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Draft Sport Hunting

Decision Document

For

SABINE NATIONAL WILDLIFE REFUGE
Draft 2010

Contents

2. Draft Environmental Assessment

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Draft Environmental Assessment

2010 Sport Hunt Plan

on

SABINE NATIONAL WILDLIFE REFUGE
Cameron Parish, Louisiana

For Further Information, Contact:
Project Leader
U. S. Fish and Wildlife Service
Southwest Louisiana National Wildlife Refuge Complex
Cameron Prairie
National Wildlife Refuge
1428 Hwy 27
Bell City, LA 70630

DRAFT

Prepared by:
U. S. Department of Interior
Bell City, Louisiana

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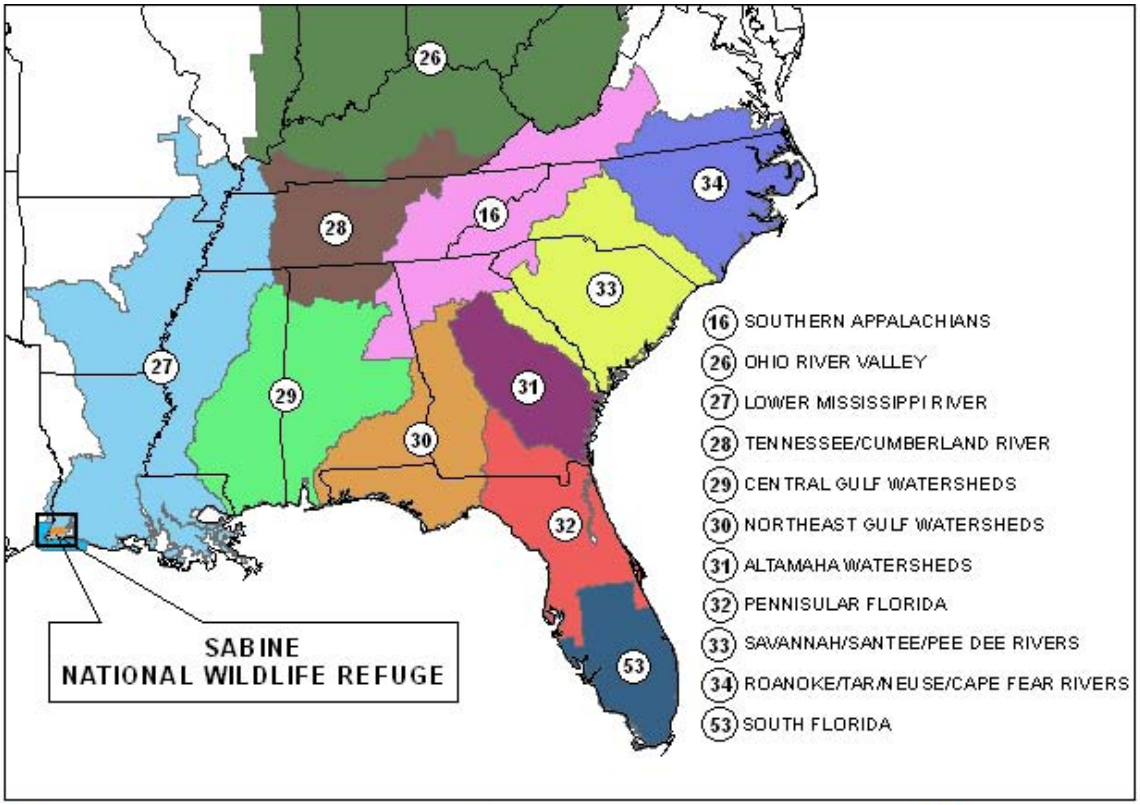

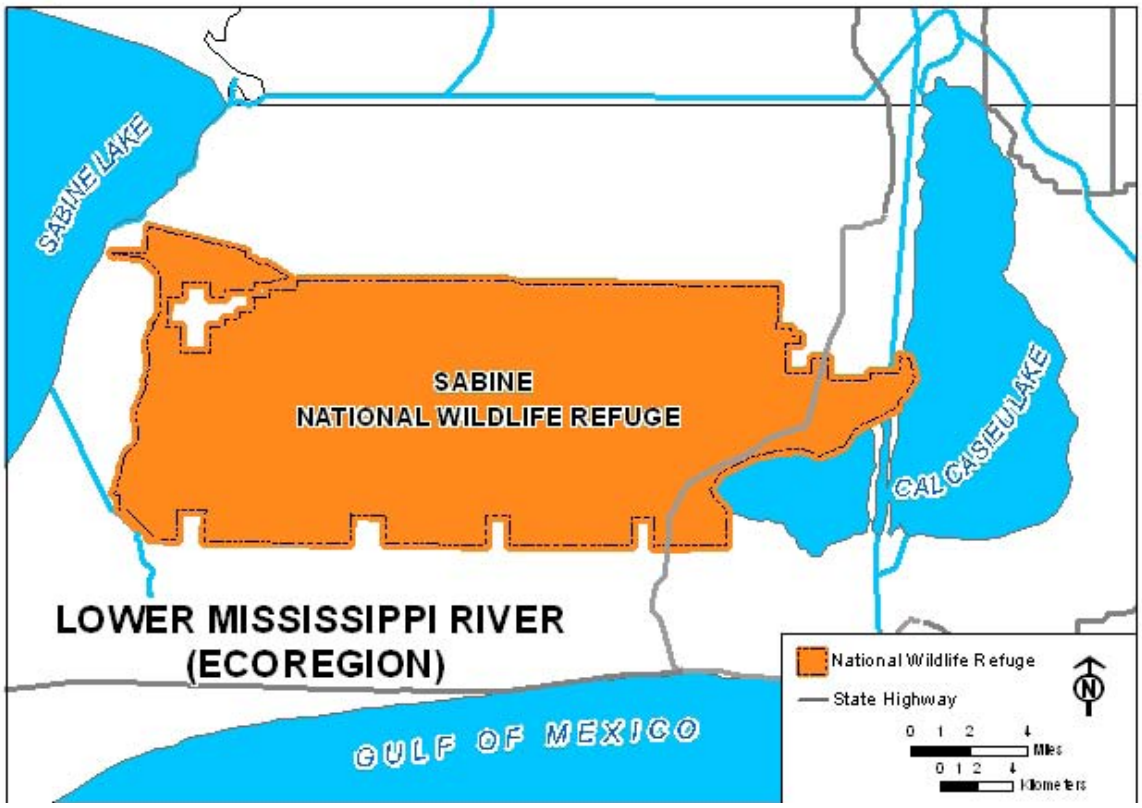

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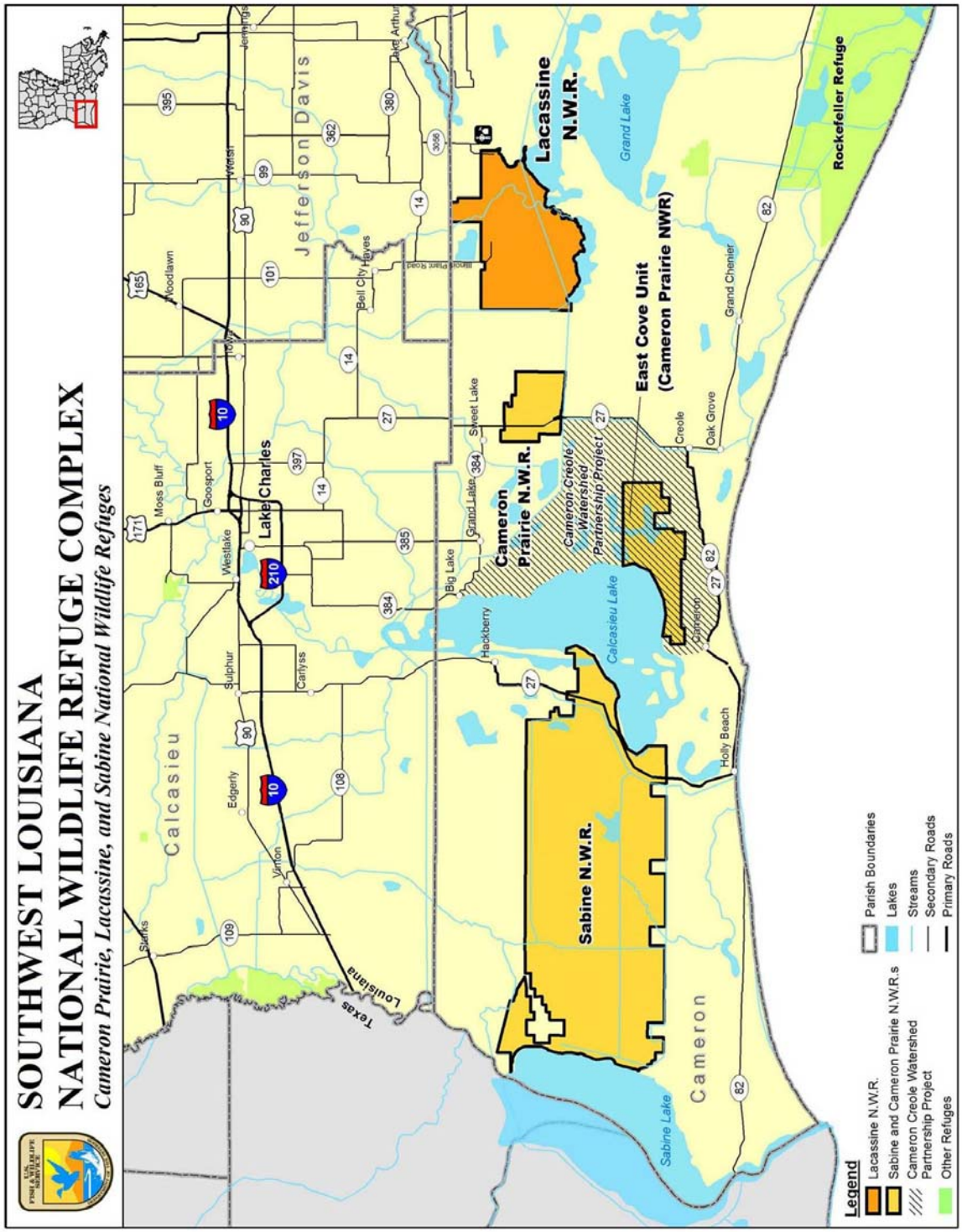

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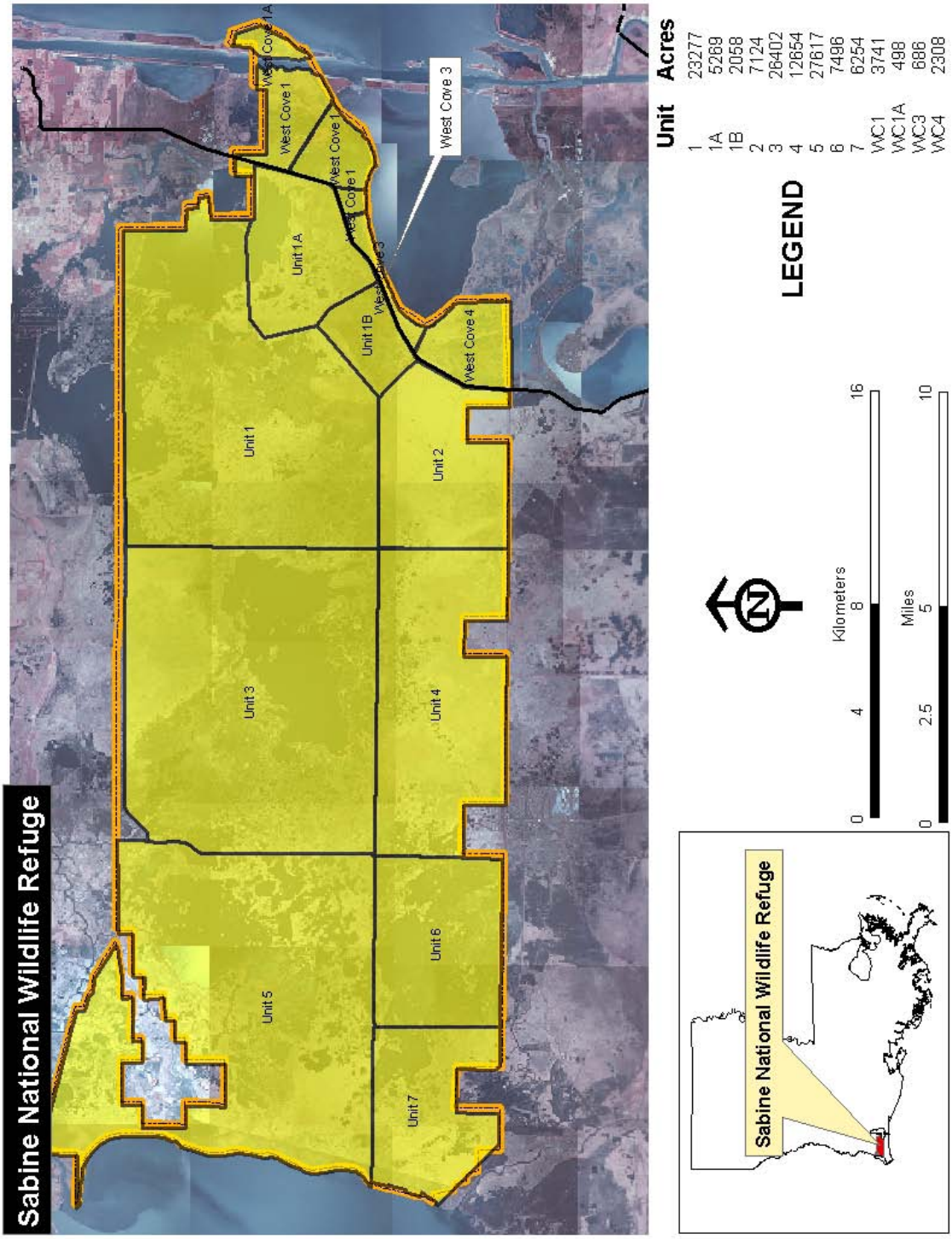

Chapter 1 Purpose and Need for Action

Sabine National Wildlife Refuge (Sabine NWR) was established on December 6, 1937. Executive Order 7764, dated December 6, 1937, stated the official purpose of the refuge: "…as a refuge and breeding ground for migratory birds and other wildlife." A secondary purpose of the refuge is "…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds..." (16 U.S.C. 715d (Migratory Bird Conservation Act)).

Sabine is managed by the goals, objectives, and strategies found in the Sabine NWR Comprehensive Conservation Plan which are designed to maintain, restore and manage habitat through the appropriate management of water and other manipulative actions such as prescribed burning. The primary management goal is to maintain and perpetuate Gulf Coast wetlands for wintering waterfowl from the Mississippi and Central Flyways. The refuge is one of the largest estuarine-dependent marine species nurseries in southwest Louisiana (USFWS 2002c).

The management goals for Sabine NWR are to (USFWS 2007):

- maintain and perpetuate refuge wetlands for wintering waterfowl
- provide for the needs of endangered plants and animals;
- allow compatible public uses, such as hunting, fishing, trapping, wildlife observation, and photography; and
- promote research on marsh and aquatic wildlife (USFWS 2002c).

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

The purpose of this Environmental Assessment is to evaluate the feasibility of providing modest additional hunting opportunities on land currently open to hunting on Sabine NWR. Hunt changes would include hunting gallinules in accordance with State seasons and bag limits. Gallinule hunting will occur only in the designated areas that are open to waterfowl hunting. The refuge shall be closed to gallinule hunting during that segment of the goose season that extends beyond the regular duck season. Use of firearms shall be restricted to shotguns only.

This hunting plan and environmental assessment also implements the recommendations found in the Sabine NWR Comprehensive Conservation Plan and Environmental Assessment completed during 2007 and updates the 1996 Sabine NWR Hunt Plan and brings it into conformance with recent policy changes and step-down management plan formatting. This plan and environmental assessment will become an appendix to the Southwest Louisiana National Wildlife Refuge Complex Visitor Services Plan.

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The proposed action is needed to implement the 2010 Sport Hunting Plan for Sabine NWR which would provide the public with a high quality recreational experience.

Chapter 2 Alternatives Including the Proposed Action

This chapter discusses the alternatives considered for hunting on the 125,790-acre Sabine National Wildlife Refuge. These alternatives are the 1) no action which continues with current management of the hunt program and 2) proposed action which implements the refuge's 2010 Sport Hunting Management Plan

2.1 No Action Alternative: Current Management

No Action: Under this alternative only waterfowl hunting would occur on 34,000 acres. Species currently allowed to be hunted, include ducks, geese, and coots. There would be no change to current wildlife management programs. Waterfowl hunting opportunities for youth and all hunters would continue to occur during the Louisiana State Western Zone waterfowl hunting season.

2.2 Proposed Action: 2010 Sport Hunting Plan for Sabine NWR

Proposed Action: The proposed action would expand the species hunted on Sabine NWR to include two species of gallinules, the Common Moorhen and the Purple Gallinule. Gallinule hunting season currently overlaps the waterfowl season and it will only occur in the existing areas opened to waterfowl hunting. Recreational hunting on Sabine NWR would be carried out in compliance with the refuge hunting plan and in accordance with State, Federal, and special refuge regulations, and FWS policy and directives. All or parts of the refuge may be closed to hunting at any time if necessary for public safety, to provide wildlife sanctuary, or for administrative reasons.

Refer to 2010 Sport Hunting Plan for Sabine NWR for specific regulations.

Chapter 3 Affected Environment

3.1 Physical Environment

Sabine NWRwas established on December 6, 1937. It is located in the extreme southwest corner of Louisiana in Cameron Parish. Habitat types found on the refuge range from fresh to salt marsh and include three large freshwater impoundments. Estuarine dependent organisms utilize the natural marsh and waterways as a nursery area, demonstrating the tremendous importance of the refuge as estuarine habitat. Wintering waterfowl utilize the entire refuge. Sabine NWR is the largest waterfowl refuge on the Gulf Coast. The greatest concentrations of waterfowl are present from late November through early February.

The two major physiographic units within the refuge are the prairie and coastal marshes, both having a common origin as Pleistocene deltaic deposits of the Mississippi River. The coastal marsh is recent alluvial and marine deposition which overlay the subsiding Pleistocene delta. The general terrain is very flat, with ground elevations ranging from 0' to 2' above sea level; a number of small lakes and potholes

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are interspersed throughout both marsh types. The three sources of water for the refuge are precipitation, river overflow, and tides. These sources have always affected refuge marshland but in varying degrees due to the influences of both natural phenomena and man-made conditions. Annual rainfall is approximately 52 inches per year for the refuge. The greatest tidal movement is governed by wind with the normal range of tides varying between 1.5 and 2 feet mean low gulf. Salinities vary in range from fresh water to over 26.00 parts per thousand (ppt).

On September 24, 2005, Category 3 Hurricane Rita roared across Southwest Louisiana with winds in excess of 100 knots, leaving a broad swath of destruction in her wake. Sabine NWR bore the brunt of Rita's 15–20 foot storm surge, which deposited many tons of debris onto the refuge. This debris came from the remnants of devastated coastal communities such as Holly Beach, Constance Beach, and Johnson's Bayou, as well as oil and gas facilities. It contained a chaotic mixture of natural vegetation, construction debris, a myriad of household items, and an unknown amount of hazardous materials. Large parcels of the U.S. Fish and Wildlife Service's property were impacted by the winds and tidal surge associated with Hurricane Rita. Hazardous materials from communities and commercial activities were carried by the wind and flood waters into the refuge, along with household materials, lumber, and displaced vegetation. These included large tanks, totes, drums, and other smaller containers which comprise a potential threat to the marsh environment and the flora and fauna of the refuge.

On September 13, 2008, Hurricane Ike hit the area and will long be remembered as one of the most devastating storm surge hurricanes to affect the Upper Texas and Louisiana Coasts. Ike's large wind swath piled water over the shallowest portion of the Gulf, and was a key factor leading to an unusually higher than normal storm surge which caused severe flooding along the Upper Texas and Louisiana Coasts. The storm surge reached north of I-10 in Lake Charles, Louisiana. Hurricane Ike was the second major hurricane to submerge this area in three years. Hurricane Ike's peak storm water level on September 13, 2008 was about 13.5 ft (4.1 m) mean sea level at Sabine Pass, Texas, resulting in most wetlands on the southwestern Chenier Plain being submerged in saltwater for at least 24 hours during the storm.

The ecological environment was drastically changed and will take years to recover; some areas were changed permanently. Some fresh water containment levees areas were heavily damaged. Many trees along the levees were uprooted or broken. The storm surge and winds introduced salt water that was detrimental to freshwater vegetation. All refuge marshlands experienced some sediment and vegetation movement, resulting in increased shallow ponding.

3.2 Habitat

The refuge is managed to balance the needs of reducing stress to wetland plants caused by waterlogging and saltwater intrusion while providing sufficient access to interior marshes for estuarine species.

Freshwater Impoundments

Three rain-fed freshwater impoundments created in 1951 and 1959 provide habitat for numerous species of waterfowl, wading birds, shorebirds, mammals, reptiles, and fish. Management Unit 3, which encompasses 26,400 acres, is the largest freshwater marsh remaining in southwest Louisiana. Management units 1A and 1B comprise 5,138 acres and 1,800 acres of marsh, respectively, and are highly utilized by a variety of wildlife, most notably ducks. Waterfowl foods in Management Unit 3

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have been found to be available at densities significantly above the level required for efficient waterfowl use (Winslow 2003). The target water management level is 1.8 feet to enhance the growth and survival of desirable plant communities for waterfowl (USFWS 1996). Water depths can be reduced, but only rainfall can increase water levels in these impoundments.

Coastal Marsh

The refuge contains 85,387 acres of fresh, intermediate, and brackish marshes interspersed with low prairie ridges, man-made levees, meandering bayous, and canals. Traditionally, the area fluctuates from being a predominantly fresh marsh to a predominantly brackish marsh and reverts back from brackish to fresh, dependent upon weather cycles and precipitation.

Prescribed fire is one of the primary habitat management tools used on the refuge. Between 1984 and 2006, 85 prescribed fires were conducted restarting plant succession on over 241,304 acres on the refuge. These fires increase plant productivity and reduce the dangers of uncontrolled fires that may threaten people or property.

From fiscal years 2003 to 2006, over 80 wildfires burned 50,279 acres. Wildfires on the refuge are primarily caused by lightning strikes and seismic surveying activity.

Restoration and Mitigation Sites

Marsh re-creation using dredge material from channel dredging and linear terrace construction is currently being employed on the refuge. The basic principle behind both practices is to re-create habitat lost when areas convert from emergent marsh to open water.

Dredge Material

The Calcasieu Ship Channel that borders Sabine Refuge to the east is dredged on a two-year cycle to allow for large ship passage to the Port of Lake Charles. Sabine was chosen for a demonstration site to use dredged material to re-create marsh that had been lost. This use of dredge material will, ideally, allow managers to not only restore these marshes, but to connect the restored sites with the greater landscape, restoring hydrology, and improve habitat quality and diversity. To address concerns about dredge material contaminants, the U.S. Army Corps of Engineers (ACE) analyzes soil samples along the channel used for beneficial use. Thus far, four sites on the refuge have received dredge material for marsh re-creation efforts. Since 1975, 1,400 acres of marsh have been restored on Sabine using dredge-fill (Louisiana Coastal Wetlands Conservation and Restoration Task Force 2002).

Research has found that elevation of these constructed wetlands has more impact than the age of the restoration on achieving “natural” soil processes (Edwards and Proffitt 2002); however, decomposition rates on the sites do appear comparable to natural areas (Mills and Edwards 2003). The belowground biomass on restored sites is significantly lower than natural sites (Ford et al. 2003). There appears to be some difference between small mammal use rates of restored sites as compared to natural sites, though this may be due to elevation difference (Mills et al. 2003). Many of these studies are ongoing. Studies are being conducted to assess patterns of vegetation (breeding system, colonization, cover, dominance, genetic diversity, growth, and succession); levels of metal

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contaminants in the sediment and biota; and use of the habitat by small mammals. Further studies of selected faunal use, dominant plant productivity, and elevation over time are currently being conducted. Analysis of the sites that experienced the brown marsh phenomenon is also underway.

Earthen Terraces

In 1990, “checker board” terraces were constructed in ponds along Calcasieu Lake in the West Cove Unit. These were followed in 2001 by the construction of 18,000 linear feet of planted, earthen terraces in Units 6 and 7 to mitigate for impacts due to oil and gas activities. The ACE and the Louisiana Department of Natural Resources (LDNR) require compensatory mitigation for acreage loss due to dredge and fill activities in wetlands. Terraces are discontinuous low ridges constructed with bottom sediments excavated from adjacent pond bottoms. They are designed to reduce wind related wave intensity, slow water movement allowing fine sediments to settle within the area, provide favorable conditions for submerged aquatic vegetation (SAV) establishment, and increase abundance and habitat of fish and other aquatic species.

Ideal sites for terrace construction are areas where water bodies join or are threatening to join with another water body. No significant benefit to SAV has been found in two studies conducted on terraces at the refuge (Steyer 1993; Caldwell 2003), but research on other terrace configurations are ongoing. An unexpected secondary benefit is they have provided nesting habitat for seabirds such as least terns, forester’s terns, and black skimmers. Another secondary benefit is that terraces contribute to increased fish habitat quality as compared to sparsely vegetated open ponds (Bush 2003). Terrace construction for 2002 exceeded 40,000 linear feet in Unit 6. Terrace construction occurred in areas of Unit 5 as part of the CWPPRA East Sabine Lake Hydrologic Restoration (CS-32) project.

Vegetation

Sabine NWR occupies the marshes between Calcasieu and Sabine lakes in southwest Louisiana, and encompasses 125,790 acres, consisting of 40,403 acres of open water and 85,387 acres of marsh grassland. This area contains a diversity of habitat including freshwater impoundments, wooded ridges and levees, canals, ponds, lakes, and bayous. Some of the largest wetland management efforts in Louisiana occur at Sabine NWR.

Plant species composition has changed from an expansive area of emergent marsh dominated by sawgrass (*Cladium jamacense*) to an area largely composed of shallow open water ponds and slowly eroding land dominated by saltmeadow cordgrass (*Spartina patens*); seashore paspalum (*Paspalum vaginatum*); Olney's three-square (*Scirpus olneyi*); and common reed (*Phragmites australis*) present today (Valentine 1979; Chabreck et al. 2001). This has been caused by changes in the salinity regime and water retention time on the refuge. Records indicate that the sawgrass die-off at Sabine occurred after the large tidal surge of Hurricane Audrey in 1957, which was followed by two years of drought. Dumping of oil field production waters (salinities of 200 ppt) into the marsh has also been blamed for the die-off. Habitat shift analysis has shown that while the species composition may have changed, there has not been a basin-wide shift to a more saline environment since 1949 (Louisiana Coastal Wetlands Conservation and Restoration Task Force 2002).

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What has not changed is that waterfowl still flock to the refuge, but they are concentrated in the freshwater impoundments. Areas in coastal southwest Louisiana outside of freshwater impoundment have experienced changes in vegetation (see Figure 4) due to increased salinity and freshwater retention time, according to surveys dating back to 1949 (O'Neil 1949; Chabreck et al. 2001). The increased salinity can be attributed to navigation channels and their maintenance, primarily the Calcasieu Ship Channel into nearby Calcasieu Lake. These channels allow salt water from the Gulf of Mexico into the marsh faster than fresh water can flow into it. Between 1875 and 1910, Calcasieu Lake salinities were low enough for the water to be used to irrigate rice, which cannot tolerate salinities over 0.6 ppt (Louisiana Coastal Wetlands Conservation and Restoration Task Force 2002).

Today, the average water salinity of Calcasieu Lake is between 8 and 12 ppt. The other major factor contributing to shifting vegetation is canals and their associated spoil banks impeding the north-south flow of fresher water over the marsh. Combined with drought conditions, this can cause areas with salinities to more than double in some instances. Three areas of the refuge were impounded to prevent saltwater intrusion and lessen drought-induced salinity shifts in those areas. The three impounded freshwater marsh management units are dominated by bulltongue (*Sagittaria spp.*), water shield (*Brasenia schreberi*), white water-lily (*Nymphaea odorata*), spikerush (*Eleocharis spp.*), cattails (*Typha spp*.) and bulrushes (*Scirpus spp.*). Open water areas throughout the refuge host a variety of submerged aquatics that assist with marsh stabilization, add to detritus build-up, and provide food for waterfowl. Widgeon grass (*Ruppia maritime*), coontail *(Ceratophyllum demersum*), southern naiad (*Najas quadalupensis*), common bladderwort (*Utricularia vulgaris*), fanwort (*Cabomba caroliniana*), Eurasian milfoil (*Myriophyllum spicatum*) and Ottelia (*Ottelia alismoides*) line the shallow areas along canals and bayous, in addition to occupying large expanses of open water. Over 25 acres in Management Unit 3 are inhabited by wild celery (*Vallisneria americana*), an important food of wintering canvasbacks. Vegetative species that occur on drier upland sites such as ridges and levees include Chinese tallow (*Sapium sebiferum*), groundsel-tree (*Baccharis halimifolia*), live oak (*Quercus virginiana*), rattlebox (*Sesbania drummondii*), black willow (*Salix nigra*), waxmyrtle (*Myrica cerifera*), common elderberry (*Sambucus canadensis*), blackberry (*Rubus spp*.), trumpet vine (*Campsis radicans*), blue vervain (*Verbena hastate*), and goldenrod (*Solidago spp*.) (USFWS 1996).

Coastal Prairie

The prairie region of southwestern Louisiana was once very extensive (about 2.5 million acres) but today is limited to small, remnant parcels (Lester 2005). An abundance of wildlife and plant species can occur on coastal prairie, making the restoration of remnant sites very important for wildlife and their habitat. Some coastal prairie (about 100 acres) occurs on Sabine with two tracts on Unit 5. The 65-acre Marceaux Island Prairie is registered in the Louisiana Department of Fisheries and Wildlife's Natural Areas Registry. Other isolated tracts also occur on the refuge. The Marceaux Island Prairie occurs on an island (ridge) surrounded by marsh. Vegetation is quite diverse and is dominated by grasses and an abundance of forbs. Punctate cupgrass (*Eriochloa punctata*), a state rare plant, is common in the Marceaux Island Prairie. Prescribed fire is used to reduce any encroachment of woody species. Conversion of prairie to agriculture or other forest types; development and maintenance of pipelines, roads, and utilities; fire suppression and practices; and encroachment of invasive species all threaten this valuable ecosystem, resulting in habitat destruction, disturbance, fragmentation, and altered composition and structure.

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Invasive Plant Species

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

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

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

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

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

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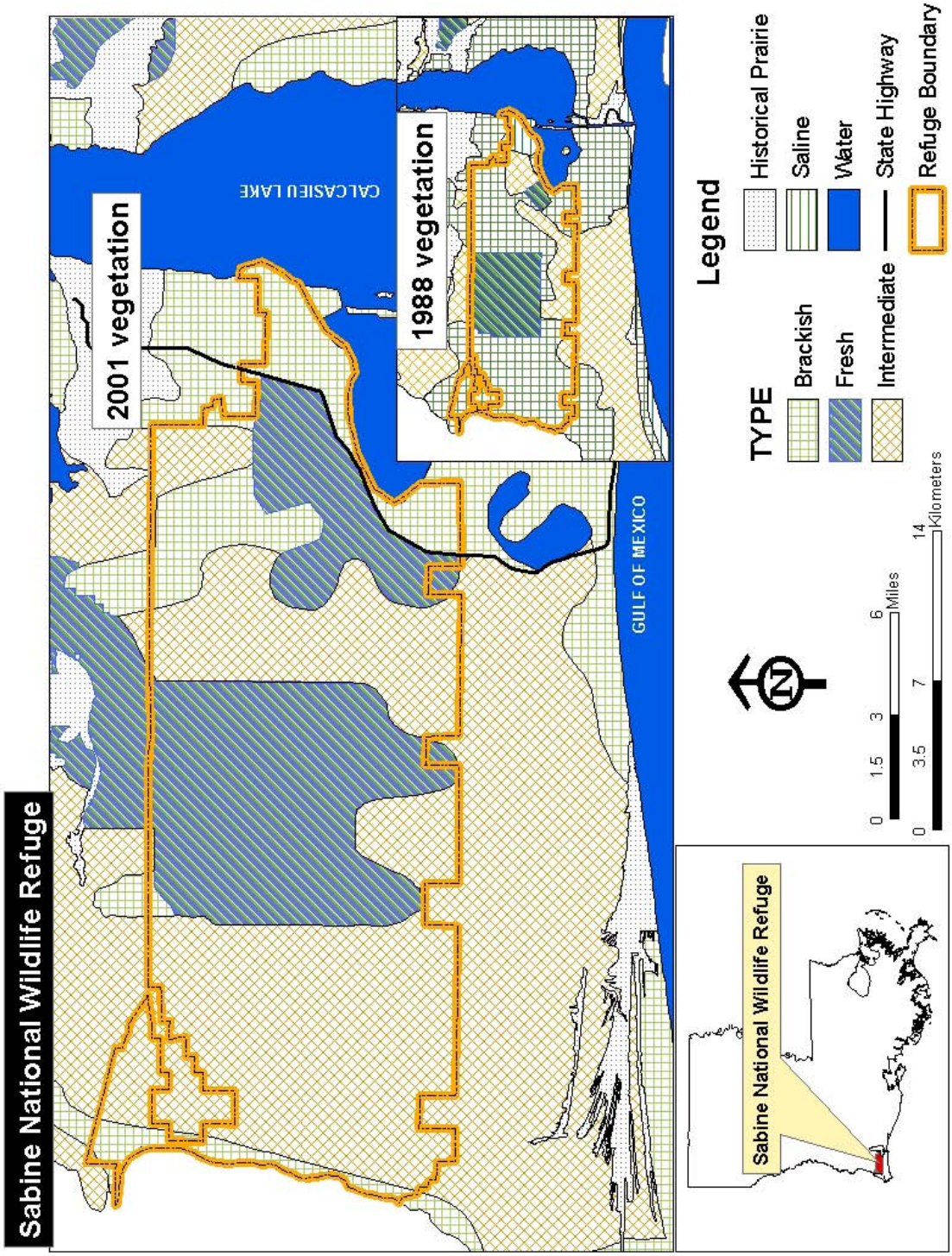
Figure 4. Vegetation of Sabine National Wildlife Refuge.



3.3 Wildlife Resources

Sabine NWRboasts more than 250 bird species, 132 fish species, 36 reptile and amphibian species, and 28 mammal species. This diversity exists in spite of ongoing habitat changes on the refuge.

Migratory Birds

One of the most abundant and important group of species found on the refuge is birds. There are 247 bird species known to inhabit the refuge throughout the year. A wide variety of bird groups are represented, including waterfowl, wading birds, shorebirds, gallinules, passerines (including a large number of neotropical migrants), rails, and raptors. At least 44 species nest on the refuge during the spring and summer.

Waterfowl

Migratory waterfowl use the refuge and are economically important in the area. Mottled ducks, wood ducks, and fulvous whistling-ducks are known to nest and raise young on the refuge. The refuge provides excellent wintering habitat for many other waterfowl species including white-fronted geese, lesser snow geese, and Canada geese. At least 20 duck species, including gadwall, green-winged teal, blue-winged teal, American widgeon, mallards, and ring-necked ducks winter on Sabine (USFWS 1996). Aerial waterfowl surveys have recorded over 100,000 ducks on the refuge three out of five winters between the winter of 1994–95 and the winter of 1998–99, and one of those years over 200,000 ducks were counted (Table 2). Gadwall, green-winged teal, and lesser snow geese frequent the refuge in higher numbers than other waterfowl species. Winter population surveys over the last ten years averaged almost 25,000 gadwall and 10,000 green-winged teal and snow geese, respectively (USFWS 2002a). Table 2 shows the approximate peak wintering waterfowl numbers for Sabine for the years 1990 to 1998.

Gallinules (Gallinula chloropus and Porphyrula martinica)

Both species of gallinule generally occupy the same habitat in southwest Louisiana and are listed as a game species by the state of Louisiana Department of Wildlife and Fisheries. The Common Moorhen (Gallinula chloropus**)** is a rail the size of a small duck, with short tail and wings, long toes, and (in the adult) a short, bright-red-and-yellow bill. Sexes are similar in plumage. This species is ecologically and behaviorally intermediate between the American Coot and the rails, and it resembles the Purple Gallinule (Porphyrula martinica**)** in certain respects. It breeds throughout much of the eastern United States and locally in the West, wintering in southeastern and southwestern states with the largest concentration in Florida. There is an endemic subspecies in the Hawaiian Islands. Individuals are territorial in the breeding season but somewhat gregarious in winter. Closely associated with marshes, ponds, canals, ditches, and rice fields where pools with submerged or floating vegetation are interspersed with emergent or shoreline vegetation, this species forages for plant materials and macroinvertebrates on the water surface, among submerged plants, and in shoreline and upland vegetation. Its diet and foraging modes are diverse. In some regions, moorhens use altered, artificial, agricultural, or urban habitats, including small ponds, during the breeding and nonbreeding seasons. (Bell, G. R. 1976)

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The purple gallinule is a medium-sized marsh hen; total adult length 27–36 cm, mass 208–288 g. In adult, head, neck, and most under-parts glossy purple, with olive-green upperparts, white under tail-coverts, red bill with yellow tip and blue-white frontal shield (at juncture of bill and forehead), and yellowish legs and feet. Toes long (middle toe and claw 7–8 cm). Sexes alike in plumage and overlap in size; female mass about 10% less than male (Hunter 1986).

Morhen nest-success rates (nests with ≥1 egg hatching): 55–80% (Cottam and Glazener 1959, Byrd and Zeillemaker 1981, Brackney and Bookhout 1982, Helm et al. 1987). Both extremes recorded in Louisiana, where Helm et al. (1987) found a success rate of 55% in marshes and 80% in rice fields. In S. Carolina, success nonsignificantly higher for 10 nests outside Boat-tailed Grackle colonies compared to 13 nests within colonies (Post and Seals 2000). Predation causes most unsuccessful nesting; flooding second most common reason for nest failure (Cottam and Glazener 1959, Wood 1974, Byrd and Zeillemaker 1981, Brackney and Bookhout 1982, Helm et al. 1987). In some areas, nest loss due to trampling by livestock may be significant (Cottam and Glazener 1959, Relton 1972). In Ohio, fate of 456 eggs in 61 nests was calculated. More than 83% hatched; only 16% lost to depredation, flooding, or parental abandonment (Brackney 1979). By contrast, in a Wisconsin sample of 146 eggs in 18 nests, about 51% hatched, while about 41% were depredated and another 7% lost due to flooding or parental abandonment (Krauth 1972). Both Ohio and Wisconsin studies reported <3% of eggs infertile (Krauth 1972, Brackney 1979). In Hawaiian Is., ≥1 egg hatched in 75% of nests, and 75% of eggs hatched in those successful nests; flooding, dogs, cats, and human vandals major causes of nest failure (Byrd and Zeillemaker 1981).

In Louisiana purple gallinule studies average brood size was found to be 1.8 for 9 broods 4–6 wk of age (Bell 1976), and average brood size at fledging varied from 1.5 (Matthews 1983) to 3.1 (Helm 1982). Brood sizes observed through roadside counts in Louisiana show a decreasing trend as the young grow from <2 wk to >6 wk (Helm 1982). Surveys conducted from air boats each Aug on Lacassine NWR in se. Louisiana indicated an average production rate of 1.6 (range 0.6–2.8) immatures/adults during 1979–1992 (Lacassine NWR unpubl.).

The North American subspecies is a game bird, but accurate counts of harvest confounded by practice of U.S. Fish and Wildlife Service and many state game agencies of not distinguishing between Common Moorhen and Purple Gallinule in “gallinule” harvest statistics (Greij 1994, Helm 1994). In 1992, 31 states had a “gallinule” hunting season allowing harvest of either species; only Florida made a distinction, with only the Common Moorhen classed as legal game (Helm 1994). Estimated U.S. “gallinule” harvest from 1977 to 1992 averaged 44,597 birds/yr (range 18,300–70,700); the states of Louisiana (77.5%), Florida (9.0%), and Texas (4.1%) collectively accounted for 90.6% of the harvest (Greij 1994).

Some hunters undoubtedly fail to distinguish moorhens and gallinules from coots, much less Purple Gallinules from Common Moorhens. Since 1965, 3 moorhen wings/1,000 coot wings were received by the U.S. Fish and Wildlife Service (USFWS), even though only coot wings were specified in the USFWS Duck Wing Collection Survey. No Purple Gallinule wings received 1965–1975 **(**Martin 1979), presumably because so infrequently taken.

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Neotropical Birds

The migrant bird literature is replete with accounts of declining populations throughout the Western Hemisphere. Some believe that this is a sign of serious environmental trouble. Many declines have been attributed to habitat destruction and fragmentation (Hagan and Johnston 1992). Coastal marshes and their associated cheniers and levees have also been affected by land-use changes resulting in habitat destruction and fragmentation. Sabine NWR is the largest Gulf coast marsh refuge west of the Mississippi River. Migrant bird research presently being conducted on the refuge has indicated that at least 75 migratory bird species utilize refuge levees during spring migration. In 1994, 1,523 birds were banded at three levee sites located in Management Unit 3. Passerines known to breed/nest on refuge levees during the summer months include the: orchard oriole, yellow-billed cuckoo, Eastern kingbird, mourning dove, white-eyed vireo, northern cardinal, and common yellowthroat. Other species such as the red-winged blackbird, boat-tailed grackle, marsh wren, and seaside sparrow nest in and among the marsh vegetation dominated by cattails, bullwhip and marshay cordgrass.

Wading Birds (Water and Marsh Birds)

Many wading bird species are present on the refuge year-round. Winter surveys have revealed that great egrets, white and white-faced ibis, and roseate spoonbills are the most abundant wading birds on the refuge and feed throughout the marshes during the winter months. Species such as white pelicans, tricolored herons, black-crowned night herons, green herons, great blue herons, and snowy egrets are also present in great numbers. Hundreds of cormorants utilize the refuge as well.

Many species of colonial nesting birds such as herons, egrets and cormorants have been observed nesting in trees and shrubs within Management Units 1, 1A, and 3. There are five active rookeries on the refuge (as indicated in a May 10, 2001 survey). Favored nesting areas include islands and abandoned levees. During the 1990s, as many as 5,000 white and white-faced ibis nested in bullwhip marsh on Unit 1B. Breeding bird surveys, conducted by boat from canals, have indicated that common moorhens and least bitterns are the most abundant species of this group during the summer. Numbers of more secretive species such as clapper rails and purple gallinules have not been determined (USFWS 1996).

Shorebirds, Gulls, Terns, and Allied Species

Over 30 shorebird species utilize habitat on the refuge during their spring and fall migrations. As part of the International Shorebird Survey, a three-year study was conducted at several sites, near Calcasieu Lake, along the eastern portion of the refuge. That survey indicated that dowitcher species were the most abundant, with black-necked stilts second and small shorebirds including sandpipers and plovers, third in abundance. Other species sighted include American avocets, yellowlegs, willets, dunlins and killdeer. A June survey of black-necked stilt nests indicated that as many as 214 nests occurred in a 384-acre, muskrat eat-out area (USFWS 1996).

Raptors

Many species of hawks, owls, and vultures utilize the refuge as a wintering ground. Red-tailed hawks, which are observed throughout the refuge in trees lining canal banks, are the most abundant of the wintering hawks. Year-round residents include barn owls, great horned owls, and black and turkey

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vultures (USFWS 1996). Black vultures can usually be found roosting in trees and on structures on Club House Island at the intersection of the Beach and Central canals.

Other Migratory Birds

Seventy-five species of migratory songbirds use the refuge levees during their spring migration. Several species of passerines are known to breed/nest on refuge levees during the summer months, including the orchard oriole, yellow-billed cuckoo, eastern kingbird, mourning dove, white-eyed vireo, northern cardinal, and common yellowthroat. Species such as the red-winged blackbird, boat-tailed grackle, eastern meadowlark, marsh wren, and seaside sparrow are known to nest in and among the marsh vegetation (USFWS 1996). Belted kingfishers and eastern kingbirds can be seen perched on trees and power lines above the canals along State Highway 27. Refuge personnel participate in two Christmas bird counts and a breeding bird survey route on the refuge each year.

Mammals

At least 28 species of mammals can be found on the refuge. The most common rodents include muskrat, nutria, marsh rice rat, and hispid cotton rat. The swamp rabbit and eastern cottontail are the only two lagomorphs found on the refuge. Many carnivorous furbearers live on the refuge, including river otter, mink, coyote and bobcat. Armadillo can frequently be seen on the levees. The only ungulate present is the white-tailed deer. Among the bats that have been documented to occur on the refuge are the red bat, Eastern pipistrelle, and Brazilian free-tailed bat (USFWS 1996).

Amphibians and Reptiles

Sabine NWRharbors at least 35 species of amphibians and reptiles. Species most commonly encountered include: the American alligator, snapping turtle, alligator snapping turtle, redeared slider, Mississippi green water snake, broad-banded water snake, western ribbon snake, speckled kingsnake, western cottonmouth, green anole, ground skink, Gulf coast toad, green treefrog, and southern leopard frog (USFWS 1996). Another species of note is the diamondback terrapin, a medium-size turtle that prefers open water in coastal salt marshes and estuaries (USFWS 2002).

The nuisance alligator harvest on the refuge occurs during September. Harvest limits and dates are set by the Louisiana Department of Wildlife and Fisheries, and in some instances the regulations on Sabine are more restrictive. Sabine's alligator harvest is a sustained yield harvest, meaning that smaller alligators, which grow into the harvested size class during the year, replace the animals taken each year. The state decides how many alligators will be harvested by considering a number of factors including habitat type, annual productivity, and harvest data from previous years (USFWS 1996).

Consideration for public safety justifies a nuisance alligator harvest. Increased alligator numbers in conjunction with increasing public use on the refuge will most likely increase the number of negative human/alligator encounters. This could lead to increased alligator attacks on humans. By implementing a scientifically managed population-wide nuisance alligator harvest, human/alligator encounters may be controlled. Current and future harvest efforts should be in areas most accessible to the visiting public. Alligators also attack and eat domestic livestock and pets, and create traffic

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hazards when crossing roads. Vehicular and boat collisions with alligators on Sabine National Wildlife Refuge have decreased during years of intensive harvest (Borden-Billiot, pers. comm.).

Invasive Animal Species

The most common invasive animal on the refuge is the nutria. This rodent was first trapped on the refuge in the winter of 1941–42, and at the time refuge personnel wished they had more of them to control vegetation. However, numbers increased dramatically in 1954 and were a problem in past years. The nutria has displaced the native muskrat in many of Louisiana's coastal marshes and they can cause harm to fragile marshes when they occur in high densities. When warranted, harvest is used to control the population.

Feral hogs are common on the refuge and can be detrimental to nesting bird success. The hogs degrade habitat and can contribute to land loss by damaging healthy plants that hold the soils in many areas together. No public harvest of feral hogs is conducted on the refuge at this time.

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

3.4 Threatened and Endangered Species

Species of special management concern, including those that are threatened or endangered, occur infrequently at Sabine National Wildlife Refuge. The Calcasieu and Sabine lakes provide habitat for two species of sea turtles: the federally endangered Kemp's ridley and the federally threatened loggerhead. The refuge provides access and habitat for these species, and Service personnel have seen Kemp's ridleys on the refuge. The refuge staff has also radio-tracked loggerheads on the refuge. In addition, the refuge could potentially be used by the endangered wood stork.

Birds of Conservation Concern 2002 (USFWS 2002b) (*BCC 2002*) is a report that describes an effort to carry out a mandate (Public Law 100-653, Title VIII) to identify species, subspecies, and populations of all migratory nongame birds that are likely to become candidates for listing under the Endangered Species Act of 1973 (ESA). The report strives to accurately identify migratory and nonmigratory bird species that represent the Service's highest conservation priorities. *BCC 2002* lists birds of conservation concern at three geographic scales—North American Bird Conservation Initiative Bird Conservation Regions, U.S. Fish and Wildlife Service Regions, and National—to maximize the utility of the lists for partners and agencies. In addition, three national plans are used to place birds on the lists: Partners in Flight, United States Shorebird Conservation Plan, and the North American Waterbird Conservation Plan. Current conservation assessment scores for each species were taken from the three plans which were based on several factors, including population trends, threats, distribution, abundance, and area importance.

While all the bird species included in *BCC 2002* are priorities for conservation action, the lists make no finding with regard to whether they warrant consideration for ESA listing. The Service's goal is to

prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions.

Table 1 lists the birds of management concern that are known or expected to occur on the refuge.

Table 1. Birds of management concern to Sabine National Wildlife Refuge

Common Name	Bird Conservation Region 37 List	USFWS Region 4 List	National List
American Bittern	X		
Little Blue Heron		X	X
Reddish Egret	X	X	X
White Ibis	X		
Northern Harrier	X		X
Peregrine Falcon	X	X	X
Yellow Rail	X	X	X
Black Rail	X	X	X
American Golden-Plover	X		X
Wilson's Plover	X	X	
Upland Sandpiper			X
Whimbrel	X	X	X
Long-billed Curlew	X	X	X
Marbled Godwit	X	X	X
Red Knot	X	X	X
Stilt Sandpiper	X		X
Short-billed Dowitcher	X		X
Buff-breasted Sandpiper	X	X	X
Gull-billed Tern	X	X	X
Common Tern			X
Least Tern	X	X	X
Black Tern	X		
Black Skimmer	X	X	X
Black-billed Cuckoo			X
Burrowing Owl		X	X
Short-eared Owl	X	X	X
Chuck-will's Widow		X	X
Whip-poor-will			X
Red-headed Woodpecker	X	X	X
Olive-sided Flycatcher		X	X
Scissor-tailed Flycatcher			X
Sedge Wren	X		X
Wood Thrush			X
Golden-winged Warbler		X	X
Prairie Warbler		X	X
Cerulean Warbler		X	X
Prothonotary Warbler	X	X	

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Worm-eating Warbler		**X**	**X**
Louisiana Waterthrush			**X**
Kentucky Warbler	**X**		**X**
Canada Warbler			**X**
LeConte's Sparrow	**X**	**X**	**X**
Nelson's Sharp-tailed Sparrow		**X**	**X**

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Table 2. Annual peak wintering waterfowl populations on Sabine National Wildlife Refuge

Year	No. of Waterfowl Observed
1990	138,107
1991	134,909
1992	279,427
1993	204,804
1994	204,881
1995	153,912
1996	72,057
1997	136,977
1998	38,538
Source: USFWS, unpublished data	

3.5 Fishery Resources

Fish associated with the refuge marshes include Gulf menhaden, Atlantic croaker, gobies, pipefish, bay anchovy, inland silverside, western mosquitofish, pinfish, striped and white mullet, silver perch, bay whiff, bayou and rainwater killifish, speckled worm eel, sand sea trout, red drum, crappie, gar, sunfishes, largemouth bass, and catfish. Shellfish associated with these areas include blue and mud crab, and white, grass, and brown shrimp (Bush 2003; USFWS 1996). Many of these fish spend time maturing in these marshes before they return to the ocean. Recreational fishery populations have been greatly reduced over the last decade because of drops in water levels due to management and drought (USFWS 2002a). Restocking efforts on the refuge failed and low populations are expected to continue in the future.

3.6 Cultural Resources

Sabine NWRcontains several archeological sites with artifacts from the Atakapa people, who inhabited much of southwest Louisiana and southeast Texas before European colonization in the mid-1700s. Known sites can be found in almost all of the units of the refuge, though details are known for few of the sites. State regulations prohibit the disclosure of the contents of most of these sites, and several sites have only been identified from aerial photographs. Most of the known site locations on the refuge were identified by a cultural resource survey (Thomas et al. 1978). There are no programs allowing the public access to these sites, and there is little for the public to view on these sites due to the high subsidence and burial rates found in coastal Louisiana. Most sites abandoned before 800 A.D. are buried. Cultural sites have been damaged inadvertently due to canal construction and maintenance, mostly before the refuge was acquired.

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Three archeological sites on the refuge were discussed in Thomas et al. (1978); these are located at the "Club House" at the intersection of the Central and Beach canals, and two oyster shell concentrations observed in the East Cove Unit. The cultural significance of these sites is unknown, but a cursory survey was conducted on the "Club House" site. The survey indicated that the material at the "Club House" was probably transported from nearby Shell Hill in order to raise the elevation of the "Club House." The materials from this site are still of concern, but may not have originated on the site.

An Atakapa site, which may have served as a seasonal settlement, has been found near the refuge at the Hackberry Salt Dome. The Atakapa, named by the early French explorers for the Choctaw Indian word for "man-eater," are believed to be one of the most technologically primitive Native American cultural groups in North America. The culture did not feature hierarchical leadership or an organized religious structure, though shamans were prominent members of the community. Most of their technological development centered on subsistence hunting, and their reputation as cannibals kept the group isolated from the Europeans until the mid-1700s.

The Atakapa probably subsisted by hunting, foraging, and fishing, and common foods were probably deer, raccoon, muskrat, turtle, alligator, and various fish and shellfish. Shell mounds are believed to have been a prominent feature in coastal Atakapa settlements. The Atakapa were semi-nomadic and probably only spent the spring and summer subsisting in small family groups on coastal lands, such as those currently occupied by the Sabine Refuge; the fall and winter were spent in larger settlements further inland.

The area was a "no-man's land" between Spanish Mexico and French (later American) Louisiana frequented only by trappers and outlaws until the early 1800s. European settlement of southwest Louisiana during the late 1700s consisted mostly of isolated communities of Acadian, French, and Spanish settlers. After Louisiana was purchased by the United States in 1803, new Scottish-Irish settlers began to settle the area, but it was not until the railroads connected the area with the outside world after the Civil War that major settlements, most notably the City of Lake Charles, were founded.

The area now occupied by the Sabine Refuge was relatively undisturbed until oil was discovered in the region in the 1920s. The fur industry became a secondary source of income for the Texas Company, an oil company that owned much of the area currently occupied by the refuge. Declines in muskrat populations during the late 1920s and early 1930s led to the Texas Company (now Chevron U.S.A. Inc.) selling surface rights to the federal government for the purpose of establishing the wildlife refuge. The company retains the subsurface rights to this day.

It is more than likely that many undiscovered archeological sites exist at Sabine. These sites may never be discovered due to the difficult survey conditions imposed by the marsh environment. The refuge at present does not have a Cultural Resources Management Plan. This plan, when completed, will specify the measures that need to be taken on the refuge to identify, protect, and interpret the area's archeological and historical sites.

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3.7 Socio Economic

Sabine NWRis located in 1,313 square-mile Cameron Parish, Louisiana, one of the largest parishes (i.e., county equivalents) in the state. Cameron Parish is situated in the extreme southwestern corner of Louisiana, abutting the Gulf of Mexico to the south and Texas to the west. In 2003, the population of the parish was estimated at 9,708, a slight decline (3%) from the 2000 Census (U.S. Census Bureau 2004). The median household income of the parish in 1999 was $34,232, compared to $32,566 for Louisiana as a whole. The same relative prosperity is reflected in a poverty rate below the state average. Approximately 12% of Cameron Parish residents lived below the poverty line in 1999, compared to almost 20% for all of Louisiana.
Educational attainment is below the state average, however, with only 8% of the population aged 25 or higher having a Bachelor's degree or higher, as opposed to the statewide average of 19%.
In 2003 transportation and warehousing was the largest of 20 major economic and employment sectors in the parish (STATS Indiana 2004). The U.S. Census Bureau classified occupations in Cameron Parish are shown in Table 2.

In terms of employment by industrial sector, the primary industries lumped as "agriculture, forestry, fishing and hunting, and mining" predominate in Cameron Parish, as shown in Table 3.

In terms of its racial and ethnic breakdown, as reported in the 2000 Census, Cameron Parish is 92.5% white, non-Hispanic; 3.9% black or African American; 0.4% American Indian; 0.4% Asian; and 2.2% Hispanic or of Latino origin (U.S. Census Bureau 2004). (These percentages do not add up precisely to 100% because of the difference between designated races—white, black, Native American, and Asian—and ethnicities, which are Latino and non-Latino.) In addition, 1.6% in the Census reported some other race or two or more races. Overall, the population of Cameron Parish
has a greater percentage of non-Hispanic whites (92.5%) than the state as a whole (62.5%). That is, it is less diverse and has fewer minorities.

Table 2. Occupations of employed civilian population 16 years and older in Cameron Parish (2000)

Occupation	Number	Percent
Management, professional, and related occupations	772	18.5
Service occupations	718	17.2
Sales and office occupations	954	22.8
Farming, fishing, and forestry occupations	199	4.8
Construction, extraction, and maintenance occupations	594	14.2
Production, transportation, and material moving	947	22.6

Source: U.S. Census Bureau, Census 2000, Summary File 3, Profile of Selected Economic Characteristics

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Table 3. Employment of civilian population 16 years and older by industry in Cameron Parish (2000)

Industry	Number	Percent
Agriculture, forestry, fishing and hunting, and mining	696	16.6
Construction	470	11.2
Manufacturing	295	7.1
Wholesale trade	143	3.4
Retail trade	426	10.2
Transportation and warehousing, and utilities	396	9.5
Information	52	1.2
Finance, insurance, real estate, and rental and leasing	155	3.7
Professional, scientific, management, administrative, and waste management services	206	4.9
Educational, health, and social services	677	16.2
Arts, entertainment, recreation, accommodation, and food services	269	6.4
Other services (except public administration)	213	5.1
Public administration	186	4.4

Source: U.S. Census Bureau, Census 2000, Summary File 3, Profile of Selected Economic Characteristics

Chapter 4 Environmental Consequences

This chapter describes the foreseeable environmental consequences of implementing the two Sport Hunting Plan alternatives (*Preferred Alternative* and *No Action Alternative*). When detailed information is available, a scientific and analytic comparison between alternatives and their anticipated consequences is presented, which is described as “impacts” or “effects.” When detailed information is not available, those comparisons are based on the professional judgment and experience of refuge staff and Service and State biologists.

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4.1 Effects Common to all Alternatives

4.1.1 Environmental Justice

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was signed by President Bill Clinton on February 11, 1994, to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities access to public information and participation in matters relating to human health or the environment.

This assessment has not identified any adverse or beneficial effects for either alternative unique to minority or low-income populations in the affected area. Neither alternative will disproportionately place any adverse environmental, economic, social, nor health impacts on minority or low-income populations.

4.1.2 Public Health and Safety

Each alternative would have similar effects or minimal to negligible effects on human health and safety. No rifle hunting will be allowed on the refuge because of the primarily marsh grass habitat. Special regulations will be implemented as described in the hunt plan to provide safety to people; For example, no hunt zones in high public use areas and no hunting within a public parking areas. Waterfowl hunting occurs throughout the areas surrounding the refuge, so total hunting pressure should change little in the area whether the refuge implements the proposed hunt changes or not.

4.1.3 Refuge Physical Environment

Impacts of each alternative on the refuge physical environment would have similar minimal to negligible effects. Some disturbance to surface soils, topography, and vegetation would occur in areas selected for hunting; however effects would be minimal. The proposed alternative of adding gallinule hunting with the existing waterfowl hunting program would result in negligible effects. The refuge would also control access to minimize habitat degradation as a result of hunter activity.

Impacts to the natural hydrology would have negligible effects. The refuge expects impacts to air and water quality to be minimal and only due to refuge visitors' automobile and boat motor emissions and run-off from roads. The effect of these refuge-related activities on overall air and water quality in the region are anticipated to be relatively negligible. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws.

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

4.1.4 Cultural Resources

Hunting and visitor access does not pose a threat or potential harm to cultural resource sites on or near the Refuge under either the *Preferred Alternative* or *No Action Alternative*. Refuge cultural resource sites are unmarked and will not be impacted by boat or foot traffic.

4.1.5 Facilities

Under the *Preferred Alternative* or *No Action Alternative*, maintenance or improvement of existing facilities (i.e. parking areas, roads, trails, and boat ramps) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation.

The Service defines facilities as: "Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc." Under both alternatives, those facilities most utilized by hunters are: roads, parking lots, and boat launching ramps with minor utilization of a few structures such as rest-rooms and designated self-check stations. Maintenance or improvement of existing facilities (i.e. parking areas, roads, boat ramps and buildings) will cause minimal short term impacts to localized soils and waters, and, may cause some wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities described are periodically conducted to accommodate daily refuge management operations and general public uses such as fishing, wildlife observation and photography. These activities will be conducted at times (seasonal and/or daily) to cause the least amount of disturbance to wildlife. During times when roads or canals are impassible due to flood events or other natural causes those roads, parking lots and boat ramps impacted by the event will be closed to vehicular use.
Additional damage to roads due to hunter use during wet weather periods might occur. The current refuge hunt program for the past 42 years has shown these impacts to be minimal. There are some costs associated with a hunting program in the form of road maintenance, instructional sign needs, and law enforcement. These costs should be minimal relative to total refuge operations and maintenance costs and would not diminish resources dedicated to other refuge management programs.
Maintenance or improvement of existing facilities (i.e. parking areas, roads and boat ramps) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation.

4.1.6 Impacts to Habitat

No Action Alternative

Under this alternative, the refuge would not be opened to gallinule hunting. The opportunity to enhance the migratory bird hunting program for all hunter ages will not occur.

Proposed Action Alternative

Hunting of gallinules is not anticipated to adversely impact refuge natural communities under this alternative. While the number of migratory bird hunters on the Refuge may increase, the additional presence is not considered a significant modifying influence. Impacts to vegetation should be minor. Hunter density presently is estimated to be an average of 1 hunter/340 acres throughout the hunting season. Vehicles

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will be confined to existing roads and parking lots. Gallinule hunting will be confined to the existing areas (34,000 acres) opened to waterfowl hunting.

4.1.7 Impacts to Hunted Wildlife

No Action Alternative

Additional mortality of individual hunted animals would not occur under this alternative. Additional disturbance by hunters to hunted wildlife would not occur; however, other public uses that cause disturbance, such as wildlife observation and photography, would still be permitted. Gallinule populations could exceed the habitat's carrying capacity. There would be no positive or negative impact on waterfowl populations.

Proposed Action Alternative

A modest increase in the mortality of gallinules would occur under this alternative. We would anticipate less than 100 gallinule would be taken a year. Hunting causes some disturbance to not only the species being hunted but other game species as well. However, refuge regulations would minimize incidental disturbance. While managed hunting opportunities result in both short and long term impacts to individual animals, effects at the population level are usually negligible. Hunting regulations for both endemic and migratory game species are based on specific state-wide and nation-wide harvest objectives. Migratory bird regulations are established at the federal level each year following a series of meetings involving both state and federal biologists. Harvest guidelines are based on population survey and habitat condition data. Refuge hunting programs are always within these regulations. As currently proposed, the known and anticipated levels of disturbance of allowing hunting are considered minimal and well within the tolerance level of known wildlife species and populations present on the refuge.

All hunting activities would be conducted with the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or questionable activities. Monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized, and public use programs would be adjusted as needed to limit disturbance. Implementation of an effective law enforcement program and development of site specific refuge regulations that are reviewed annually should minimize most incidental take problems.

4.1.8 Impacts to Non-hunted Wildlife

No Action Alternative

Increased disturbance to non-hunted wildlife would not occur. The areas hunted are the same areas that have been hunted in the past. Consumptive users would not be permitted to access any additional interior areas from October 16 through March 14.

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Proposed Action Alternative

Disturbance to non-hunted wildlife would increase slightly. However, significant disturbance would be unlikely for the following reasons. Small mammals are inactive during winter when hunting season occurs and are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity during the hunting season when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. The refuge has estimated current hunter density on peak days to be no more than 200 hunters in a 34,000-acre hunt area. During the vast majority of the state 60-day waterfowl hunting season, hunter density is much lower. Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted. Disturbance to the daily wintering activities, such as feeding and resting, of birds might occur, but would be transitory as hunters traverse habitat.

4.1.9 Impacts to Endangered and Threatened Species

Endangered or threatened species would not be impacted under either the *Preferred Alternative* or *No Action Alternative*. Refuge habitat may support the following threatened or endangered species: Kemp's ridley sea turtle, American alligator, loggerhead turtle and wood stork. A Section 7 Biological Evaluation was conducted in association with Sabine's Comprehensive Conservation Plan states that the implementation of the plan "will not affect" the listed species. Migratory bird hunting was taken into consideration in the Comprehensive Conservation Plan.

4.1.10 Impacts to Wildlife Dependant Recreation

No Action Alternative

The public would not have the opportunity to harvest a renewable resource in gallinules. The opportunity to for the public to participate in additional wildlife-oriented recreation that is compatible with the purposes for which the refuge was established will not occur. The Service would not be meeting public use demand. Public relations, as it relates to hunting, would not be enhanced with the local community. Under this alternative, current hunters would be unable to experience additional hunting opportunities.

Proposed Action Alternative

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

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The public would be allowed to harvest a renewable resource, and the refuge would be promoting a wildlife-oriented recreational opportunity that is compatible with the purpose for which the refuge was established. The public would have an increased awareness of Sabine NWR and the National Wildlife Refuge System and public demand for more hunting would be met. The public would also have the opportunity to harvest a renewable resource in a traditional manner, which is culturally important to the local community. This alternative would also allow the public to enjoy hunting at no or little cost in a region where private land is leased for hunting, often costing a person $300-$2000/year for membership. This alternative would allow youth and new hunters the opportunity to experience a wildlife-dependant recreation, instill an appreciation for and understanding of wildlife, the natural world and the environment and promote a land ethic and environmental awareness.

4.2 Cumulative Impacts Analysis

4.2.1 Anticipated Direct and Indirect Impacts of Proposed Action on Wildlife Species.

Recreational hunting, a wildlife-dependent activity, has been identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use, provided it is compatible with the purpose for which the refuge was established. All hunts fall within the framework of Louisiana's open seasons and follow state regulations. Refuge-specific regulations are reviewed annually and incorporated into the refuge hunting permit. Hunters are required to possess refuge permits while hunting on the refuge. Currently, Sabine NWR has 34,000 acres open to waterfowl hunting.

While managed hunting opportunities result in both short and long term impacts to individual animals, effects at the population level are usually negligible. Hunting regulations for both endemic and migratory game species are based on specific state-wide and nation-wide harvest objectives. Migratory bird regulations are established at the federal level each year following a series of meetings involving both state and federal biologists. Harvest guidelines are based on population survey and habitat condition data. Refuge hunting programs are always within these regulations. As currently proposed, the known and anticipated levels of disturbance of allowing hunting are considered minimal and well within the tolerance level of known wildlife species and populations present on the refuge. All hunting activities would be conducted with the constraints of sound biological principles and refuge-specific regulations established to restrict illegal or questionable activities. The benefits that hunting brings to each refuge improves the entire refuge system's available habitat and native wildlife populations and thus provides the public generally with more valuable and diverse refuge recreational opportunities of all kinds. Monitoring activities through wildlife inventories and assessments of public use levels and activities would be utilized, and public use programs would be adjusted as needed to limit disturbance. Implementation of an effective law enforcement program and development of site specific refuge regulations that are reviewed annually should minimize most incidental take problems.

4.2.1.1 Migratory Birds

The U.S. Fish and Wildlife Service, working with partners, annually prescribe frameworks, or outer limits, for dates and times when hunting may occur and the number of birds that may be taken and possessed. These frameworks are necessary to allow State selections of season and limits for recreation and sustenance; aid Federal, State, and tribal governments in the management of migratory game birds; and permit harvests at levels compatible with population status and habitat conditions. Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless

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specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the frameworks from which States may select season dates, bag limits, shooting hours, and other options for the each migratory bird hunting season. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds.
Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any ... bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the U.S. Fish and Wildlife Service as the lead federal agency for managing and conserving migratory birds in the United States. Acknowledging regional differences in hunting conditions, the Service has administratively divided the nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. Sabine NWR is within the Mississippi Flyway. The control/reduction of hunted populations on the refuge, concomitant with similar wildlife management efforts on refuges throughout the National Wildlife Refuge System, conserves the cumulative health of the habitat of the flyway in which the refuge is located and the migratory birds that utilize that flyway.

The process for adopting migratory game bird hunting regulations, located in 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rule making process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation. The process of adopting migratory game bird hunting regulations includes two separate regulations-development schedules, based on "early" and "late" hunting season regulations. Early hunting seasons pertain to all migratory game bird species in Alaska, Hawaii, Puerto Rico, and the Virgin Islands; migratory game birds other than waterfowl (e.g., coots, woodcock, snipe, rail, and gallinule, etc.); and special early waterfowl seasons, such as teal or resident Canada geese. Early hunting seasons generally begin prior to October 1. Late hunting seasons generally start on or after October 1 and include most waterfowl seasons not already established. There are basically no differences in the processes for establishing either early or late hunting seasons. For each cycle, Service biologists and others gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties (USFWS 2006).

Under the proposed action, Sabine NWR estimates less than 100 gallinules would be harvested each year based on accidental take by hunters over the past hunt seasons who thought they were shooting coot. Because the Service is required to take abundance of migratory birds and other factors in to consideration, the Service undertakes a number of surveys throughout the year in conjunction with the Canadian Wildlife Service, State and Provincial wildlife-management agencies, and others. To determine the appropriate frameworks for each species, the Service considers factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering

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habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, migratory game bird management becomes a cooperative effort of State and Federal Governments. After Service establishment of final frameworks for hunting seasons, the States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks but never more liberal. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a National Wildlife Refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows. The hunt season on Sabine NWR is more restrictive for waterfowl than the State and only ducks geese and coots are allowed to be hunted although the State allows the hunting of gallinules during this same time period. Waterfowl hunting is only allowed until noon and only for four days each week during the season, which is more restrictive than regulations set forth by Louisiana Department of Wildlife and Fisheries (LDWF).

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ‘‘Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88– 14),’’ filed with the Environmental Protection Agency on June 9, 1988. We published Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and our Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment, “Duck Hunting Regulations for 2006-07,” and an August 24, 2006, Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376), the Service announced its intent to develop a new Supplemental Environmental Impact Statement for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216). More information may be obtained from: Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, Department of the Interior, MS MBSP-4107-ARLSQ, 1849 C Street, NWR, Washington, DC 20240

4.2.1.2 Non-hunted Wildlife

Non-hunted wildlife would include non-hunted migratory birds such as songbirds, wading birds, raptors, and woodpeckers; small mammals such as voles, moles, mice, shrews, and bats; reptiles and amphibians such as snakes, skinks, turtles, lizards, salamanders, frogs and toads; and invertebrates such as butterflies, moths, other insects and spiders. Except for migratory birds and some species of migratory bats, butterflies and moths, these species have very limited home ranges and hunting could not affect their populations regionally; thus, only local effects will be discussed. Disturbance to non-hunted migratory birds could have regional, local, and flyway effects. Regional and flyway effects would not be applicable to species that do not migrate such as most woodpeckers, and some songbirds including cardinals, titmice, wrens, chickadees, etc.

Hunting season would not coincide with the nesting season. Long-term future impacts that could occur if reproduction was reduced by hunting are not relevant for this reason. Disturbance to the daily wintering activities, such as feeding and resting, of birds might occur. Disturbance to birds by hunters would probably be commensurate with that caused by non-consumptive users.

The cumulative effects of disturbance to non-hunted migratory birds under the proposed action are expected to be negligible for the following reasons; Small mammals, including bats, are inactive during winter when hunting season occurs and are nocturnal. Both of these qualities make hunter interactions with small mammals very rare. Hibernation or torpor by cold-blood reptiles and amphibians also limits their activity during the hunting season when temperatures are low. Hunters would rarely encounter reptiles and amphibians during most of the hunting season. Encounters with reptiles and amphibians in the early fall are few and should not have cumulative effects on reptile and amphibian populations. Invertebrates are also not active during cold weather and would have few interactions with hunters during the hunting season. The refuge has estimated current hunter density on peak days to be no more than one hunter/170 acres. During the vast majority of the hunting season, hunter density is much lower (one hunter/340 acres). Refuge regulations further mitigate possible disturbance by hunters to non-hunted wildlife. Vehicles are restricted to roads and the harassment or taking of any wildlife other than the game species legal for the season is not permitted. Although ingestion of lead-shot by non-hunted wildlife could be a cumulative impact, it is not relevant to National Wildlife Refuges because the use of lead shot would not be permitted on any refuge for any type of hunting.

Some species of bats, butterflies and moths are migratory. Cumulative effects to these species at the "flyway" level should be negligible. These species are in torpor or have completely passed through Louisiana by peak hunting season in Nov-Jan. Some hunting occurs during September when these species are migrating; however, hunter interaction would be commensurate with that of non-consumptive users.

4.2.1.3 Endangered Species

Endangered or threatened species would not be impacted under the preferred alternative Refuge habitat may support the following threatened or endangered species: bald eagle, Kemp's ridley sea turtle, American alligator, loggerhead turtle and wood stork. A Section 7 Biological Evaluation was conducted in association with Sabine's Comprehensive Conservation Plan states that the implementation of the plan "will not affect" the listed species. Feral hog hunting and migratory bird hunting were taken into consideration in the Comprehensive Conservation Plan.

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

4.2.2.1 Wildlife-Dependant Recreation

Wildlife-Dependant Recreation

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

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The level of recreation use and ground-based disturbance from visitors would be largely concentrated at trails and the Refuge's office and maintenance areas. This, combined with the addition of increased hunting opportunity, could have a cumulative effect on nesting bird populations. However, the hunting season is during the winter and not during most birds' nesting period. It is unlikely that any birds would establish nests near developed facilities or during the hunting season.

The public would be allowed to harvest a renewable resource, and the refuge would be promoting a wildlife-oriented recreational opportunity that is compatible with the purpose for which the refuge was established. The public would have an increased awareness of Sabine NWR and the National Wildlife Refuge System and public demand for more hunting would be met.

The refuge would control access under this alternative to minimize wildlife disturbance and habitat degradation, while allowing current and proposed compatible wildlife-dependent recreation.

4.2.2.2 Refuge Facilities

The Service defines facilities as: "Real property that serves a particular function(s) such as buildings, roads, utilities, water control structures, raceways, etc." Under the proposed action those facilities most utilized by hunters are: roads, parking lots and boat launching ramps. Maintenance or improvement of existing facilities (i.e. parking areas, roads and boat ramps) will cause minimal short term impacts to localized soils and waters and may cause some wildlife disturbances and damage to vegetation. The facility maintenance and improvement activities described are periodically conducted to accommodate daily refuge management operations and general public uses such as wildlife observation and photography. These activities will be conducted at times (seasonal and/or daily) to cause the least amount of disturbance to wildlife. All disturbed sites will be restored to as natural a condition as possible. During times when roads are impassible due to flood events or other natural causes those roads, parking lots and boat ramps impacted by the event will be closed to vehicular use.

4.2.2.3 Cultural Resources

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

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

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

4.2.2.4 Anticipated Impacts of Proposed Hunt on Refuge Environment and Community

The refuge expects no sizeable adverse impacts of the proposed action on the refuge environment which consists of soils, vegetation, air quality, water quality and solitude. The refuge would also control access to minimize habitat degradation potentially resulting from hunter activity.

The refuge expects impacts to air and water quality to be minimal and only due to refuge visitors' automobile and boat motors. The effect of these refuge-related activities, as well as other management activities, on overall air and water quality in the region are anticipated to be relatively negligible, compared to the contributions of industrial centers, power plants, and non-refuge vehicle traffic. Existing State water quality criteria and use classifications are adequate to achieve desired on-refuge conditions; thus, implementation of the proposed action would not impact adjacent landowners or users beyond the constraints already implemented under existing State standards and laws.
Impacts associated with solitude are expected to be minimal given time and space zone management techniques, such as seasonal access and area closures, used to avoid conflicts among user groups.

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

4.2.2.5 Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated Impacts

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

The implementation of any of the proposed actions described in this assessment includes actions relating to the refuge hunt program (see 2010 Sport Hunting Plan for Sabine NWR). These actions would have both direct and indirect effects (e.g., additional hunting opportunity and new site inclusion would result in increased public use, thus increasing vehicular traffic, disturbance, etc); however, the cumulative effects of these actions are not expected to be substantial.

The past refuge hunting program has been very similar to the proposed action in season lengths, species hunted, and bag limits. Changes to the hunt program in the past decade have been made to open hunting on more land within the refuge. The refuge does not foresee any changes to the proposed action in the way of increasing the intensity of hunting in the future.

4.2.2.6 Anticipated Impacts if Individual Hunts are Allowed to Accumulate

National Wildlife Refuges, including Sabine NWR, conduct hunting programs within the framework of State and Federal regulations. Sabine NWR is more restrictive than the State of Louisiana for waterfowl hunting. By maintaining hunting regulations that are equally restrictive or more restrictive than the State, individual refuges ensure that they are maintaining seasons which are supportive of management on a more regional basis. The proposed hunt plan has been reviewed and is supported by the Louisiana Dept. of Wildlife and

Fisheries. Additionally, refuges coordinate with LDWF annually to maintain regulations and programs that are consistent with the State management program.

Chapter 5 Consultation and Coordination with Others

A 30 day pubic review and comment process will been announced via a U S Fish and Wildlife Service News Release. The draft environmental assessment will be made available on the internet at http://www.fws.gov.swlarefugecomplex or by contacting the Southwest Louisiana National Wildlife Refuge Complex at 337-598-2216.

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