, and wintering habitat.

- **Strategy 2** - Restore pair pond and brood rearing habitats in key management units (those currently supporting breeding Mottled Ducks) by restoring open water habitats lost to invasive plant encroachment, using an integrated approach (an intensified program involving prescribed burning, controlled grazing, water level and salinity management, mechanical removal, and spot herbicide treatments). (Anahuac NWR RONS Project #02001 - Control invasive plants to restore open water wetland habitat, McFaddin NWR RONS #02002 - Control invasive plants to restore open water wetland habitat)
- **Strategy 3** - Maintain optimal nesting habitat utilizing an integrated brush control program which includes controlled grazing, prescribed burning, herbicide application, and mowing to reduce brush encroachment on levees, along fence lines and in salty prairie habitats. based on ongoing site-specific assessments. Fire occurrence in salty prairie and other optimum nesting cover will be managed using mowed green fire breaks and other innovative techniques.
- **Strategy 4** - Expand and refine the annual Mottled Duck breeding pair index survey on coastal refuges to include an assessment of habitat utilization by marsh type (fresh, intermediate, and brackish marshes).
- **Strategy 5** - Facilitate and support new research including studies to: 1) evaluate Mottled Duck nesting success and brood survival and identify factors affecting these vital rates; 2) determine habitat utilization and preferences during nesting, brood rearing, and molting periods; and 3) evaluate the effects of predation by alligators, mammalian predators and fire ants on Mottled Duck survival. This would include removing alligators and mammalian predators from key nesting and brood rearing habitats, and assessing impacts on nest success and duckling survival

Throughout the Life of the CCP - Anahuac NWR:

- **Strategy 1** - Restore and manage shallow freshwater habitat in upland management units to provide pair bonding and brood-rearing habitat. (Anahuac NWR RONS Project #97008 - Restore and enhance coastal freshwater wetlands, Anahuac NWR RONS Project 99001 - Enhance coastal wetlands management)
- **Strategy 2** - Create Mottled Duck pair ponds in and adjacent to intermediate marsh and salty prairie (key habitats in management units which still support breeding Mottled Ducks) by restoring wetlands at abandoned oil and gas well facilities and cattle watering sites.
- **Strategy 3** - Manage 400 acres of moist soil units annually specifically to provide brood-rearing habitat for Mottled Ducks during summer. (Anahuac NWR RONS Project #97008 - Restore and enhance coastal freshwater wetlands, Anahuac NWR RONS Project #99001 - Enhance coastal wetlands management)

Throughout the Life of the CCP - McFaddin NWR and Texas Point NWRs:

- **Strategy 1** - Enhance management capabilities for Mottled Ducks on 300 acres of freshwater impoundments within the Wild Cow Bayou Management Unit on McFaddin NWR by rehabilitating existing levees and installing new water control structures. Intensively manage 400 acres of marsh habitat adjacent to freshwater impoundments as optimal brood-rearing habitat (McFaddin NWR RONS Project #97004 - Restore and manage coastal wetlands)
- **Strategy 2** - Restore freshwater wetlands as pair bonding and brood rearing habitat in and adjacent to salty prairie (key Mottled Duck nesting habitat) by establishing 100 acres of moist soil units. (McFaddin NWR RONS Project #98004 - Restore and enhance coastal freshwater wetlands)

- **Strategy 3** - Develop and maintain at least two grit sites for Mottled Ducks within the Wild Cow Bayou Management Unit of McFaddin NWR. (McFaddin NWR RONS Project #03002 - Develop grit sites for Mottled Ducks)

Objective B. Migratory and Resident Landbirds. The objective to help maintain healthy populations of species utilizing the Refuge Complex and to document population status and trends and habitat utilization of priority species.

Rationale for the Objective

Coastal habitats of the Texas Chenier Plain region provide important wintering, migrating and nesting habitat for migratory and resident landbirds. Monitoring and study of population trends and habitat utilization provides information to assess management activities on the Refuge Complex. Data are also used in support of international, national and regional migratory bird conservation initiatives.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Conduct periodic surveys of migratory and resident landbirds, including neotropical/nearctic migrants, in marsh, prairie and woodland habitats.
- **Strategy 2** - Facilitate and support occasional research studies on priority species through partnerships with universities and the USGS Biological Resources Division.
- **Strategy 3** - Participate in the annual Audubon Society Christmas Bird Count.
- **Strategy 4** - Conduct new surveys and studies for sensitive/declining species (see Objective D, Threatened and Endangered Species, below).

Objective C. Fish and other Aquatic Species. The objective is to ensure healthy populations and document population trends, status and habitat utilization of priority species on the Refuge Complex. A second objective is to incorporate fisheries and aquatic resource management into the management of all estuarine marshes on the Refuge Complex.

Rationale for the Objective .

Estuarine marsh habitats support over 95% of the Gulf of Mexico's commercial and recreational fisheries species during some portion of their life cycles.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Working with the USFWS Division of Fisheries, continue to support and facilitate periodic monitoring of fishery resources.
- **Strategy 2** - Retrofit existing water control structures and incorporate design features in any new structures to facilitate ingress and egress of living marine organisms in estuarine marshes.
- **Strategy 3** - Enhance marine organism access to and from managed marshes by managing water control structures to facilitate passage during key movement periods.

- **Strategy 4** - Expand coordination with the National Marine Fisheries Service and the Texas Parks and Wildlife Department on fisheries management issues and opportunities.

Objective D. Threatened and Endangered Species, Species of Conservation Concern, and other “Watch Species”. The objective is to support recovery efforts and to obtain information on population trends, status and habitat utilization of sensitive, declining or rare species occurring on the Refuge Complex.

Rationale for the Objective

Eight federally-listed Threatened and Endangered species occur on or adjacent to the Refuge Complex: Bald Eagle, Piping Plover, Brown Pelican, Loggerhead sea turtle, Kemp’s Ridley sea turtle, Green sea turtle, Hawksbill sea turtle, and Leatherback sea turtle. The sea turtles are found offshore in the Gulf and in Galveston Bay, but no nesting on beaches has been documented on the Refuge Complex. Of the federally-listed avian T&E species, the greatest information needs exist for Piping Plovers, whose winter range includes the upper Texas Gulf Coast.

The Refuge Complex also provides important habitat for 33 avian species identified by the USFWS as Species of Conservation Concern within the Gulf Prairies Bird Conservation Region. Nine out of the 13 avian species listed by the Texas Parks and Wildlife Department as rare and declining species in coastal prairies and marshes in Texas are found on the Refuge Complex. The Texas Parks and Wildlife Department lists three species of reptiles which occur or potentially occur on the Refuge Complex as threatened: the smooth green snake, alligator snapping turtle and the Texas horned lizard. Several additional species of reptiles and amphibians are listed in the Texas Natural Heritage Database, now maintained by the Texas Nature Conservancy’s Texas Conservation Data Center. Little or no information about the relative abundance, distribution and habitat utilization of any of these species on the Refuge Complex is currently available.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Continue to participate in the annual coast-wide wintering Piping Plover survey.
- **Strategy 2** - Document the occurrence of Threatened and Endangered Species on the Refuge Complex during field surveys for other species.
- **Strategy 3** - Facilitate and support occasional research studies on sensitive and/or declining species through partnerships with universities and the U.S. Geological Survey, Biological Resources Division.
- **Strategy 4** - Report all incidences of stranded sea turtles to the National Marine Fisheries Service.
- **Strategy 5** - Expand coordination with federal and state agencies on sea turtle management including turtle releases and nesting activity monitoring. Continued expansion of Kemp’s Ridley sea turtles into historic nesting range could include future nesting on the Gulf shoreline within McFaddin NWR.

Note: The following strategies for new surveys and monitoring of avian species of conservation concern to be initiated on the Refuge Complex during the 15-year planning horizon of the CCP are supported by the following RONS projects:

Anahuac NWR RONS Project #97014 - Conduct neotropical migratory bird surveys
McFaddin NWR RONS Project #00011 - Conduct neotropical migratory bird surveys
Anahuac NWR RONS Project #98052 - Conduct shorebird surveys
Anahuac NWR RONS Project #98047 - Conduct Yellow Rail study
Anahuac NWR RONS Project #98051 - Conduct Black Rail study
McFaddin NWR RONS Project #03005 - Conduct American Bittern study
McFaddin NWR RONS Project #00013 - Conduct fire effects study
Anahuac NWR RONS Project #98048 - Conduct grazing study
McFaddin NWR RONS Project #00009 - Conduct grazing study

Note: Strategies for new monitoring, surveys and studies on the Refuge Complex will support meeting informational needs for priority species identified in national and international conservation plans including the North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, North American Waterbird Conservation Plan, and Partners in Flight Regional Conservation Plan. Refuge surveys and data collection will be integrated with and support regional, national and international surveys and databases whenever possible.

- **Strategy 6** - Initiate surveys to determine the relative abundance and habitat use of the following priority grassland birds which utilize Refuge Complex habitats during winter and/or migration periods: LeConte's Sparrow, Sprague's Pipit, Loggerhead Shrike, White-tailed Hawk, Northern Harrier, Short-eared Owl.
- **Strategy 7** - Expand Project Prairie Birds monitoring to include salty prairie and marsh habitats.
- **Strategy 8** - Conduct fall, winter and spring beach and bay surveys for the following priority shorebird and colonial water bird species: Piping Plover, Snowy Plover, Long-billed Curlew, Wilson's Plover, American Golden Plover, Short-billed Dowitcher, Reddish Egret, Least Tern, Black Skimmer, and Gull-billed Tern.
- **Strategy 9** - Conduct bi-weekly surveys in marsh and prairie wetland habitats (rice fields, moist soil units) on the Refuge Complex from February to May and July through September, to document relative abundance and habitat utilization and monitor population trends of the following priority shorebird and colonial water bird species: Buff-breasted Sandpiper, Hudsonian Godwit, American Golden Plover, American Bittern, Least Bittern, Wood Stork.
- **Strategy 10** - Initiate field surveys to monitor population trends of rail species on the Refuge Complex, including yellow rails and black rails.
- **Strategy 11** - Develop and maintain a database which documents the occurrence of rare species on the Refuge Complex.
- **Strategy 12** - Facilitate and support new monitoring/research studies to determine the breeding, migrational and wintering distribution and habitat utilization of Black and Yellow rails.
- **Strategy 13** - Facilitate and support new monitoring/research studies to determine the breeding, migrational and wintering distribution and habitat utilization of American Bitterns.
- **Strategy 14** - Facilitate and support new research studies to determine the effects of prescribed burning and controlled grazing on sensitive or declining avian species.
- **Strategy 15** - Facilitate and support new research study to determine occurrence, relative

abundance and habitat use of Short-eared and Burrowing Owls during wintering and migration periods.

- **Strategy 16** - Facilitate and support new research study to determine relative abundance and habitat use of White-faced and White Ibis on the Refuge Complex.

Anahuac NWR - 11-15 Years:

- **Strategy 15** - Following the successful restoration of native coastal prairie habitat on the Anahuac NWR, evaluate the potential to reintroduce Attwater's Prairie Chicken.

Note: The following strategies for new research and baseline monitoring on herptofaunal species of conservation concern to be initiated on the Refuge Complex during the 15-year planning horizon of the CCP are supported by the following RONS projects:

Anahuac NWR RONS Project #97012 - Conduct baseline herptological surveys
McFaddin NWR RONS Project #00007 - Conduct baseline herptological surveys

- **Strategy 17** - Facilitate and support new monitoring/research which evaluates the population status and habitat use of the following sensitive or declining reptile and amphibian species: pig frog, smooth green snake, alligator snapping turtle, Texas diamondback terrapin, Texas horned lizard, slender glass lizard, and crayfish snake.

Objective E. Mammals. The objective is to help maintain healthy populations and to document population status and trends and habitat utilization of priority species on the Refuge Complex.

Rationale for the Objective

Coastal habitats of the Texas Chenier Plain region support a diverse mammalian community.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Document the occurrence of mammals on the Refuge Complex during field surveys for other species.
- **Strategy 2** - Facilitate and support occasional research studies on mammals through partnerships with universities and the USGS Biological Resources Division.
- **Strategy 3** - Initiate monitoring of status and trends of muskrat populations on the Refuge Complex utilizing field surveys and GIS technology.
- **Strategy 4** - Facilitate and support monitoring to document species composition, habitat use and relative abundance of small mammal populations on the Refuge Complex.
- **Strategy 5** - Manage muskrat and nutria populations utilizing trapping under Special Use Permits for nuisance animal control when necessary to prevent damage to emergent marsh habitats.

Objective F. Reptiles and Amphibians. The objective is to maintain healthy and naturally diverse populations, and to document population status and trends. The objective for Alligators is maintain healthy populations, but at densities consistent with migratory bird management objectives. In addition, enhanced monitoring capabilities will provide better information on the status and trends of the Refuge Complex alligator population, and harvest management will be directed at maintaining a natural population age structure.

Rationale for the Objective

Coastal habitats of the Texas Chenier Plain region support a diverse herptofaunal community. Several species of reptile and amphibians occurring on the Refuge Complex are State-listed as threatened or endangered or species of concern. The American alligator was first afforded protection under the Endangered Species Act in the late 1960's. Since then, populations have increased dramatically throughout its range. Nest counts conducted by the Texas Parks and Wildlife Department indicate a substantial increase in alligator numbers throughout its range in Texas (TPWD, Annual Alligator Reports). Areas within both hunted and non-hunted portions of nearby Cameron Parish, Louisiana have averaged greater than a 12% increase annually in the number of nesting female alligators since the early 1970's (Louisiana Department of Wildlife and Fisheries Annual Alligator Status Reports 1970-2000). Survey information on McFaddin NWR indicates a greater than 200% increase in the refuge alligator population during the past decade; a similar increase has been noted on Anahuac NWR.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Facilitate and support baseline monitoring to determine species composition and relative abundance of herptofaunal assemblages across habitat types on the Refuge Complex. (Anahuac NWR RONS Project #97012- Conduct baseline herptological surveys, McFaddin NWR RONS Project #00007 - Conduct baseline herptological surveys)
- **Strategy 2** - Facilitate and support new surveys and research on priority sensitive or declining reptile and amphibian species (see strategies under Threatened and Endangered species, above).
- **Strategy 3** - Continue to administer an adult alligator harvest program as an economic use on the Refuge Complex under the Texas Parks and Wildlife Department's alligator management program. Continue to implement modifications to the alligator harvest program to achieve the following harvest objectives: 1) increase the percentage of smaller size class alligators (less than 6') to a minimum of 30-40% of the annual harvest; and 2) decrease the percentage of larger alligators (greater than 9') to 5% or less.
- **Strategy 4** - Conduct annual aerial basking surveys and nighttime spotlight surveys to monitor alligator population trends.
- **Strategy 5** - Monitor recoveries of marked alligators on McFaddin and Anahuac NWRs to enhance monitoring of population trends.
- **Strategy 6** - Continue coordination and information sharing with the Texas Parks and Wildlife Department on alligator harvest management, population monitoring and research.
- **Strategy 7** - Conduct a research study to determine nesting frequencies of adult female alligators through monitoring of mitochondrial DNA within egg membranes. These data will be used to improve population estimates generated from aerial nest counts. (McFaddin NWR RONS Project # 02001- Conduct DNA alligator study)
- **Strategy 8** - In cooperation with TPWD, facilitate and support new research to determine the diet of alligators during spring and summer to evaluate influences of predation on Mottled Ducks and other native fish and wildlife.

Objective G. Invertebrates. The objective is to maintain healthy populations and natural diversity, and to document species occurrence on the Refuge Complex.

Rationale for the Objective

Many invertebrate species provide important food resources for migratory birds and other priority fish and wildlife species.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Work with partners to conduct baseline inventories of species occurrence and relative abundance. Cooperate with established inventory programs such as “Bio-Blitz” and annual North American Butterfly Association count.

Objective H. Plant Resources. The objective is to maintain native plant species diversity and document native plant species composition and plant community changes over time on the Refuge Complex.

Rationale for the Objective

Natural disturbances such as drought and floods, fire and herbivory by wildlife, and management activities such as grazing, prescribed burning, water level and salinity management all impact plant communities on the Refuge Complex. Sea level rise, subsidence and exotic plant and animal species are now also impacting native plant communities. Understanding how these events, processes and management activities affect plant community dynamics is essential to ensure long-term conservation of plant resources.

Strategies

Throughout the Life of the Plan and Refuge Complex-wide:

- **Strategy 1** - Assess habitat response to management activities including prescribed burning and grazing and natural perturbations such as fire and hurricanes through systematic field vegetation surveys and monitoring.
- **Strategy 2** - Facilitate and support periodic research and monitoring of plant resources and factors such as sea level rise, subsidence and exotic species which are impacting plant resources through partnerships with universities and the USGS Biological Resources Division.
- **Strategy 3** - Implement a systematic fire effects monitoring program in representative habitats on the Refuge Complex.
- **Strategy 4** - Facilitate and support new research to determine the effects of fire, fire seasonality and fire intensity on marsh surface elevation change and vegetative response. (Anahuac NWR RONS Project #97021 - Monitor marsh elevation change, McFaddin NWR RONS Project #00013- Conduct fire effects study)
- **Strategy 5** - Develop enhanced Geographic Information System capabilities and use in combination with remote imaging data to track and monitor vegetation changes in marsh habitats.
- **Strategy 6** - Develop and implement step-down Habitat Management Plans for each Refuge.

GOAL 4. By working with others locally and on a landscape level, address threats to natural biological diversity, ecological integrity, and environmental health on the Refuge Complex.

Note: The following RONS Projects are Essential Staffing Positions which support addressing ecosystem threats:

Anahuac NWR RONS Project #98011 - Essential Staffing - Oil and Gas Specialist
Anahuac NWR RONS Project #98004 - Essential Staffing - GIS Computer Specialist
Anahuac NWR RONS Project #98034 - Essential Staffing - Plant Ecologist
Anahuac NWR RONS Project #97058 - Essential Staffing - Wildlife Biologist
Anahuac NWR RONS Project #00007 - Essential Staffing - Refuge Operations Specialist Texas Point
NWR RONS Project #00001 - Essential Staffing - Heavy Equipment Operator

Objective A. Coastal Habitat Loss

Objective A-1. By Year 15 of the CCP's implementation, address threats from Relative Sea Level Rise and Reduced Sediment Supply by decreasing rates of coastal land loss due to shoreline erosion along the Gulf of Mexico, East Galveston Bay, and the GIWW.

Rationale for the Objective

Along the Texas Coast, wetland losses between the mid-1950's and mid-1990's were most substantial for estuarine emergent marshes (Moulton *et al.* 1997). Relative sea level rise and reduced coarse sediment supply to Gulf and bay nearshore littoral systems are resulting in significant loss of coastal habitats in the region. Average rates of shoreline retreat along the Gulf adjacent to the refuges are as high as 50 feet per year on Texas Point NWR, and 10-15 feet per year along most of McFaddin NWR (Bureau of Economic Geology unpublished data, Morton 1998). Over 800 acres of dunes and emergent marsh have been lost due to Gulf shoreline erosion on these refuges during the last 25 years, and remaining inland marshes are increasingly threatened by more frequent inundation during high tidal events. The predicted trend in relative sea level rise is a rise of over 2 feet over the next century, increasing the threats to coastal emergent marshes from accelerated shoreline erosion. Although less severe, erosion along the East Galveston Bay shoreline is also causing wetland loss on Anahuac NWR, and threatens remaining marshes with saltwater intrusion. Erosion along the GIWW is also causing direct loss of wetlands and poses a significant threat to marshes from saltwater intrusion on both McFaddin and Anahuac NWR. Levees created when the GIWW was excavated have almost entirely eroded away along significant portions of its length within these refuges.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Increase coordination with the U.S. Army Corps of Engineers, National Marine Fisheries Service, Texas General Land Office, Texas Parks and Wildlife Department, Texas Department of Transportation and other local, state and federal agencies to develop and implement long-term interjurisdictional strategies to reduce coastal land loss along the Gulf of Mexico, East Galveston Bay, and the GIWW. Goals would include implementing major projects to restore the Gulf barrier beach/dune complex on McFaddin NWR (dependent upon the results of ongoing sand source investigations, possibly using off-shore sand supplies), to restore sediment supply to the Gulf's nearshore littoral zone on Texas Point NWR through the beneficial use of dredge material, and to construct structural protection (rock breakwaters) and restore emergent marshes along shorelines of Galveston Bay (Anahuac NWR) and the GIWW (Anahuac and McFaddin NWRs).

- **Strategy 2** - Participate in the U.S. Army Corps of Engineers new Regional Sediment Management program.
- **Strategy 3** - Coordinate with the U.S. Army Corps of Engineers on their ongoing Section 227 National Shoreline Erosion Demonstration Project in Jefferson County and their Shoreline Erosion Feasibility Study for Galveston and Jefferson counties.
- **Strategy 4** - Increase coordination among state, federal and local agencies on the issue of relative sea level rise and promote advanced conservation planning to address threats.

Throughout the Life of the CCP - Anahuac and Moody NWRs:

- **Strategy 1** - Working with the Galveston Bay Foundation and other conservation organization partners, maintain existing offshore rock wavebreaks and restore emergent marsh by planting smooth cordgrass along the East Galveston Bay shoreline.
- **Strategy 2** - Working with partners, install an additional 7,500 linear feet of shoreline erosion abatement (offshore rock wave breaks) and restore 100 acres of under shore emergent marsh (smooth cordgrass plantings) along East Galveston Bay shoreline on Anahuac NWR. (Anahuac NWR RONS Project #97006 - Restore and protect coastal wetlands)
- **Strategy 3** - Working with partners, identify key areas needing protection and initiate shoreline protection activities (rock breakwaters, marsh plantings) along the GIWW, with a goal of protecting 10,000 linear feet of shoreline.
- **Strategy 4** - Increase coordination with landowners, USFWS Partners for Fish and Wildlife and Coastal programs to enhance shoreline protection on Moody NWR.

Throughout the Life of the CCP – McFaddin and Texas Point NWRs:

- **Strategy 1** - Working with the Texas General Land Office and other partners, maintain existing dune restoration project and explore opportunities for additional dune restoration along the Gulf of Mexico on McFaddin NWR. Restore an additional 5,000 linear feet of the dunes along the Gulf of Mexico on McFaddin NWR. (McFaddin NWR RONS Project #00001 - Restore dune habitats and protect coastal wetlands)
- **Strategy 2** - Working with the Texas General Land Office, maintain existing shoreline protection and seek opportunities for additional protection along the GIWW shoreline. Protect an additional 10,000 linear feet of GIWW shoreline on McFaddin NWR using offshore wavebreaks, shoreline armoring, and/or emergent plantings (smooth cordgrass). (McFaddin NWR RONS Project #00017 - Restore and protect coastal wetlands)
- **Strategy 3** - Coordinate with the U.S. Army Corps of Engineers and other partners to implement additional projects to beneficially use dredge materials from the Sabine-Neches Ship Channel to reduce land loss by restoring sediment supply to the Gulf shoreline on and adjacent to Texas Point NWR.

Objective A-2. By Year 15 of the CCP’s implementation, address threats from Altered Hydrologic Processes and resulting Interior Marsh Loss by reducing saltwater intrusion, increasing freshwater and mineral sediment inflows to marshes, and maintaining natural marsh hydroperiods.

Rationale for the Objective

Land subsidence and sea level rise, channel construction, and channelization of natural waterways have had significant hydrologic impacts on coastal marshes including saltwater intrusion, increased tidal energies causing erosion of organic marsh substrates, loss of freshwater inflows and reduced mineral sediment supply, and excessive flooding or drainage/drying. Over the last century, these processes have gradually converted extensive areas of fresh and intermediate marshes to a more brackish regime thereby decreasing natural biological diversity. Fresh and intermediate marshes support more diverse avifaunal (Mitsch and Gosselink 1993) and plant communities (Chabreck 1988, Chabreck *et al.* 1989, Mitsch and Gosselink 1993) than do brackish and saline marshes. In some areas, these processes have resulted in the conversion of vegetated emergent marshes to open water (marsh loss). Loss of estuarine marshes through conversion to open water has been significant in the region since the mid-1950's (Moulton *et al.* 1998). Relative sea level rise further threatens vegetated marshes through increased saltwater intrusion and submergence. The current projection for relative sea rise in the region is a rise of over 2 feet over the next century. To survive, remaining marshes must accrete or gain elevation at a rate that keeps up with sea level rise. Maintaining plant productivity through active management and preventing loss of organic marsh soils by restricting saltwater intrusion and tidal energies, increasing freshwater inflows, and beneficially using dredge materials to restore mineral sediment supply appear to offer the most realistic options for reversing current trends of interior marsh loss in the Chenier Plain region.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Expand coordination with local state, and federal agencies to develop and implement watershed-scale hydrologic restoration projects. A key component will be assessing the feasibility of and identifying options for restoring freshwater inflows to coastal marshes south of the GIWW.
- **Strategy 2** - Expand coordination with the U.S. Army Corps of Engineers, Texas General Land Office, Texas Parks and Wildlife Department, Texas Department of Transportation and others to develop strategies to restore and enhance wetlands on the Refuge Complex through the beneficial use of dredged materials. This will include participating in the U.S. Army Corps of Engineers new Regional Sediment Management program.
- **Strategy 3** - Coordinate with state and federal agencies and others to implement a hydrologic restoration project aimed at stopping emergent marsh loss (conversion of emergent marsh to open water) on J.D. Murphree WMA, Sea Rim State and private lands in the eastern portion of the Salt Bayou watershed in Jefferson County. Reducing saltwater intrusion and tidal energies by reducing the influence of the Keith Lake Fish Pass will be a key component of this strategy.
- **Strategy 4** - Actively manage water levels and salinities in managed marsh units (semi-impoundments and impoundments) utilizing water control structures, levees and water delivery and drainage infrastructure to maintain a continuum of brackish to fresh conditions and desirable marsh hydroperiods (wetting and drying cycles).
- **Strategy 5** - Monitor status and trends of wetlands on all four refuges in the Refuge Complex by developing enhanced on-site Geographic Information System capabilities.
- **Strategy 6** - Develop partnerships with the U.S. Geological Survey and facilitate and support new research on marsh accretion and its relationship to management practices including burning and structural marsh management.
- **Strategy 7** - Restore marsh hydrology by removing barriers formed by abandoned roads, levees

and well pads remaining from past oil and gas development.

1-5 Years - Anahuac and Moody NWRs:

- **Strategy 1** - Research the availability of, and if possible, acquire additional water rights to facilitate increasing freshwater inflows to the East Unit from East Bay Bayou and Onion Bayou and to the Middleton Tract from Elm Bayou. (Anahuac NWR RONS Project #98003 - Develop and implement Refuge Complex Water Management Plan)
- **Strategy 2** - Ensure adequate freshwater in-flows and reduce saltwater intrusion through annual water purchases and enhanced water management infrastructure including new pumps and delivery systems. (Anahuac NWR RONS Project #99001 - Enhance coastal wetlands management).
- **Strategy 3** - Protect and enhance management of intermediate and fresh marshes on the Deep Marsh Unit (New Ditch water control structure), and on the East Unit and Middleton Tract Unit by replacing water control structures and restoring levees along East Bay and Elm bayous.
- **Strategy 4** - Coordinate with Trinity Bay Conservation District and other partners to repair saltwater barriers and water control structures on East Bay, Elm and Onion bayous and on the Moody NWR.
- **Strategy 5** - Increase coordination with landowners, other USFWS divisions and state and federal agencies to restore hydrology by reducing saltwater intrusion on Moody NWR.

6-10 Years - Anahuac NWR:

- **Strategy 1** - Construct rock weirs and restore man-made channels to marsh elevation on western portion of Pace Tract.

11-15 Years – Anahuac NWR:

- **Strategy 1** - Eliminate hydrological barriers by removing former rice levees and restore freshwater sheet flows from upland areas to marshes on the East Unit.
- **Strategy 2** - Construct a passive overflow spillway structure on East Bay Bayou to restore over bank flooding and freshwater inflows into East Unit marshes.
- **Strategy 3** - Construct a passive overflow spillway structure on Elm Bayou to restore over bank flooding and freshwater inflows into Middleton Tract marshes.

1-5 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Restore hydrology on both refuges by reducing saltwater intrusion and restoring hydro-periods through construction of rock weirs or earthen plugs in artificial (man-made) channels on both refuges (north of Texas Bayou, Willow and Barnett Lakes). (McFaddin NWR RONS Project #00016 - Restore coastal wetlands through hydrological restoration, Texas Point NWR RONS Project #00002 - Restore coastal wetlands through hydrological restoration).
- **Strategy 2** - Coordinate with local, state and federal agencies to assess the feasibility of and identify options for restoring freshwater inflows to coastal marshes within the Salt Bayou watershed south of the GIWW.
- **Strategy 3** - Research the availability of and need for acquiring water rights to ensure that freshwater inflows remain adequate to maintain the natural diversity and productivity of the Willow

Slough marsh. (Anahuac NWR RONS Project #98003 - Develop and implement Refuge Complex Water Management Plan)

6-15 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Coordinate with state and federal agencies and others to develop and implement a comprehensive hydrological restoration project to restore marshes on Texas Point NWR. Reducing saltwater intrusion and tidal energies by restoring Texas Bayou and its tributaries to historic dimensions will be a key component of this project.
- **Strategy 2** - Coordinate with state and federal agencies and others to develop and implement a hydrological restoration project to restore marshes on the western portion of McFaddin NWR. Reducing saltwater intrusion and tidal energies by restoring Mud Bayou to its historic dimensions will be a key component of this project.

Objective B. Exotic and Invasive Species. The objective for addressing threats from exotic and invasive species is to utilize Integrated Pest Management strategies to implement a comprehensive exotic and invasive species control program which will: 1) reduce current infestations by 50% by Year 15 of the CCP's implementation and 2) prevent any new infestations.

Rationale for the Objective

Monocultures of exotic and invasive plants reduce natural biological diversity, increase erosion, alter nutrient cycling and displace macro- and micro-fauna that depend on native plants for habitat and food (Sheley *et al.* 1999). Early detection of invading plant communities can minimize spread (Navaratnam and Catley 1986) and reduce future control efforts and costs. Refuge habitats are currently significantly impacted by exotic plants and animals including: Chinese tallow (*Sapium sebiferum*), water hyacinth (*Eichhornia crassipes*), alligator weed (*Alternanthera ohilocoeroides*), water lettuce (*Pistia stratiotes*), McCartney rose (*Rosa bracteata*), vasey grass (*Paspalum urvillei*), Johnson grass (*Sorghum halepense*), deeprooted sedge (*Cyperus entrerianus*), Eurasian water milfoil (*Myriophyllum spicatum*), hydrilla (*Hydrilla verticillata*), Salvinia minima, Japanese honeysuckle (*Lonicera japonica*) red imported fire ants, nutria, and feral hogs. Giant Salvinia (*S. molesta*), to date documented on the Refuge Complex only once and in small amounts near a refuge boat ramp, has been found nearby and poses a significant threat to freshwater wetlands. Invasive native plant species include eastern baccharis (*Baccharis halimifolia*), big-leaf sumpweed (*Iva frutescens*), rattlebox (*Sesbania drummondii*), common reed (*Phragmites communis*) and cattail (*Typha spp.*).

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Implement an integrated exotic and invasive species control program on the Refuge Complex, and update the Integrated Pest Management Plan to reflect a comprehensive approach to exotic/invasive species management.
- **Strategy 2** - Expand field monitoring to provide early detection of new infestations, and develop enhanced GIS capabilities to map existing and new stands of upland and aquatic exotic and invasive plants.
- **Strategy 3** - Develop new partnerships with universities and the U.S. Geological Survey Biological Resources Division to evaluate control strategies.
- **Strategy 4** - Annually treat 25% of all Chinese tallow trees seven feet tall or four inches in diameter on the Refuge Complex using basal bark herbicide applications, and utilizing mowing, fire and spot herbicide applications on smaller Chinese tallow trees.

- **Strategy 5** - Utilize salinity management, mechanical removal and spot herbicide treatments to control water hyacinth in freshwater habitats and near water control structures and in water delivery systems.
- **Strategy 6** - Utilize salinity management, fire, mowing and spot herbicide treatment to control invasive aquatic plants such as cattail and common rush on the Refuge Complex.
- **Strategy 7** - Continue and expand feral hog population control efforts.
- **Strategy 8** - Develop exotic aquatic plant interpretive signs and install them at all Refuge Complex boat ramps.

1- 5 Years - Anahuac NWR:

- **Strategy 1** - Evaluate control strategies for deep-rooted sedge and several exotic grasses currently impacting prairie and wet prairie habitats.
- **Strategy 2** - Mechanically remove Chinese tallow along the GIWW, Oyster Bayou, East Bay Bayou, Onion Bayou, and State Highway 124.
- **Strategy 3** - Expand coordination with the Trinity Bay Conservation District and the Chambers-Liberty Counties Navigation District on control of aquatic and terrestrial exotic plants on waterways, canals and ditches and on banks and levees within drainage and irrigation easements through the Anahuac NWR.

1-5 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Expand integrated control program for water hyacinth in the Willow Slough Marsh on the North Unit of McFaddin NWR. (McFaddin NWR RONS Project #00002 - Control exotic and invasive species)
- **Strategy 2** - Utilize spot herbicide treatments to help control McCartney rose on non-saline prairie habitats. (McFaddin NWR RONS Project #00002 - Control exotic and invasive species)
- **Strategy 3** - Expand control efforts for Chinese tallow on Texas Point NWR and the North Unit of McFaddin NWR.

Objective C. Contaminants. The objective for the threat from contaminants is, by Year 15 of the CCP's implementation, identify and monitor all potential point and non-point source pollution impacts to the Refuge Complex and develop a strategy to clean up contaminants and protect refuge resources from those impacts.

Rationale for the Objective

Contaminant issues affecting the Refuge Complex include potential petroleum and petrochemical spills from: 1) on-Refuge oilfield operations; 2) shipping on the GIWW; and 3) offshore production in the Gulf. The potential for petrochemical and petroleum spills affecting the Refuge Complex is high. Over 20 active oil and gas wells are currently producing on the Refuge Complex. Significant drilling and production activity occurs in Gulf waters offshore of McFaddin and Texas Point NWRs. The GIWW between Houston and Lake Charles, Louisiana is one of the busiest reaches of this waterway for shipping petrochemical and petroleum products. The GIWW parallels much of McFaddin and Anahuac NWRs, and the Sabine-Neches Ship Channel parallels Texas Point NWR. Former and current oil and gas production areas on the Refuge Complex contain extensive infrastructure which is no longer in use, including flow lines, pipelines, oil pits, well pads, and brine disposal areas. Many of these lines, pits, and pads may contain contaminants including heavy metals, normal occurring radio-active material, brine, and

petroleum products. In addition, Refuge Complex marshes comprise the downstream end of at least 10 waterways. Factories, refineries, solid waste disposal sites, oil field sludge disposal areas, feedlot operations, agricultural operations and housing developments are potential pollution sources in upstream reaches of these watersheds. Finally, spent lead shotgun pellets may still pose a threat to waterfowl and other wildlife in the region. The incidence of lead shot in Mottled Duck gizzards remains relatively high to the present in birds harvested on the Anahuac and McFaddin NWRs, even after over 15 years of implementation of non-toxic ammunition regulations.

Strategies

Throughout Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Working with the USFWS' Division of Ecological Services Environmental Contaminants program, conduct periodic monitoring and studies of contaminant levels and impacts to fish and wildlife resources.
- **Strategy 2** - Facilitate and support research and monitoring on contaminants and contaminant impacts to fish and wildlife resources through partnerships with universities and the USGS Biological Resources Division.
- **Strategy 3** - Continue monitoring of lead shot ingestion rates in Mottled Ducks.
- **Strategy 4** - Develop comprehensive spill response plan for incidences occurring off-refuge which threaten Refuge Complex resources. A first step in plan development will be increasing coordination with interagency and private spill response teams.
- **Strategy 5** - Assemble a qualified first responder team comprised of Refuge Complex staff through training and participation in interagency spill response drills.
- **Strategy 6** - Conduct a thorough inventory and assessment of abandoned oil and gas infrastructure and possible contaminants issues on the Refuge Complex, and develop plan for removal and habitat restoration. Initiate removal of abandoned oil and gas production infrastructure including well pads, access roads, and flow lines.
- **Strategy 7** - Facilitate and support water quality monitoring in Taylors Bayou, Willow Slough, Spindletop Bayou, Mud Bayou, Oyster Bayou, Robinson Bayou, East Bay Bayou, Onion Bayou, Elm Bayou and the GIWW.
- **Strategy 8** - Facilitate and support field assessment to identify any potential "hot spots" of lead contamination from lead shot on the Refuge Complex. Develop and implement management actions for remediating any areas with high levels of lead.

Objective D. New Oil and Gas Development. The objective for managing new oil and gas exploration and development is to ensure that new oil and gas exploration and development activities on the Refuge Complex is conducted in the most environmentally-sensitive manner possible by defining a process which facilitates close coordination with industry and timely processing of requests to conduct activities, and which mandates the use of scientifically-accepted "best management practices" for these activities in sensitive coastal environments.

Strategies

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Coordinate with oil and gas interests on all exploration and development activities on the Refuge Complex, and administer such activities under USFWS policy

and regulations through issuance of Special Use Permits.

- **Strategy 2** - Develop and implement a step-down Oil and Gas Management Plan for the Refuge Complex.

GOAL 5. All local, national, and international visitors will enjoy safe and high quality outdoor experiences on the Refuge Complex and learn of the Refuge Complex' role in conserving the region's coastal natural resources. New partnerships with our local communities will be forged to highlight, promote, and conserve the unique natural assets of the upper Texas Gulf Coast.

Note: The following RONS projects are Essential Staff positions which support expansion of wildlife-dependent recreational opportunities and outreach activities to promote community partnerships. The Law Enforcement position supports the upcoming transition from collateral duty refuge officers to full-time refuge officers, and will enhance protection of refuge resources and public safety throughout the Refuge Complex.

Texas Point NWR RONS Project #00001 - Essential Staffing - Heavy Equipment Operator
Anahuac NWR RONS Project #98034 - Essential Staffing - Plant Ecologist
Anahuac NWR RONS Project #97058 - Essential Staffing - Wildlife Biologist
Anahuac NWR RONS Project #00007 - Essential Staffing - Refuge Operations Specialist
McFaddin NWR RONS Project #98007 - Staffing - Refuge Law Enforcement Officer

Objective A. Hunting. By Year 15 of the CCP's implementation, 90% of all hunting visits on the Refuge Complex will qualify as high-quality hunting experiences.

We define "a high-quality hunting experience" as one that: 1) maximizes safety for hunters and other visitors; 2) encourages the highest standards of ethical behavior in taking or attempting to take wildlife; 3) is available to a broad spectrum of the hunting public; 4) contributes positively to or has no adverse affect on population management of resident or migratory species; 5) reflects positively on the individual refuge, the Refuge System, and the USFWS; 6) provides hunters uncrowded conditions by minimizing conflicts and competition among hunters; 7) provides reasonable challenges and opportunities for taking targeted species. It also minimizes the reliance on motorized vehicles and technology designed to increase the advantage of the hunter over wildlife; 8) minimizes habitat impacts; 9) creates minimal conflict with other priority wildlife-dependent recreational uses or refuge operations; and 10) incorporates a message of stewardship and conservation in hunting opportunities (USFWS Draft Policy 605 FW 2.1).

Our objective will be met if 90% or more of hunting visits meet the standards set for a high-quality hunting experience, as determined annually by hunter comments collected at the hunt check stations. As such, 1) less than 10% of hunters will report feeling unsafe; 2) less than 10% of hunters will report feeling crowded; 3) no hunter will report unfairness in obtaining access to hunt; 4) less than 5% of hunters contacted will be cited for hunting violations during routine enforcement; and 5) there will be no hunting-related safety incidents.

Rationale for the Objective

Waterfowl hunting is a long and established tradition in the coastal marshes of southeast Texas (McNear, 1956). Hunters have long contributed to the conservation of waterfowl and their habitats through the purchase of federal Migratory Bird Hunting and Conservation Stamps (Duck Stamps). Since 1934, more than 4.2 million acres of wetlands have been purchased for protection through Duck Stamp revenues of more than \$450 million. (USFWS 1995). Due to the remoteness and wetland environment of these refuges, hunting access is challenging and is a key factor when providing for hunting opportunities. Improving and managing hunting access will facilitate high-quality hunting experiences. Providing more information to hunters, increasing "Designated Hunt Area" opportunities to reduce crowding problems in

designated areas, and providing additional hunting opportunities will also contribute to an overall high-quality hunting experience.

Strategies

Note: Facility development will focus on partnership opportunities with local, county and state agencies and with our Refuge Friends groups and other conservation and outdoor recreation organizations.

Throughout Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Provide waterfowl hunting opportunities on approximately 38,000 acres of the Refuge Complex. Opportunities include assigned area by reservation or drawing hunts, controlled entry hunts which limit overall numbers of hunters in a particular hunt unit, and unrestricted entry hunts. Reservation, drawing, and controlled entry hunts require a fee permit, while unrestricted hunts do not. All refuge hunters must possess a general refuge hunting permit.
- **Strategy 2** - Administer the waterfowl hunt program under current regulations. Hunting on all hunt units is allowed three (3) day per week until noon, except the Pace Tract on Anahuac NWR which is open seven days per week until noon.
- **Strategy 3** - Maintain existing access facilities which support the hunting program including check stations, roads, boat ramps, boat rollers, parking areas, footbridges and waterways.
- **Strategy 4** - Develop a detailed step-down Hunt Management Plan for the Anahuac, McFaddin and Texas Point NWRs.
- **Strategy 5** - Revise the hunting permit fee system to provide for a Refuge Complex-wide annual waterfowl hunting permit.
- **Strategy 6** - Develop an Internet-based system for obtaining fee area hunting permits.
- **Strategy 7** - Improve public safety and education and outreach with an expanded and enhanced law enforcement program. (McFaddin NWR RONS Project # 00005)
- **Strategy 8** - Develop and produce hunting area maps that provide detailed information on locations, access, special features, safety and ethical behavior.
- **Strategy 9** - By Year 5 of the CCP's implementation, implement a 25-hp restriction on inland waters in designated Hunt Units to improve public safety and minimize habitat damage.

1-5 Years - Anahuac NWR:

- **Strategy 1** - Construct footbridges across Onion Bayou and over canals to the North Reservoir on the East Unit to improve hunter access.
- **Strategy 2** - Enhance boat access within the East Unit and the Middleton Tract Unit through improved maintenance of access ditches.
- **Strategy 3** - Provide additional "Designated Hunt Areas" on a first-come, first-serve basis on the East Unit.
- **Strategy 4** - Open designated portions of the East Unit during the September Early Teal season.
- **Strategy 5** - Open designated area(s) to dove hunting, using a Cooperative Agreement with the Texas Parks and Wildlife Department to include open areas in their "Short Term Public Hunting

Lease Program.”

6-15 Years - Anahuac NWR:

- **Strategy 1** - Install information kiosks at the Oyster Bayou boat ramp, providing orientation map to hunting units, access points, hunt regulations, and safety information.
- **Strategy 2** - Develop directional signage to refuge hunting areas for hunters accessing the refuge via navigable waters.
- **Strategy 3** - Improve the Boat Canal/Oyster Bayou boat launch and parking area.

1-5 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Provide seasonally-open primitive access (4-wheel drive trail) on the Gulf of Mexico beach ridge on McFaddin NWR (permanent or temporary action dependent upon ultimate disposition of State Highway 87 project), for access to hunt areas during waterfowl seasons.
- **Strategy 2** - Reduce conflicts between waterfowl hunters on the Star Lake/Clam Lake Hunt Unit during the regular waterfowl season by requiring all hunters in this unit to register at the check station, including those accessing the unit from the Gulf beach along Perkins Levee or the Brine Line, and by requiring all hunters accessing Star Lake and associated waters by boat to access via the refuge’s Star Lake boat launch.
- **Strategy 3** - Provide additional “Designated Hunt Area” duck hunting opportunities on McFaddin NWR.
- **Strategy 4** - Reestablish and maintain the shallow ditch system for boat access within the Central Hunt Unit.

6-15 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Construct a new hunter check station at McFaddin NWR.
- **Strategy 2** - Install information kiosks on McFaddin and Texas Point NWRs, providing orientation map to hunting units, access points, hunt regulations, and safety information.
- **Strategy 3** - Developed improved boat access (inlet dredging, dock and levee crossover) from the GIWW to the Central Hunt Unit.

Objective B. Fishing. By Year 15 of the CCP’s implementation, 90% of all fishing visits on the Refuge Complex will qualify as high-quality fishing experiences, as determined by angler comments documented during routine visitor contacts. We define a high-quality fishing experience is defined as one that: 1) is available to a broad spectrum of the fishing public; 2) provides an opportunity to use various angling techniques; 3) provides opportunities in both freshwater and saltwater environments; and 4) reflects positively on the individual Refuge, the Refuge System and the USFWS.

Rationale for the Objective

The Refuge Complex offers exceptional recreational fishing and crabbing opportunities in both saltwater and freshwater environments. Improving access for fishing and providing additional education on fishing and fishing opportunities on the Refuge Complex will help facilitate high-quality fishing experiences.

Strategies

New facility and program development will focus on partnership opportunities with local, county and state agencies and with Refuge Friends groups and other conservation and outdoor recreation organizations.

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Maintain existing access facilities which support the fishing program including roads, boat ramps, parking areas, fishing piers and trails.
- **Strategy 2** - Host annual National Fishing and Boating Week event on Anahuac NWR.
- **Strategy 3** - Develop a brochure clearly defining fishing areas, including maps of access points for fishing opportunities, regulations and providing information on some of the more popular game fish species.
- **Strategy 4** - Develop Internet-based availability of fishing information.

1-5 Years - Anahuac NWR:

- **Strategy 1** - Improve access for fishing on East Galveston Bay by constructing a boardwalk and fishing platform from Frozen Point Road to the Bay.
- **Strategy 2** - Develop walk-in access for fishing at Coon Creek, Oyster Bayou, and between Shoveler Pond and Westline Road.

1-5 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Extend open hours on McFaddin NWR (to designated areas accessible via Clam Lake Road and Star Lake Road) to one hour before sunrise to one hour after sunset daily to facilitate additional recreational fishing and other wildlife-dependent recreational opportunities.
- **Strategy 2** - Construct fishing/crabbing piers on 10-Mile Cut/Clam Lake and Star Lake.
- **Strategy 3** - Construct a new boat launch and parking facilities on 10-Mile Cut.
- **Strategy 4** - Develop freshwater fishing opportunities on Pond 13.
- **Strategy 5** - Coordinate and partner with local, county and state agencies to improve a primitive boat launching area off Pilot Station Road in Sabine Pass, to improve boat access to Texas Bayou and Texas Point NWR.

Objective C. Wildlife Observation and Photography. By Year 15 of the CCP's implementation, Refuge Complex visitors will enjoy several new high quality opportunities to view and photograph wildlife in managed and restored habitats.

Rationale for the Objective

Because overall management of the Refuge Complex under this Alternative will emphasize active habitat management and habitat restoration, new wildlife viewing and photography opportunities should be developed for both managed and restored habitats such as marsh semi-impoundments and moist soil units, and in restored native habitats including wetlands, prairies and woodlots. These facilities will improve viewing opportunities for wetland-dependent migratory birds, grassland birds and neotropical migratory birds, butterflies and other native wildlife. Close, personal experiences with nature help foster a deeper appreciation for fish and wildlife and their habitats.

Strategies

New facility and program development will focus on partnership opportunities with local, county and state agencies, industry and with our Refuge Friends groups and other conservation and civic organizations.

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - existing facilities which support wildlife observation and photography including roads, parking areas, trails, observation platforms, boardwalks, and photography blinds.
- **Strategy 2** - Institute an entry fee program on Anahuac NWR for refuge visitors, available as day passes or annual entry permits (Refuge Complex annual hunting permit will also serve as annual entry permit).

1-5 Years - Anahuac NWR:

- **Strategy 1** - Complete the butterfly habitat and native habitat demonstration area adjacent to the Visitor Information Station. (Anahuac NWR RONS Project 03000 - Develop and interpret butterfly habitat)
- **Strategy 2** - Construct a new observation platform overlooking Oyster Bayou Moist Soil Units.

6-15 Years - Anahuac NWR:

- **Strategy 1** - Construct a tree-canopy height observation platform on the East Bay Bayou Trail to provide observation and photography opportunities in rice and moist soil units.
- **Strategy 2** - Develop a self-guided canoe and kayak trail on East Bay Bayou.

1-5 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Construct a connecting trail and observation platform on Texas Point NWR.
- **Strategy 2** - Construct a parking area and observation platform at the McFaddin NWR Clam Lake Road entrance.
- **Strategy 3** - Develop a levee trail and boardwalk for wildlife observation on McFaddin NWR.
- **Strategy 4** - Construct a wildlife viewing platform at the new McFaddin NWR headquarters office.
- **Strategy 5** - Maintain a levee trail along Perkins Levee (open seasonally for wildlife observation and photography, outside of the waterfowl hunting season).

6-15 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Construct a photography blind on McFaddin NWR.
- **Strategy 2** - Develop a self-guided canoe and kayak trail along 10-Mile Cut from McFaddin NWR to Sea Rim State Park.

Objective D. Environmental Education and Interpretation. By Year 15 of the CCP's implementation, 90% of visitors will feel that they have increased their knowledge of native fish, wildlife and plants and of the Refuge Complex's role in conserving these resources through habitat management and restoration and addressing threats to ecosystem health.

Rationale for the Objective

Because overall management of the Refuge Complex under this Alternative will emphasize active habitat management, native habitat restoration, and addressing threats to ecosystem health, educational and interpretive programs and materials should focus on managed and restored habitats, management and restoration methodology, and the fish, wildlife and plant species they support. Educating visitors about the importance of our coastal resources and on the role of the Refuge Complex in managing, restoring and maintaining native biological diversity will lead to support and responsible stewardship action. Many excellent opportunities exist to expand partnerships with local school districts to incorporate environmental education in their science curricula.

Strategies

New facility and program development will focus on partnership opportunities with local, county and state agencies, industry, and with organizations such as our Refuge Friends groups. Partnerships with volunteers and school districts will be expanded in support of the environmental education program.

Throughout the Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Construct Refuge Complex Administrative Headquarters and Wildlife Interpretive Center in Chambers County.
- **Strategy 2** - Maintain existing facilities which support environmental education and interpretation including the Anahuac NWR Visitor Information Station, roads, parking areas, trails, interpretive signs, observation platforms and boardwalks.
- **Strategy 3** - Through a partnership with the Friends of Anahuac Refuge, refuge volunteers and local school districts, provide an environmental education program on Anahuac NWR for kindergarten through fifth grade students. Specific curricula have been developed for each grade. Over 1,000 students annually are taught during field trips to the refuge and through an in-school reading program.
- **Strategy 4** - Provide guided tours and interpreted nature walks for visitors on Anahuac NWR in partnership with the Friends of Anahuac Refuge and volunteers.
- **Strategy 5** - Host annual education special events including the Youth Waterfowl Expo, Marsh Madness and National Fishing Week celebration, and participate in educational activities at local and regional festivals including GatorFest, Rice Festival, and the Texas Wildlife Expo.
- **Strategy 6** - Produce a video detailing the natural resources of the Chenier Plain region and the role of the Refuge Complex in conserving these resources. (Anahuac NWR RONS Project #98040 - Produce educational audio-visual presentations)
- **Strategy 7** - Revise the two refuge general brochures and websites to detail each Refuge's role in managing and restoring native habitats and fish, wildlife, and plants. (Anahuac NWR RONS Project #98037 - Enhance educational and interpretive programs, McFaddin **NWR**.)
- **Strategy 8** - Develop programs on wildflowers, butterflies, mammals and reptiles and amphibians found on the Refuge Complex. (Anahuac NWR RONS Project #98043 - Expand environmental education program)

1-5 Years - Anahuac NWR:

- **Strategy 1** - Develop interpretive exhibits for the butterfly habitat and native prairie demonstration site, including exhibits which highlight native butterflies and native plants which provide important habitat for butterflies. (Anahuac NWR RONS Project #03000 - Develop and interpret butterfly habitat)
- **Strategy 2** - Develop interpretive exhibits on waterfowl and waterfowl management for the East Unit Hunter Check Station. (Anahuac NWR RONS Project #00005- Develop interpretive exhibits for WCS)
- **Strategy 3** - Complete interpretive facility development in the Visitor Information Station including: 1) two interactive multi-media audio-visual programs; 2) digital imaging displays of coastal habitats and fish and wildlife species representing all four seasons; and 3) a hanging display of life-sized marsh and water bird carvings.
- **Strategy 4** - Initiate weekly interpretive walks during spring, focusing on bird and butterfly identification and habitat use.
- **Strategy 5** - Develop and produce a “Children’s Check List” of common refuge plants, animals and fish.

6-10 Years - Anahuac NWR:

- **Strategy 1** - Develop a self-guided radio interpretive program for the Willows- Shoveler Pond - Frozen Point auto tour route. (Anahuac NWR RONS Project #98036 - Develop tour route radio program and interpretive exhibits).
- **Strategy 2** - Develop a brochure on the role of fire in marsh and prairie ecology and its use as a management tool on the Refuge Complex. (Anahuac NWR RONS Project #98037 - Enhance educational and interpretive programs)
- **Strategy 3** - Construct an interpretive kiosk at the East Bay Bayou Tract trailhead, and produce self-guided brochure/trail guide for East Bay Bayou Tract.
- **Strategy 4** - Conduct naturalist-led interpretive walks during fall and winter, focusing on wintering waterfowl and the habitats they utilize.
- **Strategy 5** - Develop 4 mobile interpretive displays on 1) habitat management practices for waterfowl, shorebirds, and other wetland-dependent migratory birds; 2) native coastal prairie and prairie restoration; 3) coastal woodlots; and 4) fire ecology. (Anahuac NWR RONS Project #98036 - Develop tour route radio program and interpretive exhibits)
- **Strategy 6** - Develop interpretive signs on native habitats including coastal wetlands, coastal prairie, and coastal woodlots and the wildlife species they support, and strategically place throughout the Refuge. (Anahuac NWR RONS Project #03001 - Develop interpretive displays)
- **Strategy 7** - Develop interpretive exhibits on wetland and upland habitat management practices including prescribed burning, controlled grazing, water management and exotic species control and strategically place throughout the Refuge. (Anahuac NWR RONS Project #03001 - Develop interpretive displays)
- **Strategy 8** - Develop interpretive signs for the Oyster Bayou Moist Soil Unit overlooks, emphasizing waterfowl and shorebird ecology and moist soil management. (Anahuac NWR RONS Project #03001- Develop interpretive displays)

11-15 Years - Anahuac NWR:

- **Strategy 1** - Develop an advanced independent projects program, working with local scouting and 4-H groups.
- **Strategy 2** - Develop an educational activity for middle school and high school students describing neotropical migratory bird migration and the importance of protecting breeding, wintering and stopover habitat. The activity would include a classroom session followed by a field trip to the Refuge during spring migration.
- **Strategy 3** - Install a microwave video camera in the field to project images of “real time” nature back to the Visitor Information Station and/or the Friends of Anahuac Refuge Web page.

1-5 Years - McFaddin and Texas Point NWRs:

- **Strategy 1** - Develop and initiate an on-refuge Environmental Education program for Sabine Pass schools and students.
- **Strategy 2** - Install interpretive kiosks and signs on McFaddin and Texas Point NWRs to interpret coastal marsh and coastal woodlot habitats and native fish and wildlife resources.
- **Strategy 3** - Develop and install interpretive exhibits in the new McFaddin NWR headquarters office.

6-10 Years – McFaddin and Texas Point NWRs:

- **Strategy 1** - Develop interpretive exhibits on waterfowl and waterfowl management for the McFaddin NWR check station.

Objective E. Management of Beach Uses on McFaddin NWR. The objective is to protect public safety and natural resources along the Gulf of Mexico shoreline within the Refuge.

Rationale for the Objective

The beaches along the Gulf of Mexico on and adjacent to the McFaddin NWR support recreational uses including surf fishing, swimming, sunbathing, wildlife observation and camping. The beaches are considered an area of joint Federal and State of Texas jurisdiction. The beach inland of the Mean High Water line lies within the Refuge. Motorized vehicular traffic occurs on the beach from the vegetation line seaward to mean low tide line, on the public beach easement established under the State of Texas “Open Beaches Act” (Texas Natural Resources Code, Chapter 61: Use and Maintenance of Public Beaches).

Strategies

Throughout the Life of the Plan – McFaddin and Texas Point NWRs:

- **Strategy 1** - Continue and expand law enforcement activities to protect public safety and natural resources.
- **Strategy 2** - Expand coordination with the Texas General Land Office and county agencies to enhance protection of public safety and natural resources on Gulf of Mexico beaches.

Objective F. Community Outreach and Partnerships

Objective F-1. Community Outreach. The objective is to promote conservation of natural resources on a landscape scale by working effectively with partners in support of USFWS management and public use programs on the Refuge Complex and by supporting community-based conservation and conservation education and development of nature tourism opportunities.

Rationale for the Objective

Partnerships with the Friends of Anahuac Refuge and the McFaddin and Texas Point Refuges Alliance, and with conservation organizations including the Galveston Bay Foundation, Ducks Unlimited and local Audubon chapters have been highly successful in supporting a variety of refuge management programs and activities. Refuge volunteers currently provide over 10,000 hours of service annually. Excellent opportunities exist for integrating USFWS programs into community-based conservation, conservation education and development of nature tourism opportunities.

Strategies

Throughout Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Work with the Friends of Anahuac Refuge and the McFaddin and Texas Point Refuges Alliance to increase volunteerism and other partnership endeavors (Anahuac NWR RONS Project #0004 - Expand volunteer program)
- **Strategy 2** - Expand coordination with county agencies, Chambers of Commerce and other organizations and others to promote conservation and nature tourism opportunities through mutual information sharing, development of promotional materials, and other partnership endeavors.
- **Strategy 3** - Expand coordination with conservation organizations and other state and federal agencies and develop additional partnership programs.
- **Strategy 4** - Develop a "Refuge Update" news article for publication in local newspapers.

Objective F-2. Private Lands Partnerships. By Year 15 of the CCP's implementation, 1,500 acres of coastal marsh and prairie wetlands habitat, 500 acres of prairie and 10 acres of woodlot habitat on private lands in the Texas Chenier Plain region will be enhanced or restored through coordination with interested private landowners and the use of USFWS private lands programs.

Rationale for the Objective

Many private lands in the region are skillfully managed to provide habitat for wintering waterfowl and other migratory birds. Excellent opportunities and much interest among landowners exist to enhance, restore and manage wetland, grassland and woodlot habitats on private lands. A variety of private lands programs are available to private landowners to enhance fish and wildlife habitat.

Strategies

Note: The Strategies below are supported by the following RONS Project:

Anahuac NWR RONS Project #02002 - Hold Management Workshops for Private Landowners.

Throughout Life of the CCP and Refuge Complex-wide:

- **Strategy 1** - Provide technical assistance to private landowners in Chambers, Jefferson and Galveston counties wishing to enhance wetland, grassland and woodland habitats through active management and restoration.
- **Strategy 2** - Expand coordination with private landowners in Chambers, Jefferson and Galveston counties to develop habitat enhancement and restoration projects the USFWS' Partners for Fish and Wildlife Program, and through other private lands programs such as the Texas Prairie Wetlands Project (a partnership program sponsored by Ducks Unlimited, Texas Parks and Wildlife Department, the Natural Resource Conservation Service, and the U.S. Fish and Wildlife Service).
- **Strategy 3** - Hold three on-refuge workshops for private landowners and other agency personnel to demonstrate marsh management and restoration, moist soil management, prairie and woodlot restoration, and to highlight available USFWS private lands programs and grant opportunities.