APPENDIX E: COMPATIBILITY DETERMINATIONS

APPENDIX E: COMPATIBILITY DETERMINATIONS FOR ANAHUAC, MCFADDIN, AND TEXAS POINT NWRS

COMPATIBILITY DETERMINATION: ANAHUAC NWR - WATERFOWL HUNTING

Use: Waterfowl Hunting

Refuge Name: Anahuac National Wildlife Refuge

County: Chambers County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act, Emergency Wetlands Resources Act, Refuge Recreation Act, Fish and Wildlife Act 1956

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act)

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

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Anahuac National Wildlife Refuge (NWR or Refuge) proposes to continue to provide waterfowl hunting opportunities (for ducks, geese, and coots) in designated areas that are compatible with Refuge purposes. Hunting is a wildlife-dependent, priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. Waterfowl hunting is a long-standing traditional use on and around Anahuac NWR (McNeir 1956, Jackson 1961, Lagow 1970). This

Compatibility Determination considers continuation of waterfowl hunting on the Refuge, and includes consideration of modifications to the Refuge hunting program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).
Waterfowl hunting on Anahuac NWR is supported by several modes of access, including motorized vehicles, motorized and non-motorized boating, bicycling, and walking. Because they are highly interrelated, this compatibility determination includes an assessment of these other activities in conjunction with waterfowl hunting.

Opportunities for waterfowl hunting on Anahuac NWR will be available within the season set by Texas Parks and Wildlife Department in compliance with annually published regulations. Designated hunting areas will be open during established State waterfowl seasons, with the exception that hunting for ducks and coots will not be allowed on the Refuge until the last Saturday in October (not including the September teal and youth-only seasons). If the State-specified duck and coot regular season opens later than the last Saturday in October, then hunting on the Refuge will open consistent with the State-specified season date.

In addition, if the light goose conservation order is in effect, these season dates may be reduced on the Refuge in accordance with the timing of the departure of geese from the area, typically late February. All applicable State and Federal regulations are enforced.

The waterfowl hunting season generally falls within the period of September through February. Traditionally, the hunting season on the Texas coast begins in September with the early teal season. The regular waterfowl season follows, often beginning in late October and running through January. The light goose conservation order typically begins at the end of the regular waterfowl season in January and runs through March.

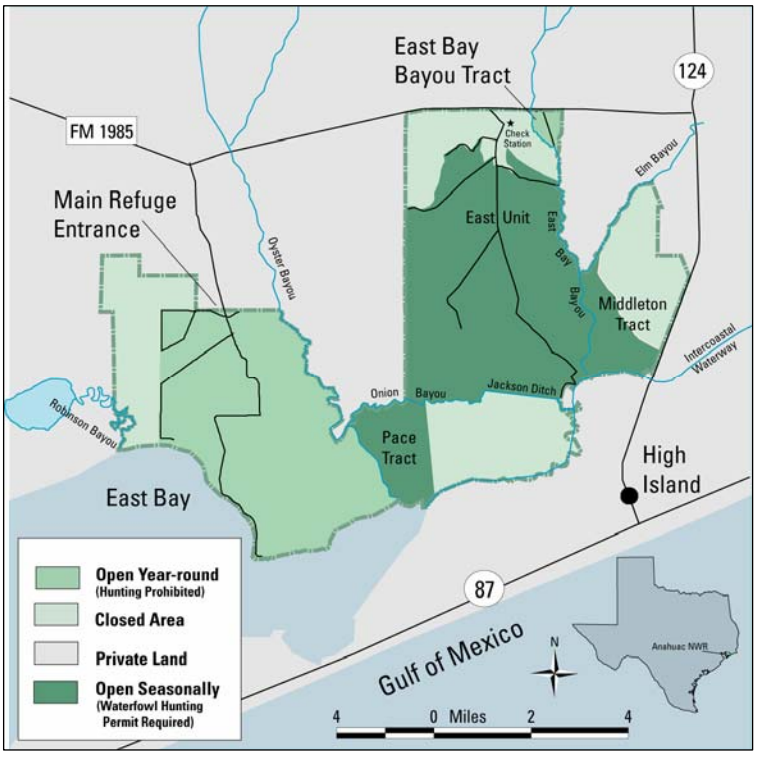

Figure E.1. Location of waterfowl hunt units on Anahuac NWR.

Three different hunt units are open to waterfowl hunting on Anahuac NWR (Figure E.1), including the Pace Tract (1,500 acres), and portions of the East Unit (10,200 acres) and Middleton Tract (1,200 acres). These three hunt units total 12,900 acres. These units occur primarily in coastal marsh habitats, including saline, brackish and intermediate marshes. In addition to coastal marsh habitats, rice fields, moist-soil units and fresh water reservoirs are open to waterfowl hunting on the East Unit hunt area.

The three hunt units are open on different days of the week to provide hunting opportunities throughout the week, as well as periods of rest for waterfowl. The Pace Tract will be open daily during the early teal season and the regular waterfowl season. The East Unit will be open on Saturdays and Sundays during the early teal season, and on Saturdays, Sundays and Tuesdays during the regular waterfowl season. The Middleton Tract will be open daily during the early teal season and on Saturdays, Sundays, and Wednesdays during the regular waterfowl season. All hunt units are closed on

Thanksgiving, Christmas and New Year's Day. These units are open for waterfowl hunting only, and are closed to the public at other times of the year.

Hunters may enter Refuge hunt units no earlier than 4:00 am. All hunts are morning-only hunts. Hunting is permitted from legal shooting time (1/2 hour before sunrise) until 12:00 pm. Hunters must be off the Refuge hunt units by 12:30 pm.

A waterfowl hunting permit must be signed and in the possession of the hunter while hunting on any of the Refuge hunt units. This permit is available at no charge and serves to inform the hunter of Refuge-specific regulations. In addition, a daily or annual user fee is required for hunting the East Unit during the regular waterfowl season. In fiscal year 2002, approximately 4,800 hunters utilized the Refuge for waterfowl hunting.

Waterfowl hunting is a long and established tradition in the coastal marshes of southeast Texas, and occurred on Refuge lands long before the establishment of the Refuge (McNeir 1956, Jackson 1961, Lagow 1970). The Refuge first opened to public waterfowl hunting in 1980, after the purchase of the Pace Tract in 1979. After additional acquisitions, portions of the East Unit, and then the Middleton Tract, were also opened to public waterfowl hunting. Today, 40% of Anahuac NWR is open for waterfowl hunting, the maximum allowable limit permitted under the Migratory Bird Conservation Act, 16 U.S.C. 715d.

Additional public waterfowl hunting opportunities exist in the area at the State managed J.D. Murphree Wildlife Management Area, the Wallisville Lake Project managed by the U.S. Army Corps of Engineers, and the McFaddin and Texas Point National Wildlife Refuges managed by the U.S. Fish and Wildlife Service. With more than 97% of the state privately owned (TPWD 2005), limited public hunting opportunities are available in Texas. State and Federal public hunting areas provide important wildlife-dependent recreational opportunities for the general public.

Availability of Resources:

Costs to administer the hunt program will mostly be salaries and facilities maintenance. This would include staffing the East Unit waterfowl check station throughout the season to issue permits, collect fees, provide information and collect harvest data. A staffed check station improves visitor services and the quality of a visitor's experience by providing orientation and guidance. Additionally, valuable biological data on migratory birds are collected by Refuge staff at waterfowl check stations. Other costs to administer the program includes law enforcement throughout the season by refuge law enforcement staff, as well as sign posting, development and publishing of refuge specific regulations and permits, and responding to public inquiries and requests for permits. Existing facilities requiring maintenance and upkeep include the accessible hunt blind and boardwalk, the waterfowl check station, parking areas, crosswalks, bridges, portable restrooms, roads, and boat ramps and boat rollers. The length of the season as determined annually by the State may result in an increase or decrease in the number of staff days required to administer the program.

The daily or annual user fees for waterfowl hunting on the East Unit would assist with the costs associated with running the hunt program, however as previous years have demonstrated, these funds are insufficient to cover all costs associated with the program. Base funding will also be needed to manage the program. Volunteer workdays will continue to be organized in order to help prepare the hunt units for the upcoming seasons.

In addition to season length, hunter trends, either up or down, will result in an increase or decrease in staffing needed. If hunter use considerably declines on the Refuge, along with associated fees, the Refuge may need to consider alternatives for staffing the check station. Though not preferred, a self-registering procedure may be developed in response to such trends.

Anticipated Impacts of Use:

The potential impacts of the Anahuac NWR waterfowl hunt program on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and Endangered (T&E) species known to use the Refuge hunt units or areas adjacent to hunt units during waterfowl season include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), and American alligator (*Alligator mississippiensis*, Threatened). Waterfowl hunting activities will not adversely impact any Threatened or Endangered species occurring on the Refuge. Bald eagles are observed only occasionally on the Refuge. They typically feed on wounded or sick birds, and are usually associated with large concentrations of wintering waterfowl that occur in refuge sanctuary areas. Non-toxic shot regulations are actively enforced on the Refuge, and no cases of lead poisoning in eagles scavenging on waterfowl carcasses have been documented on the Refuge. Brown Pelicans do not generally utilize habitats found on refuge hunt units, but may be present in habitats adjacent to hunt units. Brown pelicans are sometimes observed flying over the Refuge and along the shoreline of East Bay and the GIWW. Minor disturbance impacts to brown pelicans may occur from hunters traveling to the Refuge by boat on East Bay and the GIWW. The GIWW is heavily used by both commercial and recreational boat traffic, and brown pelicans are habituated to boat traffic. These T&E avian species do not nest on the Refuge, their presence is transient in nature, and they are highly mobile and readily able to move to undisturbed areas. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. The refuge waterfowl hunt program does not directly or indirectly impact alligators.

Habitats: The greatest potential for impacts to vegetation resources and habitats on the Refuge likely comes from motorized boating activities. Many Refuge hunt areas are accessible only or primarily by motorized boat. Wetland vegetation, especially submerged aquatic vegetation, can be impacted by motorboat activity. For example, propeller scarring has been shown to detrimentally impact seagrass beds in the Laguna Madre in South Texas (Pulich *et al.* 1997, Dunton *et al.* 1998) and in Florida (Madley *et al.* 2004). Propeller scarring leaving permanent channels in shallow pond and waterway bottoms on the Refuge has also raised concerns about the potential for increased saltwater intrusion, with concurrent negative impacts on emergent and submergent aquatic vegetation.

Foot traffic in areas open to hunting can lead to vegetation trampling, and in heavy use areas, cause plant mortality. Some vegetation trampling and trailing from hunter foot traffic occurs in marsh habitats in hunt areas, although these impacts tend to be short-term.

These impacts are expected to be localized and minimal. Regulations, including horsepower restrictions and area closures to motorized boating (i.e. no prop zones) are used on the Refuge to protect wetland habitats and public safety.

Migratory Birds and Other Biological Resources: The most direct effect of hunting on the Refuge is the mortality of harvested waterfowl species resulting from hunting activities. Regulations governing harvest in states in the Central and Mississippi Flyways are developed annually through the Federal framework process for harvest of migratory birds in the U.S. This process is designed to ensure that viable waterfowl populations are sustained over the long-term. Overall, harvest on the Refuge, and cumulatively on all national wildlife refuges open to migratory bird hunting, constitutes a very small percentage of the overall harvest of migratory birds in these Flyways. The continuation of the waterfowl hunting program on the Refuge under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex EIS/CCP/LPP (USFWS 2007) will not have any measurable effect on overall populations of hunted waterfowl species and the long-term viability of these populations.

Harvest statistics for the East Unit hunt area of the Anahuac NWR are collected annually through the operation of hunter check station. Annual harvest statistics for the years 2000-2007 are presented in Table 1 below. These data do not represent total harvest on the Refuge, as harvest information is not

collected from hunters utilizing the Pact Tract and Middleton Tract refuge hunt units. Green-winged teal, gadwall, blue-winged teal and Northern shoveler are the principal duck species harvested on the Refuge. Snow geese and Greater white-fronted geese comprise the majority of the refuge goose harvest.

Table E-1. Waterfowl Harvest Numbers, East Unit of Anahuac NWR, 1999-2006.*
*Data collected at the Anahuac NWR East Unit Hunter Check Station.

Species	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007
Black-bellied Whistling-Duck	0	0	0	0	0	0	0	35
Fulvous Whistling-Duck	1	0	4	8	1	0	1	5
Greater White-Fronted Goose	54	38	41	10	11	53	21	38
Snow Goose[1]	159	79	84	139	46	55	91	136
Ross's Goose	15	2	5	2	1*	5**	3	8
Canada/Cackling Goose	6	2	1	1	2	1	0	5
Unidentified Goose	0	0	0	0	2*	0	0	0
Wood Duck	18	15	11	7	7	2	3	9
Gadwall	373	234	365	120	238	272	247	115
American Wigeon	43	57	44	14	36	36	25	12
Mallard	91	98	50	35	42	27	58	67
Mottled Duck	84	90	46	64	76	83	52	106
Blue-winged Teal	74	177	123	186	107	91	98	180
Cinnamon Teal	2	0	1	0	5	0	0	1
Northern Shoveler	143	356	116	59	85	96	163	141
Northern Pintail	36	34	44	21	14	6	31	37
Green-winged Teal	488	477	212	219	219	244	371	287
Canvasback	1	3	0	0	0	1	3	1
Redhead	3	11	3	1	4	1	5	6
Ring-necked Duck	5	19	58	13	8	11	11	12
Greater Scaup	0	0	0	0	1	0	3	1
Lesser Scaup	0	0	0	0	28	32	195	61
Scaup species	6	103	42	71	0	0	0	0
Surf Scoter	0	0	0	1	0	0	0	0
Bufflehead	0	0	1	0	0	0	1	3
Goldeneye species	1	1	7	0	1	2	0	6
Hooded Merganser	2	8	3	2	2	5	2	2
Red-breasted Merganser	0	0	0	1	0	0	0	0
Masked Duck	0	0	0	0	0	0	0	1
Ruddy Duck	0	2	2	0	0	0	4	3
American Coot	7	6	5	2	2	0	0	0
Total Birds	1612	1812	1268	976	938	1023	1388	1278

[1] Includes snow geese harvested during the light goose conservation order.
* Geese harvested during the light goose conservation order.
** Includes two geese harvested during light goose conservation order.

Many studies have documented the effects of hunting intensity on the number of birds utilizing an area (Madsen *et al.* 1992 as cited by Fox and Madsen 1997). This study demonstrated that relatively light hunting pressure can reduce waterfowl abundance in hunted areas. Distribution and habitat use, feeding patterns, and the nutritional status of waterfowl have also been shown to be affected by hunting activities. Hunting activity can cause birds to alter habitat use, change feeding locations (Madsen 1995), feed more at night (Thornburg 1973, Morton *et al.* 1989) and reduce the amount of time spent feeding (Korschgen *et al.* 1985, Madsen 1995). Collectively, these changes in behavior have the potential to adversely impact the nutritional status of waterfowl (Bélanger and Bédard 1995).

Hunting may have a more significant impact on resident mottled ducks. Pair bonds for mottled ducks are established earlier than northern nesting birds and disturbance caused by hunting may disrupt the reproductive cycle for this species. Additionally, opening the regular waterfowl season before the arrival of migrating ducks from northern breeding areas allows for disproportionate harvest of resident birds, primarily Mottled Ducks. Refuge-specific regulations prohibit the opening of the general waterfowl season on the Refuge any earlier than the third Saturday in October in order to prevent this impact.

Monthly aerial surveys of wintering waterfowl on the Refuge have documented the disproportionate use of established sanctuary areas by waterfowl, as compared to the areas open to hunting. This further supports the above studies and indicates that hunting affects the overall distribution of wintering waterfowl on the Refuge. It has been shown that sanctuary areas on the wintering grounds are effective in maintaining local waterfowl populations in a landscape subject to hunting pressure (Bellrose 1954, Madsen 1998). Heitmeyer and Raveling (1988) found that waterfowl used sanctuaries during the day and local rice fields at night. Similarly, Fleskes *et al.,* (2005) found northern pintail used areas closed to hunting during the day and dispersed throughout the area at night. These data indicate that while sanctuaries are effective in maintaining local waterfowl populations through the hunting season, birds must disperse at night to feed.

Sanctuary areas tend to support greater numbers of waterfowl the longer they have been established. Bellrose (1954) found that traditional sanctuary areas support higher populations of migrating ducks than newly established sanctuary areas. Similarly, Madsen (1998) found that it took two to six years between the creation of sanctuary areas and the time when peak numbers of dabbling ducks were reached. These data indicate that traditional, long-term sanctuary areas are more valuable to maintaining local waterfowl populations than sanctuary areas that shift from year to year. Presumably, providing waterfowl with predictable undisturbed sanctuary areas increases the ability of birds to meet the obligations of their annual cycle. Waterfowl undergo considerable physiological demands during winter. Heitmeyer (1988) estimated that prebasic molt in female mallards required an additional three grams per day of protein over base metabolic rates. These demands approach the estimated five grams per day associated with reproduction. Pair formation for most North American waterfowl takes place away from the breeding grounds. Waterfowl must accumulate endogenous energy reserves to meet the demands of courtship (Afton and Sayler *in* Baldassarre and Bolen 1994). Baldassarre and Bolen (1994) proposed that birds that do not accumulate energy reserves may have less time and energy at their disposal to initiate courtship and/or may be unable to maintain previously established pair bonds. Clearly, birds must meet high energy demands to successfully fulfill critical wintering components of their annual cycle. Further, Heitmeyer and Fredrickson (1981) build a scenario where endogenous reserves established on wintering grounds return mallards to breeding areas in better condition to begin nesting, leading to larger clutch sizes and earlier nests, which tend to be more successful. Providing sanctuary areas of adequate size adjacent to quality feeding areas may contribute to the ability of birds to meet the physiological demands required during winter and possibly the subsequent nesting cycle.

The size, location and habitat quality of sanctuary areas on the Refuge remains critically important to ensure that migrating and wintering populations of waterfowl maintain sound nutritional and physiological status. Overall, it is expected that the maintenance of traditional sanctuary areas on the Refuge adequately mitigates for impacts from hunting activities. In years of particularly poor habitat quality due to climatic extremes or tidal flooding from tropical disturbances, however, it is possible that hunting activities would result in reduced abundance of wintering waterfowl on the Refuge.

Although the impacts of waterfowl hunting on wetland-dependent migratory and resident birds which are not hunted is likely less than for waterfowl, studies have demonstrated that hunting (including accessing hunt areas) does affect abundance and distribution of these other avian species. The noise associated with shooting likely reduces habitat utilization by shorebirds, wading birds, other marsh and waterbirds, and landbirds using wetland habitats within hunt areas, at least while hunting is occurring.

Incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels and based on past history, incidental take is

expected to be small and will not directly or cumulatively impact current or future populations of wildlife on the Refuge.

Means of access to and within Refuge hunt areas include motorized boating (primarily in Oyster, Onion and East Bay bayous and East Galveston Bay), non-motorized boating, motorized vehicles, bicycling, and walking. Motorized boating has been shown to affect the abundance, distribution and habitat use of waterfowl and other birds (Dahlgren and Korschgen 1992, Knight and Cole 1995). Non-motorized boats, vehicles on roads, and walking also have potential to disturb birds and influence distribution and habitat use (Burger 1981, Knight 1984, Klein 1993). Compared to motor and airboats, canoe, kayak and rowboat travel appears to have the least disturbance effects on most wildlife species (Jahn and Hunt 1964). Non-motorized boats can still cause significant disturbance effects based on the ability to penetrate into shallower areas (Speight 1973). Vos *et al.* (1985) reported that slow-moving boats caused disturbance to nesting great blue herons when maneuvering directly below the heronries, where most other boats could not access due to shallow water. Kaiser and Fritzell (1984) reported that green-backed heron activity declined on three of four survey routes when canoes and boat use increased on the main river channel of the Ozark National Scenic Riverway.

Boat use on the Refuge occurs primarily in bayous, canals and ditches, limiting disturbance impacts to these narrow corridors. The majority of the hunt areas therefore are not impacted by boating activity. In addition, a variety of regulations govern means of access to hunt areas, including boat motor and horsepower restrictions, prohibition of airboat and all-terrain vehicle use, and establishment of areas in which only non-motorized boat access is allowed. While these regulations are in place primarily to protect habitats and public safety, they also reduce overall disturbance impacts to waterfowl and other migratory birds.

Other Wildlife-dependent Recreational Uses: A major goal of Anahuac NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. Waterfowl hunting has occurred on the Refuge since 1980, along with other these other recreational uses. Few conflicts among users of the Refuge have been documented in relation to waterfowl hunting. The separation of hunt units from portions of the Refuge open to wildlife observation and photography, fishing, environmental education and interpretation minimizes potential conflicts and reduces safety issues. Hunt units are closed to other public uses during the hunting season and during the remainder of the year once the hunting season has closed. The other priority wildlife-dependent recreational uses are offered on portions of the Refuge that are more easily accessible to the public via refuge roads and trails, enhancing the quality of these opportunities for the public.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

To reduce the impact of hunting on the resident Mottled Duck, modifications may be placed on opening dates for the regular waterfowl season. Season dates on the Refuge will be concurrent with Texas Parks

and Wildlife Department for the September teal season, youth-only season, and duck and coot regular season in the Texas South Zone, and goose regular season in the Texas East Zone, with the exception that hunting for duck (not including the September teal and youth-only seasons) and coot will not be allowed on the Refuge until the last Saturday in October. If the State-specified duck and coot regular season opens later than the last Saturday in October, then hunting on the Refuge will open consistent with the State-specified season date. All waterfowl hunters must follow the stipulations set forth in the waterfowl hunting regulations published annually by the Refuge.

Portions of the East Unit will be open for waterfowl hunting on Saturdays and Sundays of the early teal season, and three days a week (Tuesdays, Saturdays and Sundays) of the regular waterfowl season. Portions of the Middleton Tract will be open for waterfowl hunting daily during the early teal season and three days a week during the regular waterfowl season (Wednesdays, Saturdays and Sundays). The Pace Tract will be open daily during the early teal and regular waterfowl seasons.

These units will be open for waterfowl hunting only, and are closed to public access at other times of the year. All hunts will be morning-only hunts. Hunters may enter Refuge hunt units no earlier than 4:00 am. Hunting is permitted from legal shooting time (1/2 hour before sunrise) until 12:00 pm. Hunters must be off the Refuge hunt units by 12:30 pm. All other refuge units are closed to waterfowl hunting. Long-term, traditional sanctuary areas will remain as sanctuary, with no public access permitted in the unit. Motorized boats are allowed in the Pace Tract, and the ponds located off of Jackson Ditch on the East Unit. Motorized boats on the Middleton Tract are restricted to 25 horsepower or less. Only non-motorized access (via boat or walk-in) is allowed on the East Unit (with the exception of the ponds located off of Jackson Ditch). Bicycles are permitted only on roads open to motorized vehicles and designated levees.

On inland waters of Refuge hunt areas open to motorized boats, the operation of motorized boats is restricted to lakes, ponds, ditches, and other waterways. Motorized boats are prohibited on or through emergent wetland vegetation. In addition, the use of boats powered by air-cooled or radiator-cooled engines is restricted to those powered by a single engine of 25 horsepower or less and utilizing a propeller 9 inches (22.5 cm) in diameter or less. By year 2011, all motorized boats on inland waters of Refuge hunt units will be restricted to 25 hp or less. Boat motor horsepower restrictions would not apply on Oyster Bayou, Onion Bayou and East Bay Bayou. This grace period of 5 years is aimed to provide those hunters currently using boats with a horsepower greater than 25 hp ample time to prepare for this change in regulation. In areas where propellers are damaging submergent vegetation and creating permanent channels in shallow water, no prop zones may also be initiated. Regular monitoring will be required to adequately determine where these zones would best be located. Airboats, marsh buggies, all-terrain vehicles and personal watercraft are prohibited on the Refuge.

A limited number of parties will be permitted to enter the East Unit through the check station by vehicle. No limits are currently in place for numbers of hunters or parties on the Pace and Middleton Tracts. Both the Pace Tract and Middleton Tract are accessed primarily by boat. The remoteness and difficulty accessing these tracts have naturally limited the number of parties hunting in these units. If hunter use in these units increases substantially, thereby negatively impacting the quality of the hunt, an alternative system would be devised to reduce the number of parties using these units.

The use of retrieving dogs will continue to be allowed and encouraged in all areas open to waterfowl hunting for the conservation of downed birds. Dogs must be under the control of handlers at all times.

The Refuge will maintain an active law enforcement presence in an effort to maximize compliance with State and Federal waterfowl hunting regulations. Annual monitoring of hunter use and impacts will be implemented. The information gathered will be used to review and possibly revise hunting regulations to enhance the quality and safety of the Refuge's hunting program, and to ensure that waterfowl hunting activities will continue to be compatible with Refuge purposes and the mission of the National Wildlife Refuge System.

Justification:

The Anahuac NWR waterfowl hunting program is determined to be compatible with the establishment purposes of the Refuge and the mission of the National Wildlife Refuge System. The Refuge provides quality waterfowl habitats for thousands of migratory birds annually. Migratory bird populations and harvest parameters are monitored and managed on a flyway basis and are designed to ensure the long-term sustainability of populations. Additionally, the hunt program on the Refuge is specifically designed to provide quality public hunting opportunities while minimizing potential impacts to local populations of migratory birds and their habitats.

Refuge-specific regulations are in place to minimize potential adverse impacts from hunting-related disturbance to wildlife and habitats. Regulations govern means of access to hunt areas, including boat motor and horsepower restrictions, prohibition of airboat and all-terrain vehicle use, and establishment of areas in which only non-motorized boat access is allowed. Of critical importance is the USFWS' ability to manage and maintain traditional sanctuary areas. The Refuge waterfowl hunt program is also managed in such a way to minimize conflicts with other compatible recreational uses and management programs. The Refuge will continue to monitor hunter use, compliance with rules and regulations, and impacts to waterfowl and other wildlife and use this information to adjust the waterfowl hunt program as necessary to protect Refuge resources.

Hunting is a priority wildlife-dependent public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Waterfowl hunting is a long-standing traditional use on and around Anahuac NWR, and has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving habitat, thereby ultimately contributing to the overall mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andy Loranger 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Baldassarre, G. A. and E. G. Bolen. 1994. Waterfowl Ecology and Management. John Wiley and Sons, Inc.

Bélanger, L. and J. Bédard. 1995. Hunting and waterfowl. Pages 243-256 in R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D. C. 372pp.

Bellrose, F. C. 1954. The value of waterfowl refuges in Illinois. Journal of Wildlife Management 18(2):160-169.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Cons. 21:231-241.

Dahlgren, R. B. and C. E. Korschgen. 1992. Human disturbances of waterfowl: an annotated bibliography. U.S. Fish and Wildlife Service Resource Publication 188. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/disturb/disturb.htm (Version 16JUL97).

Dunton, K. H., S. V. Schonberg, S. Herzka, P. A. Montagna, and S. A. Holt. 1998. Characterization of anthropogenic and natural disturbance on vegetated and unvegetated bay bottom habitats in the Corpus Christi Bay National Estuary Program study area, Volume II: Assessment of scarring in seagrass beds. Corpus Christi Bay National Estuary Program, CCBNEP-25b.

Fleskes, J. P., D. S. Gilmer, and R. L. Jarvis. 2005. Pintail distribution and selection of marsh types at Mendota Wildlife Area during fall and winter. California Fish and Game 91(4):270-285.

Fox, A. D. and J. Madsen. 1997. Behavioral and distributional effects of hunting disturbance on waterbirds in Europe: implications for refuge design. Journal of Applied Ecology 34:1-13.

Heitmeyer, M. E. 1988. Protein costs of the prebasic molt of female mallards. The Condor 90:263-266.

Heitmeyer, M. E., and L. H. Fredrickson. 1981. Do wetland conditions in the Mississippi Delta hardwoods influence mallard recruitment? Trans. North Am. Wildl. Nat. Resour. Conf. 46:44-57.

Heitmeyer, M. E. and D. G. Raveling. 1988. Winter resource use by three species of dabbling ducks in California. Dept. Wildlife and Fisheries Biology, Univ. of Calif., Davis. Final Report to Delta Waterfowl and Wetlands Research Center, Portage La Prairie, Manitoba, Canada. 200pp.

Jackson, R. S. 1961. Home on the Double Bayou. University of Austin Press, Austin, Texas.

Jahn, L. R. and R. A. Hunt. 1964. Duck and coot ecology and management in Wisconsin. Wisconsin Conserv. Dep. Tech. Bull. No. 33. 212pp.

Kaiser, M. S. and E. K. Fritzell. 1984. Effects of river recreationalists on green-backed heron behavior. J. Wildl. Manage. 48(2): 561-567.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21:31-39.

Knight, R. 1984. Responses of wintering bald eagles to boating activity. J. Wildl. Manage. 48(3): 999-1004.

Knight, R. L. and D. N. Cole. 1995. Wildlife responses to recreationalists. Pages 51-69 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

Korschgen, C. E., L. S. George, and W. L. Green. 1985. Disturbance of diving ducks by boaters on a migrational staging area. Wildl. Soc. Bull. 13:290-296.

Lagow, J. 1970. Waterfowl management and harvesting *in* Coastal Land Resources Conference, Galveston, Texas. TAMU-SG-71-101.

Madley, K., J. Krolick, and B. Sargent. 2004. Assessment of boat propeller scar damage within the Greater Charlotte Harbor region. Florida Fish and Wildlife Conservation Commission, St. Petersburg, Florida.

Madsen, J. 1995. Impacts of disturbance on migratory waterfowl. Ibis 137: S67-S74.

Madsen, J. 1998. Experimental refuges for migratory waterfowl in Danish wetlands. II. Tests of hunting disturbance effects. Journal of Applied Ecology 35:398-417.

McNeir, F. W. 1956. Forest McNeir of Texas. The Naylor Co. San Antonio, Texas.

Morton, J. M., R. L. Kirkpatrick, M. R. Vaughan, and D. F. Stauffer. 1989. Habitat use and movements of American black ducks in winter. Journal of Wildlife Management 53(2): 390-400.

Pulich, W., C. Blair and W. A. White. 1997. Current status and historical trends of seagrasses in the Corpus Christi Bay National Estuary Program study area. Corpus Christi Bay National Estuary Program, CCBNEP-20.

Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

Texas Parks and Wildlife Department. (2005). South Texas Wildlife District: Urban Wildlife Management – Texas Wildscapes. Retrieved 11 April 2006 from http://www.tpwd.state.tx.us/landwater/land/habitats/southtx_plain/urban/wildscapes.phtml

Thornburg, D. D. 1973. Diving duck movements on Keokuk Pool, Mississippi River. J. Wildl. Manage. 37(3):382-389.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Vos, D. K., R. A. Ryder, and W. D. Graul. 1985. Response of breeding great blue herons to human disturbance in northcentral Colorado. Colonial Waterbirds. 8(1):13-22.

COMPATIBILITY DETERMINATION: ANAHUAC NWR - DOVE HUNTING

Use: Dove Hunting

Refuge Name: Anahuac National Wildlife Refuge

County: Chambers County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act, Emergency Wetlands Resources Act, Refuge Recreation Act, Fish and Wildlife Act 1956

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act)

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

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Anahuac National Wildlife Refuge (NWR or Refuge) proposes to provide dove hunting opportunities, compatible with Refuge purposes, in designated areas. Hunting is a wildlife-dependent, priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. Dove hunting is a long-standing traditional use in southeast Texas. This Compatibility Determination considers the establishment of dove hunting on the Refuge as proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP)(USFWS 2007).

Dove hunting on Anahuac NWR will be administered through a Cooperative Agreement with Texas Parks and Wildlife Department and their "Short Term Public Hunting Lease Program." Both mourning dove and white-winged dove occur on the Refuge, with mourning dove by far the more prevalent. Opportunities for dove hunting on Anahuac NWR would be available within the State designated season. The Refuge falls within the Texas South Dove Hunting Zone. Dove hunting season in the South Zone generally falls within the period of September to January (the 2006-2007 dove season in the South Zone was open from September 22 through November 16, 2006 and December 26, 2006 through January 12, 2007). Public hunting of dove would be allowed on designated days and times as a "Youth/Adult" hunt area on a designated portion(s) of the Refuge. A "Youth/Adult" hunt program requires that all hunters 18 years of age and older be accompanied by a youth hunter 17 years of age or younger.

Areas open to dove hunting on the Refuge will be determined annually and will be described in the Texas Parks and Wildlife Department Public Dove Hunting Areas Supplement to the Texas Public Hunting Lands Map Booklet. Areas open to dove hunting on the refuge will be in portions of the Refuge associated with or adjacent to lands managed through the Refuge's cooperative farming (rice) program. Means of access to the hunt area(s) will be by foot or motorized vehicle only.

Availability of Resources:

Costs to administer the hunt program will mostly be salaries. This would primarily involve law enforcement throughout the season by Refuge law enforcement staff. Through the Cooperative Agreement with the Texas Parks and Wildlife Department, TPWD staff will provide signage for designated dove hunt areas, and assist in conducting law enforcement activities.

Anticipated Impacts of Use:

The potential impacts of the Anahuac NWR dove hunt program on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and Endangered (T&E) species known to use the Refuge hunt units or areas adjacent to hunt units include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), and American alligator (*Alligator mississippiensis*, Threatened). Of these species, only the American alligator occurs in or adjacent to areas which would be open for dove hunting. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. The refuge dove hunting program would not directly or indirectly impact alligators. They typically feed on wounded or sick waterfowl, and are usually associated with large concentrations of wintering waterfowl that occur in refuge sanctuary areas. Non-toxic shot regulations are actively enforced on the Refuge, and no cases of lead poisoning in eagles scavenging on waterfowl carcasses have been documented on the Refuge. Brown pelicans are sometimes observed flying over the Refuge and along the shoreline of East Bay and the GIWW. These T&E avian species do not nest on the Refuge, their presence is transient in nature, and they are highly mobile and readily able to move to undisturbed areas. Dove hunting activities will not adversely impact any Threatened or Endangered species occurring on the Refuge.

Habitats: Foot traffic in areas open to hunting can lead to vegetation trampling, and in heavy use areas, cause plant mortality. Some vegetation trampling and trailing from hunter foot traffic would occur in designated dove hunt areas, although these impacts would be minimal and short-term.

Migratory Birds and Other Biological Resources: The most direct effect of hunting on the Refuge is the mortality of harvested species resulting from hunting activities. Regulations governing dove harvest in the Central and Mississippi Flyways and the State of Texas are developed annually through the Federal framework process for harvest of migratory birds in the U.S. This process is designed to ensure that viable populations are sustained over the long-term. Anticipated annual dove harvest on the Refuge is expected to number fewer than 250 birds, which represents an extremely small percentage of overall

harvest in Texas and the Central Flyway. Cumulatively, dove harvest on all national wildlife refuges open to dove hunting in Texas and the Central Flyway represents a very small percentage of overall harvest of these species. The establishment of a dove hunting program on the Refuge will not have any measurable effect on overall dove populations and the long-term viability of these populations.

Incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. Incidental take is expected to be small and will not directly or cumulatively impact current or future populations of wildlife on the Refuge.

Although the impacts of dove hunting on birds which are not hunted is likely less than for dove, studies have demonstrated that hunting (including accessing hunt areas) does affect abundance and distribution of other avian species. The noise associated with shooting likely reduces habitat utilization by birds using upland habitats within hunt areas, at least while hunting is occurring.

Means of access to and within Refuge hunt areas may include motorized vehicles and walking. Vehicles on roads and walking have potential to disturb birds and influence distribution and habitat use (Burger 1981, Knight 1984, Klein 1993). Walking tends to displace birds and can cause localized declines in species richness and abundance (Riffell *et al.* 1996). Refuge-specific regulations prohibit off-road vehicular travel and all-terrain vehicle use. Areas open for dove hunting will be located so as to minimize impacts to waterfowl and other migratory birds using adjacent managed wetlands.

Other Wildlife-dependent Recreational Uses: A major goal of Anahuac NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. Waterfowl hunting has occurred on the Refuge since 1980, and few conflicts among between hunters and other users of the Refuge have been documented. No conflicts are expected between dove hunters and other refuge users. The separation of hunt units from portions of the Refuge open to wildlife observation and photography, fishing, environmental education and interpretation minimizes potential conflicts and reduces safety issues. Hunt units are closed to other public uses during the hunting season and during the remainder of the year once the hunting season has closed. The other priority wildlife-dependent recreational uses are offered on portions of the Refuge that are more easily accessible to the public via refuge roads and trails, enhancing the quality of these opportunities for the public.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Dove hunting on Anahuac NWR will be administered through a Cooperative Agreement with the Texas Parks and Wildlife Department and their "Short Term Public Hunting Lease Program." Opportunities for dove hunting on Anahuac NWR would be available within the season set by Texas Parks and Wildlife Department. Public hunting of dove would be allowed on designated days and times as a "Youth/Adult" hunt area on a designated portion(s) of the Refuge.

Dove hunt areas will be determined annually and described in the Texas Parks and Wildlife Department Public Dove Hunting Areas Supplement to the Texas Public Hunting Lands Map Booklet. Location of designated dove hunt areas will be chosen so as to minimize disturbance impacts to waterfowl and other avian species utilizing managed rice field and moist soil habitats.

Means of access to the hunt area(s) will be by foot or motorized vehicle only. All-terrain vehicles are prohibited on the Refuge.

Only non-toxic shot may be used.

The use of retrieving dogs will be allowed and encouraged in all areas open to dove hunting for the conservation of downed birds. Dogs must be under the control of handlers at all times.

The Refuge will maintain an active law enforcement presence in an effort to maximize compliance with State and Federal hunting regulations. Annual monitoring of hunter use and impacts will be implemented. The information gathered will be used to review and possibly revise hunting regulations to enhance the quality and safety of the Refuge's hunting program, and to ensure that hunting activities will continue to be compatible with Refuge purposes and the mission of the National Wildlife Refuge System.

Justification:

The Anahuac NWR proposed dove hunting program is determined to be compatible with the establishment purposes of the Refuge and the mission of the National Wildlife Refuge System. Migratory bird populations and harvest parameters are monitored and managed on a flyway basis and are designed to ensure the long-term sustainability of populations. Additionally, the hunt program on the Refuge will be specifically designed to provide quality public hunting opportunities while minimizing potential impacts to local populations of migratory birds and their habitats.

Regulations govern means of access to hunt area(s), including prohibition of all-terrain vehicle use. The Refuge dove hunt program will also be managed in such a way to minimize conflicts with other compatible recreational uses and management programs. The Refuge will monitor hunter use, compliance with rules and regulations, and impacts to dove and other wildlife and use this information to adjust the hunt program as necessary to protect Refuge resources.

Hunting is a priority wildlife-dependent public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Dove hunting is a long-standing traditional use in southeast Texas, and has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving habitat, thereby ultimately contributing to the overall mission of the National Wildlife Refuge System. Through management as a "Youth/Adult" hunt (all hunters 18 years of age and older must be accompanied by a youth hunter 17 years of age or younger), the dove hunt on Anahuac NWR will provide additional family-oriented recreational opportunity, with a focus on involving and educating youth.

Signature: Refuge Complex Manager: Andrew T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: Chris S 5-4-07
(Signature and Date)

Literature Cited

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Cons. 21:231-241.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21:31-39.

Knight, R. L. 1984. Responses of wintering bald eagles to boating activity. J. Wildl. Manage. 48(3): 999-1004.

Riffell, S. K., K. J. Gutzwiller, and S. H. Anderson. 1996. Does repeated human intrusion cause cumulative declines in avian richness and abundance? Ecol. Appli. 6(2):492-505.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Texas Parks and Wildlife Department. 2005. South Texas Wildlife District: Urban Wildlife Management – Texas Wildscapes. Retrieved 11 April 2006 from http://www.tpwd.state.tx.us/landwater/land/habitats/southtx_plain/urban/wildscapes.phtml

COMPATIBILITY DETERMINATION: ANAHUAC NWR - FISHING

Use: Fishing

Refuge Name: Anahuac National Wildlife Refuge

County: Chambers County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act, Emergency Wetlands Resources Act, Refuge Recreation Act, Fish and Wildlife Act 1956

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act)

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

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Anahuac National Wildlife Refuge (NWR or Refuge) proposes to continue to provide fishing opportunities in designated areas that are compatible with Refuge purposes. Fishing is a wildlife-dependent, priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. It is a wildlife-oriented recreational use and a traditional use of Anahuac NWR. This Compatibility Determination considers continuation of fishing on the Refuge, and includes consideration of modifications to the Refuge fishing program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

Means of access for fishing opportunities on Anahuac NWR are supported by motorized vehicles, walking, and non-motorized boating. Because they are highly interrelated, this compatibility determination includes an assessment of these other activities in conjunction with fishing.

Opportunities for fishing on Anahuac NWR are available year-round. Through the main refuge entrance, anglers have access to East Bay, the East Bay Boat Ramp and the Oyster Bayou Boat Ramp 24 hours a day, seven days a week. Overnight stays are permitted only for the purpose of nighttime fishing along East Galveston Bay, and are restricted to the vehicle pull-offs off of the Frozen Point Road and at the East Bay Boat Ramp parking area. There are no developed camp sites or other camping facilities at these locations (or elsewhere on the Refuge). Nighttime anglers typically sleep in vans or recreational vehicles, as the presence of biting insects generally do not support comfortable outdoor sleeping conditions. Other public use areas on the Refuge are open from one hour before sunrise to one hour after sunset, including the East Bay Bayou Tract. During fiscal year 2002, over 32,000 anglers utilized the Refuge for fishing or crabbing.

Fishing: Both saltwater and freshwater fishing opportunities are available on Anahuac NWR. Saltwater fishing opportunities are focused along the shoreline of East Bay, where many anglers wade fish for prized species including red drum, speckled trout, and flounder. Designated pull-offs along Frozen Point Road provide easy access to the bay. Additionally, anglers may fish along West Line Road, and roadside ditches provide opportunities to catch bait for personal use. Crabbing is a popular activity, especially along West Line Road.

Fishing access is also provided at the end of Frozen Point Road, following the primitive road leading to Oyster Bayou, as well as near Coon Creek (along the south end of Yellow Rail Prairie) and along West Line Road. These areas are designated by signs and open to foot travel only.

Freshwater fishing opportunities are available along East Bay Bayou on the East Bay Bayou Tract. Whether fishing from a non-motorized boat, or along the banks from three small bank piers located on the bayou, anglers here have the opportunity to catch crappie, largemouth bass, gar, bowfin, and channel and blue catfish. Freshwater anglers may also fish along the banks of Shoveler Pond and along the canal from the Oyster Bayou Boat Ramp to the southwest corner of Shoveler Pond for species like gar and catfish.

Additionally, the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex EIS/CCP/LPP (USFWS 2007) proposes to construct an accessible walkway from Frozen Point to East Bay to improve fishing access, and to increase interpretive materials regarding fishery resources.

Boating: Boating is not permitted on inland waters of the Refuge with the exception of the Oyster Bayou Boat Canal, and in designated areas during hunting season. Two boat ramps located on the Refuge provide access to Oyster Bayou and East Bay. Boat ramps facilitate launching of small, shallow-draft boats only. Small, non-motorized boats may be launched on East Bay Bayou at a primitive canoe launch located on the East Bay Bayou Tract. Airboats and personal watercraft are prohibited from launching on the Refuge.

Refuge boat ramps provide access to several area bayous and Galveston Bay, all of which are popular fishing destinations. These ramps are the primary public access points to portions of Oyster Bayou, Onion Bayou, Robinson Bayou and East Bay. Although fishing in these waters takes place off the Refuge, anglers and boaters utilize Refuge facilities, boat ramps and roads to access these areas.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage wildlife-dependent recreational fishing activities at existing and projected levels. Costs associated with this activity are primarily staff time. Refuge law enforcement officers regularly check anglers and crabbers for compliance with State and Refuge regulations. Additional costs involve maintenance to roads, boat ramps, and trails

providing access for fishing. Additional funds would be needed for the proposed construction of an accessible walkway from Frozen Point to East Bay to improve fishing access, and to increase interpretive materials regarding fishery resources. The Refuge would pursue a variety of funding sources in order to fully support this use, including agreements with other agencies, and grant funding and volunteer assistance.

Anticipated Impacts of the Use:

The potential impacts of the Anahuac NWR fishing program on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and Endangered (T&E) species known to use the Refuge include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), and American alligator (*Alligator mississippiensis*, Threatened). It is expected that impacts to these species will be negligible. Bald Eagles are not observed in high numbers on the Refuge. They typically feed on wounded or sick birds, and are usually associated with large concentrations of wintering waterfowl that occur in Refuge sanctuary areas. Brown Pelicans are sometimes observed flying over the Refuge and along the shoreline of East Bay. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. Fishing activities may pose a potential conflict with American alligators, which are attracted to bait used by anglers. Alligators can become accustomed to the presence of anglers and the associated food source, thereby reducing their natural fear of humans and potentially creating a safety hazard. Overall, no impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of fishing on the Refuge.

Fishery Resources: The most direct effect of fishing on the Refuge is the mortality of harvested freshwater and saltwater fish, blue crabs, and several fish and shellfish species caught for use as bait. Fishing and crabbing on the Refuge occur under regulations promulgated by Texas Parks and Wildlife Department. These regulations are designed to ensure that viable fish and shellfish populations are sustained over the long-term. Continuation of fishing and crabbing on the Refuge should not have any measurable effect on overall populations and the long-term viability of these species' populations.

Similarly, the potential exists for over-harvest or illegal harvest of fisheries. Regular law enforcement patrols to ensure compliance with State and Federal regulations will assist in minimizing these potential impacts.

Migratory Birds and other Biological Resources: Some disturbance to wildlife from fishing activities is also expected. Fishing activities may influence the composition of bird communities (Tydeman 1977), as well as distribution, abundance, and productivity of waterbirds (Bell and Austin 1985). Jahn and Hunt (1964 as cited by Dahlgren and Korschgen 1992) reported that increases in recreational activity by anglers, boaters, and shoreline activity appeared to discourage breeding ducks and coots from using otherwise suitable habitat. Bell and Austin (1985) suggested that anglers fishing from the shoreline and boats displaced waterfowl from their preferred feeding and roosting areas and caused wigeon, green-winged teal, pochard and mallard to depart from a 174 ha reservoir prematurely. Cooke (1987) also documented that anglers on the bank and in boats often fished the shallow, sheltered bays and creeks that birds favor and negatively impacted distribution and abundance of waterfowl, grebes, and Eurasian coots. Cooke (1977 as cited by Liddle and Scorgie 1980) suggested that anglers create an area around them within which birds will not venture. Thus, an angler sitting on the shore can effectively exclude birds from his immediate vicinity.

Some disturbance of roosting and feeding shorebirds probably occurs (Burger 1981) but is considered minimal. During north winds, resulting low tides create extensive foraging habitat for shorebirds. Concurrently, however, fishing opportunities are thereby reduced or eliminated as waters become too shallow to fish. In these instances, temporal separation occurs between shorebird use and angler use.

Non-motorized boats, vehicles on roads, and walking also have potential to disturb birds and influence distribution and habitat use (Burger 1981, Knight 1984, Klein 1993). Compared to motor and airboats, canoe, kayak and rowboat travel appears to have the least disturbance effects on most wildlife species (Jahn and Hunt 1964). Non-motorized boats can still cause significant disturbance effects based on the ability to penetrate into shallower areas (Speight 1973). Vos *et al.* (1985) reported that slow-moving boats caused disturbance to nesting great blue herons when maneuvering directly below the heronries, where most other boats could not access due to shallow water. Kaiser and Fritzell (1984) reported that green-backed heron activity declined on three of four survey routes when canoes and boat use increased on the main river channel of the Ozark National Scenic Riverway.

Discarded fishing line and other fishing litter can entangle migratory birds and other wildlife and cause injury or death (Thompson 1969, Gregory 1991).

Additional biological impacts of fishing may include trampling of vegetation. In heavy use areas, this may cause plant mortality and subsequent erosion along shoreline areas (Liddle and Scorgie 1980, Hendee *et al.,* 1990). Smooth cordgrass (*Spartina alterniflora*) plantings are used to slow erosion along the East Bay shoreline. Anglers accessing the shoreline may cause cordgrass mortality through direct foot traffic. Additional law enforcement issues arise from anglers driving vehicles across the salty prairie ridge to access the East Bay shoreline, resulting in plant mortality and erosion. Further education and continued law enforcement will be needed to address this issue. The USFWS, under Refuge Management Alternative D of the Texas Chenier Plain EIS/CCP/LPP (USFWS 2007), proposes to construct an accessible walkway from Frozen Point Road to East Bay. This walkway will improve access to the bay while reducing vegetation impacts currently caused by anglers in this area.

Overnight stays for nighttime fishing along the East Bay shoreline are permitted, but are limited to vehicle pull-offs off of the Frozen Point Road and the East Bay Boat Ramp parking area. There are no developed camp sites or other camping facilities at these locations (or elsewhere on the Refuge). Nighttime anglers will typically sleep in vans or recreational vehicles, as biting insects typically do not support comfortable outdoor sleeping conditions. Because overnight stays are limited to these gravel roadsides, no impacts to vegetation or wildlife are expected from this activity.

Other Wildlife-dependent Recreational Uses: A major goal of Anahuac NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. While areas on the Refuge open to fishing are also open to the other wildlife-dependent recreational uses, few conflicts between fishermen and other users of the Refuge have been documented. At current use levels, fishing occurring concurrently with wildlife observation and photography, environmental education and interpretation on some areas of the Refuge does not appear to detrimentally impact these other uses. However, litter generated from fishing activities could negatively impact the visual experience of refuge visitors (Marion and Lime 1986). Areas on the refuge open to fishing are not open to hunting, which minimizes potential conflicts and reduces safety issues.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible.
_X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

This section identifies the restrictions and regulations necessary to ensure compatibility of fishing on Anahuac NWR.

Fishing and crabbing are allowed in designated areas of the Refuge in accordance with State regulations and subject to Refuge-specific conditions. Fishing and crabbing are permitted along shoreline areas on East Bay, along East Bay Bayou on the East Bay Bayou Tract, along West Line Road, along the canal from the Oyster Bayou Boat Ramp to the southwest corner of Shoveler Pond, and along the banks of Shoveler Pond. Fishing is allowed using pole and line, rod and reel, or hand-held line only. Cast-netting for bait for personal use is permitted along waterways in areas open to the public and along public roads. Trotlines, setlines, jug lines, limb lines, bows and arrows, gigs, spears, and crab traps are prohibited. Spotlighting on the Refuge is illegal except for bay fishing on the shoreline along East Bay. Fishing from water control structures, and the harvesting of frogs and turtles, is prohibited. Harvesting fish and crabs for commercial purposes is prohibited.

Boating is not permitted on inland waters of the Refuge with the exception of the boat canal, and in designated areas during hunting season. Motorized boats may be launched at two boat ramps located on the Refuge providing access to Oyster Bayou and East Bay. Boat ramps facilitate launching of small, shallow-draft boats only. Small, non-motorized boats may be launched on East Bay Bayou at a primitive canoe launch located on the East Bay Bayou Tract, and along the shoreline on East Bay. Airboats and personal watercraft are prohibited from launching on the Refuge.

Overnight stays are permitted only for the purpose of nighttime fishing along East Galveston Bay, and are restricted to vehicle pull-offs on the Frozen Point Road and at the East Bay Boat Ramp parking area.

Continued law enforcement patrols and efforts to educate the public will be necessary to ensure compliance with the above stipulations and State and Federal fishing regulations.

Justification:

Continuation of fishing and crabbing on the Refuge should not have any measurable effects on overall populations of aquatic species and the long-term viability of these species' populations. The Texas Parks and Wildlife Department regularly adopts regulations in response to fish population levels and management needs. These regulations are designed to ensure that viable fish and shellfish populations are sustained over the long-term.

Fishing activities on Anahuac NWR typically occur along the shoreline of East Bay, and along East Bay Bayou. Other areas where fishing occurs on Anahuac NWR include waterways (ditches and canals) along roads and levees, in areas considered to be non-critical habitat for other wildlife. Additional areas of the Refuge remain closed to the public to provide sanctuary areas for wildlife. If fishing activity on Anahuac NWR increases substantially, additional stipulations may be needed to protect habitats and resources. Refuge staff will continue to monitor and evaluate use and associated impacts regularly.

Fishing is a priority wildlife-dependent public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Fishing has been a traditional form of outdoor recreation on the Refuge and in southeast Texas. When conducted in accordance with the stipulations listed herein, fishing would be compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrew T. Lorenzen 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Bell, D. V. and L.W. Austin. 1985. The game-fishing season and its effects on overwintering wildfowl. Biol. Conserv. 33:65-80.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Conserv. 21:231-241.

Cooke, A. S. 1987. Disturbance by anglers of birds at Grafham Water. ITE Symposium 19:15-22.

Dahlgren, R. B. and C. E. Korschgen. 1992. Human disturbances of waterfowl: an annotated bibliography. U.S. Fish and Wildlife Service Resource Publication 188. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/disturb/disturb.htm (Version 16JUL97).

Gregory, M. R. 1991. The Hazards of Persistent Marine Pollution: Drift Plastics and Conservation Islands. J. Royal Soc. New Zealand 21(2): 83-100.

Hendee, J.C., G. H. Stankey, and R. C. Lucas. 1990. Wilderness Management. North American Press, Golden, CO.

Jahn, L. R. and R. A. Hunt. 1964. Duck and coot ecology and management in Wisconsin. Wisconsin Conserv. Dep. Tech. Bull. No. 33. 212pp.

Kaiser, M. S. and E. K. Fritzell. 1984. Effects of river recreationalists on green-backed heron behavior. J. Wildl. Manage. 48(2): 561-567.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21:31-39.

Knight, R. L. 1984. Responses of wintering bald eagles to boating activity. J. Wildl. Manage. 48(3): 999-1004.

Liddle, M. J. and H. R. A. Scorgie. 1980. The effects of recreation on freshwater plants and animals: a review. Biol. Cons. 17:183-206.

Marion, J. L. and D. W. Lime. 1986. Recreational Resource Impacts: Visitor Perceptions and Management Responses. Pp. 239-235. Kulhavy, D.L. and R.N. Conner, Eds. In Wilderness and Natural Areas in the Eastern United States: A Management Challenge. Center for Applied Studies, Austin State Univ., Nacogdoches, TX. 416pp.

Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

Thompson, J. D. 1969. Feeding behavior of diving ducks on Keokuk Pool, Mississippi River. M.S. Thesis, Iowa State Univ., Ames. 79pp.

Tydeman, C. F. 1977. The importance of the close fishing season to breeding bird communities. J. of Environmental Management 5:289-296.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Vos, D. K., R. A. Ryder, and W. D. Graul. 1985. Response of breeding great blue herons to human disturbance in northcentral Colorado. Colonial Waterbirds. 8(1):13-22.

COMPATIBILITY DETERMINATION: ANAHUAC NWR – WILDLIFE OBSERVATION, PHOTOGRAPHY, ENVIRONMENTAL EDUCATION AND INTERPRETATION

Use: Wildlife Observation, Photography, Environmental Education and Interpretation

Refuge Name: Anahuac National Wildlife Refuge

County: Chambers County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act, Emergency Wetlands Resources Act, Refuge Recreation Act, Fish and Wildlife Act 1956

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act)

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

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Anahuac National Wildlife Refuge (NWR or Refuge) proposes to continue to provide wildlife observation, photography, environmental education and interpretation opportunities in designated areas of the Refuge that are compatible with Refuge purposes. These activities are wildlife-dependent, priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The continuation and enhancement of these programs will be addressed in this compatibility determination.

Wildlife Observation and Photography:

Wildlife watching is the most popular activity on Anahuac NWR, with over 42,000 visitors (59% of all visitors) in fiscal year 2002 indicating that wildlife observation was their primary reason for visiting the Refuge. Anahuac NWR offers fourteen miles of graveled roads, a 750 foot accessible boardwalk and photo blind, four miles of trails, and several observation platforms to view and photograph wildlife. Visitors are required to stay on designated roads and trails. Refuge public use areas are open from one hour before sunrise to one hour after sunset daily.

Auto Tour: Most visitors to Anahuac NWR can tour the Refuge and view wildlife from their vehicles. Fourteen miles of roads are open year-round, unless weather conditions make roads impassable. All Refuge roads open to vehicle traffic are available for wildlife observation and photography.

Wildlife Observation Trails: Five designated trails give visitors access to each of the native habitat types found on the Refuge – coastal marsh, coastal prairie, and woodlands, and to intensively managed habitats including moist soil units and rice fields. The Butterfly and Hummingbird Habitat Landscape and Willows Trail are two universally-accessible trails providing viewing opportunities for butterflies, hummingbirds, native flowering plants and prairie grasses, freshwater wetlands and a small coastal woodlot. Benches and observation platforms are located throughout the trails. The Levee Trail leads to an observation deck overlooking moist soil units, and the East Bay Bayou Trail follows the riparian corridor along East Bay Bayou and outlets to rice fields and moist soil units. Yellow Rail Trail, although not a trail, per se, is a designated area of salty prairie meadow that is open for exploration. Naturalist-led walks in the spring offer visitors the best chance to spot the secretive yellow rail that winters here. In addition, the Shoveler Pond Boardwalk is a universally-accessible boardwalk that extends 750 feet into Shoveler Pond, a 220-acre freshwater wetland.

Canoe Trail: A primitive launching pier gives canoeists and kayakers access to a 3.8 mile segment of East Bay Bayou. This stretch of water offers wildlife watching opportunities from a non-motorized boat. Boating is not permitted in inland waters of the Refuge except for the boat canal leading to Oyster Bayou.

Observation Platforms: Five observation platforms are located throughout the Refuge for viewing wildlife. In addition to the observation platform located at the end of the Shoveler Pond boardwalk, a wildlife-friendly overlook made of recycled plastic is also located on Shoveler Pond. Another platform is located on the Levee Trail, overlooking adjacent moist soil units. A covered platform on the East Bay Bayou Tract overlooks rice fields and moist soil units in rotation and an elevated overlook located on East Bay near the East Bay Boat Ramp offers views of the bay and adjacent marsh. These elevated platforms rise several feet above ground level providing refuge visitors an opportunity to see large expanses of habitat and associated wildlife.

Photography Blind: A universally-accessible photography blind is located on the Shoveler Pond Boardwalk, providing opportunities to view and photograph wildlife up close with minimal disturbance.

Other Non-priority Uses in Support of Wildlife Observation and Photography:
Bicycling and horseback riding occur in very limited numbers on the Refuge. Bicycling in support of wildlife observation is permitted on roads open to motorized vehicles only. Because Refuge roads are gravel, conditions for biking are poor, and use is therefore limited. Horseback riding in support of wildlife observation occurs very infrequently on the Refuge. Individuals interested in utilizing horses to view wildlife must stay on designated roads. Horseback riding as an organized trail ride is prohibited.

Environmental Education and Interpretation:

Visitor Information Station: In 2001, the Visitor Information Station (VIS) was constructed at the main entrance of the Refuge. The VIS includes interpretive exhibits and materials focusing on Refuge habitats and wildlife. Volunteers staff the VIS daily throughout the spring and on weekends the remainder of the year, providing information to and answering questions from visitors. In addition, the Friends of Anahuac Refuge manages a small nature store located in the VIS, selling educational materials related to the

natural resources of the Refuge and the surrounding upper Texas coast. All proceeds from the sale of merchandise go towards educational, interpretive, or habitat management needs of the Refuge. The VIS is staffed by Refuge volunteers. As the volunteer program continues to expand, the refuge aims to increase the number of days the VIS is open to the public.

Outdoor Education Program: An Outdoor Education Program on Anahuac NWR developed by the Friends of Anahuac Refuge enables students to learn about the natural world through hands-on educational activities. Designed for students in kindergarten through 5th grade, these programs are free to interested schools, are taught by volunteers, and take place outdoors on the Refuge. During the 2001-2002 school year, over 1,300 students participated in the Outdoor Education Program.

Interpretation: Eight outdoor interpretive signs throughout the Refuge currently describe various aspects of Refuge wildlife and habitats. The Visitor Information Station (VIS) houses a small interpretive exhibit and offers Refuge brochures and bird checklists to visitors. Interpretive tours and programs are provided by Refuge staff and volunteers to interested schools and organizations upon request. During FY02, over 900 individuals participated in interpretive tours of the Refuge.

Special events are held on the Refuge throughout the year to promote an awareness and understanding of the important natural resources found along the upper Texas coast. Family Fishing Day, Youth Waterfowl Expo, and Yellow Rail Walks are held annually.

Additional strategies to support wildlife observation, photography, environmental education and interpretation are identified under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007). These strategies include the addition of information kiosks, interpretive signs, exhibits, an observation platform, brochures, interpretive walks and the installation of a "web-cam". The development of educational programs for middle and high school students, audio-visual programs, Refuge videos, and a self-guided interpretive radio program are also included in these strategies, as well as the construction of a Refuge Complex headquarters and wildlife interpretive center. In addition, an entry fee program is proposed for Refuge visitors.

Availability of Resources:

Direct annual costs to administer these programs and facilities are primarily in the form of staff time. The development of new facilities and programs, as well as the maintenance and upkeep of existing facilities and programs, will be the primary costs associated with wildlife observation, photography, environmental education and interpretation offered on the refuge. Law enforcement support will continue to be necessary to ensure compliance with Refuge regulations. Additional funding will be required before the facilities and programs listed as strategies under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain EIS/CCP/LPP can be fully implemented. Refuge staff will pursue funding options through partnerships with other non-governmental organizations including the Friends of Anahuac Refuge, and pursue grants and matching funds to ensure that these strategies are implemented. The volunteer program on Anahuac NWR plays a significant role in the Refuge's ability to offer the existing programs and facilities on the Refuge, and volunteer support will continue to be critical in the Refuge's ability to fully implement the proposed strategies. The implementation of an entry fee on Anahuac NWR will also assist in covering costs associated with these strategies.

Anticipated Impacts of Use(s):

The potential impacts of the Anahuac NWR wildlife observation, photography, environmental education and interpretation programs on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and Endangered (T&E) species known to use the Refuge include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), and American alligator (*Alligator mississippiensis*, Threatened). It

is expected that impacts to these species will be negligible. Bald Eagles are not observed in high numbers on the Refuge. They typically feed on wounded or sick birds, and are usually associated with large concentrations of wintering waterfowl that occur in refuge sanctuary areas. Brown Pelicans are sometimes observed flying over the Refuge and along the shoreline of East Bay. The most likely impact to Brown Pelicans may occur if visitors disturb birds resting or feeding along the East Bay shoreline. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels and are a primary attraction for wildlife observation. Some disturbance to basking alligators may occur from visitor use. Overall, no significant impacts to Federally-listed T&E species are expected to occur due to wildlife observation, photography, environmental education or interpretation on the Refuge.

Migratory Birds and other Biological Resources: Primary means of access to areas on the Refuge used for wildlife observation and photography include motorized vehicles on Refuge roads open to the public, walking on trails, boardwalks and observation platforms, and non-motorized boating in East Bay Bayou. A very small number of visitors use bicycles on public roads. An even smaller number ride horses on roads. Motorized vehicles and walking are used to access areas used for environmental education and interpretation on Anahuac NWR. Impacts associated with wildlife observation, photography, environmental education and interpretation activities vary based on mode of access. Walking, vehicles on roads, non-motorized boating, bicycling, and horseback riding all have the potential to disturb wildlife and influence distribution and habitat use.

Disturbance of wildlife by visitors is likely to be greatest in concentrated areas of use, including along trails, boardwalks, observation platforms and along roads (Klein 1993). While some species appear to acclimate to vehicular traffic, and even presence of visitors on trails, boardwalks, and observation platforms, other species are less tolerant of disturbance. Overall it is likely that species composition and abundance is decreased in areas supporting these recreational uses. However, by concentrating disturbances to these designated areas which constitute a very small portion of the Refuge, large and extensive tracts of undisturbed habitat remain available for wildlife throughout the Refuge.

Disturbance impacts to birds from visitation are often magnified during the breeding season. Color of clothing worn can attract or repel different passerine species based on breeding plumages of those species (Gutzwiller and Marcum 1997). Primary song occurrence and consistency of certain passerines can be impacted by a single visitor (Gutzwiller *et al.* 1994). Human disturbance may also limit the number of breeding pairs and production of certain passerine species (Reijnen and Foppen 1994). Predation on songbird, raptor, colonial nesting species and waterfowl nests tends to increase near more frequently visited areas (Dwernychuk and Boag 1972, Buckley and Buckley 1978, Lenington 1979, Boyle and Samson 1985, Miller *et al.* 1998). Glinski (1976) suggests that attracting wildlife using taped vocalizations may increase energy expenditures of wildlife, disrupt territory establishment, and increase susceptibility to predation.

In general, activities that occur outside of vehicles (along walking trails, etc), tend to increase disturbance potential for most wildlife species (Burger 1981, Klein 1993, Gabrielsen and Smith 1995). In wetland habitats, disturbance from out of vehicle approaches can reduce the time spent foraging or even cause avoidance of areas disturbed (Klein 1993). Similarly, walking tends to displace birds and can cause localized declines in species richness and abundance (Riffell *et al.* 1996).

On Yellow Rail Prairie, visitors are allowed to access a 10-acre area in an attempt to flush and view yellow rails. This is accomplished by walking slowly through the area, and is most successful when groups of people slowly walk parallel to each other dragging a rope in between participants. This activity occurs primarily during the months of March and April, and includes several guided “Yellow Rail Walks” led by Refuge staff or trained volunteers. Disturbance of rails flushed during this activity undoubtedly occurs and possibly leads to reduced utilization of this area by rails. Suitable undisturbed habitats exist adjacent to this site, and it is unlikely that this disturbance results in long-term negative impacts to individual rails or rail populations.

Walking with pets can cause additional disturbances to wildlife. Pets are known to both chase and kill wildlife (George 1974, Lowry and McArthur 1978). The greatest increase in heart rates of bighorn sheep occurred when approached by humans with a dog (MacArthur *et al.* 1982). Prairie chickens showed a stronger fear response to domestic dogs than to native predators such as foxes (Hamerstrom *et al.* 1965).

Vehicular use along the auto tour can impact Refuge wildlife and habitats directly or indirectly. Vehicles can cause wildlife mortality through direct impact (Dowler and Swanson 1982, Adams and Geis 1983, Rosen and Lowe 1994, Ashley and Robinson 1996). Reptiles are most likely to be impacted by vehicles as they sun themselves on or cross Refuge roads; however birds, mammals and amphibians are also susceptible. Vehicles can also cause disturbance to wildlife. Noise, vibration and visual stimuli may cause animals to avoid the vicinity of roads, and noise may mask communications (Busnel 1978, Zande *et al.* 1980, Reijnen and Foppen 1994, Spellerberg 1998). Although vehicles themselves can cause wildlife disturbance, wildlife often habituate to the presence of slow moving vehicles which ultimately can act as viewing blinds for those within.

Compared to motor and airboats, canoe, kayak and rowboat travel appears to have the least disturbance effects on most wildlife species (Jahn and Hunt 1964). Non-motorized boats can still cause significant disturbance effects based on the ability to penetrate into shallower areas (Speight 1973). Vos *et al.* (1985) reported that slow-moving boats caused disturbance to nesting great blue herons when maneuvering directly below the heronries, where most other boats could not access due to shallow water. Kaiser and Fritzell (1984) reported that green-backed heron activity declined on three of four survey routes when canoes and boat use increased on the main river channel of the Ozark National Scenic Riverway.

Disturbance impacts caused by wildlife photographers tend to be greater than other wildlife observation techniques (Klein 1993, Morton 1995, Dobb 1998). Photographers are much more likely to leave their vehicles and approach wildlife on foot (Klein 1993). Other impacts include the potential for photographers to remain close to wildlife for extended periods of time in an attempt to habituate the wildlife subject to their presence (Dobb 1998) and the tendency of casual photographers with low power lenses to get much closer to their subject than other activities would require (Morton 1995).

Litter improperly discarded by visitors can entangle wildlife or be ingested, potentially resulting in injury or death (Gregory 1991). Efforts to educate the public about such issues are incorporated into outreach efforts and educational programs.

Impacts related to horseback riding may include exotic plant seed dispersal (Hammitt and Cole 1987), soil compaction and erosion (Bainbridge 1974, Hammitt and Cole 1987, Hendee *et al.* 1990) aesthetic concerns relative to horse manure (Lee 1975), direct wildlife disturbance (Owen 1973, Carlson and McLean 1996), and potential conflicts with other recreational users. As horseback riding is limited to refuge gravel roads, and use is very low, these impacts are negligible.

The above impacts are minimized on the Refuge by locating public use facilities away from sensitive areas, restricting public access to existing roads and trails, and through the strategic placement of trails, observation decks, boardwalks, and photography blinds. While some disturbance impacts occur along these linear corridors, extensive tracts of undisturbed habitats remain available for wildlife in areas adjacent to public use facilities and throughout the Refuge. Additionally, impacts are minimized through development and active enforcement of refuge-specific rules and regulations, including emergency closures if warranted, and through educational materials made available to the visiting public. As of result of active management of these wildlife-dependent recreational uses, direct, indirect and cumulative impacts to migratory birds and other biological resources from these uses remain at acceptable levels and will not affect the viability of any fish, wildlife or plant population on the Refuge.

Other Wildlife-dependent Recreational Uses: A major goal of Anahuac NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. While all uses except hunting do occur concurrently on the portions of the refuge open

to the public, few conflicts between users have been documented. Areas on the refuge open to hunting are not open for these other uses, thereby eliminating potential conflicts and safety issues.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Stipulations designed to ensure compatibility for wildlife observation, photography, environmental education and interpretive programs outlined in the description of use section should minimize impacts to a point where these activities would be compatible with the purposes established for Anahuac NWR.

Designated refuge public use areas are open from one hour before sunrise to one hour after sunset daily. Access to the East Bay Boat Ramp, Oyster Bayou Boat Ramp, and East Bay shoreline for fishing is provided 24 hours a day along designated roads.

Although wildlife observation, photography, environmental education and interpretation occur via several different modes of access, all users must stay on designated roads and trails.

Yellow Rail Prairie, although lacking a clearly marked trail, is a designated 10-acre area that has been identified as the area of use. Due to the difficulty in walking on foot through this salty prairie meadow and adjacent marsh, limited use has occurred here outside of naturalist-led walks offered in the spring. Monitoring of use will continue to occur in this area, and if use begins to expand beyond the designated 10-acre area, clearly-defined use areas will be identified.

Boating is prohibited in inland waters of the Refuge (with the exception of some inland waters within designated hunt units during the waterfowl hunting season). All-terrain vehicles and off-road vehicle travel are prohibited. Airboats and personal watercraft are prohibited from launching on the Refuge.

Bicycling and horseback riding in support of wildlife observation is permitted on gravel roads only. Horseback riding as an organized trail ride is prohibited.

Recordings to attract wildlife are prohibited. Collection of plants or animals, or feeding or disturbing wildlife, is prohibited. Pets must be leashed at all times.

Public use trends and associated impacts from human activity will continue to be monitored. If significant increases in use occur, and/or if impacts to resources are determined significant, the program will be reevaluated and modified as necessary to ensure compatibility.

Justification:

These programs are determined to be compatible with the establishment purposes of the Refuge and the mission of the National Wildlife Refuge System. Wildlife observation, photography, environmental education and interpretation are wildlife-dependent, priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to

provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Facilities and activities related to wildlife observation, photography, environmental education and interpretation occur in designated areas of the Refuge, leaving large areas of undisturbed habitat available for wildlife. The stipulations outlined above are specifically designed to and should minimize potential impacts of these activities. The Refuge will continue to monitor uses and adjust programs as necessary to protect Refuge resources. The educational benefits gained from these activities are expected to outweigh their associated impacts. Providing opportunities for wildlife observation, photography, environmental education and interpretation has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving habitat, thereby further contributing to the overall mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andre T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: 5-4-07
(Signature and Date)

Literature Cited:

Adams, L. W. and A. D. Geis. 1983. Effects of roads on small mammals. J. Appl. Ecol. 20(2):403-415.

Ashley, E. P., and J. T. Robinson. 1996. Road mortality of amphibians, reptiles and other wildlife on the Long Point causeway, Lake Erie, Ontario. Canadian Field-Naturalist 110:403-412.

Bainbridge, D.A. 1974. Trail Management. Bulletin of the Ecological Society of America. 55:8-10.

Boyle, S. A. and F. B. Samson. 1985. Effects of nonconsumptive recreation on wildlife: a review. Wildl. Soc. Bull. 13(2): 110-116.

Buckley, P. A. and F. G. Buckley. 1978. Guidelines for protection and management of colonially nesting waterbirds. North Atlantic Regional Office, National Park Service, Boston, MA. 52pp.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Cons. 21:231-241.

Busnel, R. (Ed). 1978. Effects of Noise on Wildlife. Fletcher, J.L. and R.G. Busnel eds. Academic Press, New York.

Carlson, B. A. and E. B. McLean. 1996. Buffer zones and disturbance types as predictors of fledging success in great blue herons, *Ardea herodias*. Colonial Waterbirds 19(1): 124-127.

Dobb, E. 1998. Reality check: the debate behind the lens. Audubon: Jan.-Feb.

Dowler, R. C. and G. A. Swanson. 1982. High mortality of Cedar Waxwings associated with highway plantings. Wilson Bull. 94: 602-603.

Dwernychuk, L. W. and D. A. Boag. 1972. How vegetative cover protects duck nests from egg-eating birds. J. Wildl. Manage. 36:955-958.

Gabrielsen, G. W. and E. N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

George, W. G. 1974. Domestic cats as predators and factors in winter shortages of raptor prey. Wilson Bulletin 86(4):384-396.

Glinski, R. L. 1976. Birdwatching Etiquette: the need for a developing philosophy. Am. Bird 30(3):655-657.

Gregory, M. R. 1991. The hazards of persistent marine pollution: Drift plastics and conservation islands. J. Royal Soc. New Zealand. 21(2):83-100.

Gutzwiller, K. J. and H. A. Marcum. 1997. Bird reactions to observer clothing color: applications for distance sampling techniques. J. Wildl. Manage. 61:935-947.

Gutzwiller, K. J., R. T. Wiedenmann, K. L. Clements, and S. H. Anderson. 1994. Effects of human intrusion on song occurrence and singing consistency in subalpine birds. The Auk 111(1):28-37.

Hamerstrom, F., D. D. Berger, and F. N. Hamerstrom Jr. 1965. The effect of mammals on prairie chickens on booming grounds. Journal of Wildlife Management 29:536-542.

Hammitt, W. E. and D. N. Cole. 1987. Wildland recreation: ecology and management. John Wiley and Sons, New York, NY. 341 pp.

Hendee, J.C., G. H. Stankey, and R. C. Lucas. 1990. Wilderness Management. North American Press, Golden, CO.

Jahn, L. R. and R. A. Hunt. 1964. Duck and coot ecology and management in Wisconsin. Wisconsin Conserv. Dep. Tech. Bull. No.33 212pp. http://digital.library.wisc.edu/1711.dl/EcoNatRes.DNRBull33

Kaiser, M. S. and E. K. Fritzell. 1984. Effects of river recreationalists on green-backed heron behavior. J. Wildl. Manage. 48(2): 561-567.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21(1):31-39.

Lee, R. G. 1975. The management of human components in the Yosemite National Park ecosystem. Yosemite National Park, CA. 134 pp.

Lenington, S. 1979. Predators and blackbirds: The "uncertainty principle" in field biology. The Auk 96:190-192.

Lowry, D. A. and K. L. McArthur. 1978. Domestic dogs as predators on deer. Wildlife Society Bulletin 6:38-39.

MacArthur, R. A., V. Geist, and R. H. Johnston. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. Journal of Wildlife Management 46:351-358.

Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. Ecological Applic. 8(1):162-169.

Morton, J. M. 1995. Management of human disturbance and its effects on waterfowl. Pages F59-F86 *in* W. R. Whitman, T. Strange, L. Widjeskog, R. Whittemore, P. Kehoe, and L. Roberts (eds.). Waterfowl habitat restoration, enhancement and management in the Atlantic Flyway. Third Ed. Environmental Manage. Comm., Atlantic Flyway Council Techn. Sect., and Delaware Div. Fish and Wildl., Dover, DE. 1114pp.

Owen, M. 1973. The management of grassland areas for wintering geese. Wildfowl. 24:123-130.

Reijnen, R. and R. Foppen. 1994. The effects of car traffic on breeding bird populations in woodland. I. Evidence of reduced habitat quality for willow warblers (*Phylloscopus trochilus*) breeding close to a highway. J. Applied Ecol. 31(1):85-94.

Riffell, S. K., K. J. Gutzwiller, and S. H. Anderson. 1996. Does repeated human intrusion cause cumulative declines in avian richness and abundance? Ecol. Appli. 6(2):492-505.

Rosen, P. C. and C. H. Lowe. 1994. Highway mortality of snakes in the Sonoran Desert of southern Arizona. Biol. Conserv. 68:143-148.

Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

Spellerberg, I. F. 1998. Ecological effects of roads and traffic: a literature review. Global Ecology and Biogeography Letters. 7(5):317-333.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Vos, D. K., R. A. Ryder, and W. D. Graul. 1985. Response of breeding great blue herons to human disturbance in northcentral Colorado. Colonial Waterbirds. 8(1):13-22.

Zande, A. N. van der, W. J. ter Keurs, and W. J. Van der Weijden. 1980. The impact of roads on the densities of four bird species in an open field habitat – evidence of a long-distance effect. Biol. Conserv. 18:299-321.

COMPATIBILITY DETERMINATION: ANAHUAC NWR – CONTROLLED LIVESTOCK GRAZING

Use: Controlled Livestock Grazing

Refuge Name: Anahuac National Wildlife Refuge

County: Chambers County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act, Emergency Wetlands Resources Act, Refuge Recreation Act, Fish and Wildlife Act of 1956

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act)

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

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Anahuac National Wildlife Refuge (NWR) proposes to continue the controlled grazing program in designated areas of the Refuge. Grazing is a refuge economic use which provides an important tool for management of Refuge habitats. This Compatibility Determination considers continuation of the controlled grazing program on the Refuge, and includes consideration of modifications to the program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

Cattle grazing is an inexpensive, dependable, and effective tool used to accomplish Refuge goals, specifically for management of migratory birds including wintering and resident waterfowl, shorebirds and

wading birds. Grazing is used to: 1) open up dense vegetation; 2) depress perennial plants; 3) encourage growth of annual grasses and sedges; and 4) reduce tall, rank grass types and encourage creeping grass species. This program is implemented to encourage a mosaic of heavily, moderately, and ungrazed areas to provide habitats in multiple successional stages on the Refuge.

The grazing program on Anahuac NWR is a cow-calf operation with some bulls introduced for breeding. The cow bloodline is a mixed breed of Zebu ancestry, with Brahma, Angus or Charolais bulls used for breeding. Using a graze-rest strategy, permittees typically graze coastal marshes during the cool season, generally October through April and non-saline uplands during the warm season. An average of 11,501 (range 8,884 – 14,451) animal unit months (AUMs) occurred annually on Anahuac NWR between FY 1998-2005. Grazing strategies include variations in stocking rates, timing (cool vs. warm season) and duration. Stocking rates and rotations are determined annually according to management objectives for the various grazing units and the quantity and condition of forage in those units, and are often influenced by the availability of freshwater.

Grazing does not take place uniformly across units, particularly in coastal marshes. Cattle tend to concentrate grazing pressure adjacent to upland areas with decreased grazing pressure with increasing distance from high ground. Acres grazed and grazing pressure varies from year to year. In FY 2005, a typical year, approximately 20,954 acres was open to grazing, though cattle only utilized an estimated 12,250 acres.

Prescribed burning is an integral part of using cattle to meet management objectives. Fire can be used to create favorable foraging conditions for cattle and focus grazing pressure. Excluding high priority uplands, such as salty prairie sites, from burning can reduce grazing pressure where it is less desirable while focusing it on adjacent wetlands.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage the grazing program at existing and projected levels. Costs associated with this activity are primarily staff time. Some additional expenses are incurred through site preparation work required to protect grazing infrastructure from fire operations. The cost of new or replaced infrastructure is shared between the permittee and the USFWS.

Anticipated Impacts of Use:

Controlled grazing can be an effective and inexpensive tool in wetland and grassland management providing habitat components that benefit waterfowl and other wildlife species. The relation of cattle grazing to wildlife varies considerably, depending on stocking rate, seasonality, plant community, and wildlife concerned (Chabreck 1968). Research indicates that dual use of grasslands by wildlife and livestock is often compatible when livestock grazing is carefully managed and wildlife needs are considered (Holechek 1982).

Threatened and Endangered Species: Federally-listed Threatened and Endangered species (T&E species) known to use Refuge habitats include bald eagle (*Haliaeetus leucocephalus*, threatened), brown pelican (*Pelecanus occidentalis*, endangered), and American alligator (*Alligator mississippiensis*, threatened). Bald Eagles are not observed in high numbers on the Refuge. They typically feed on wounded or sick birds, and are usually associated with large concentrations of wintering waterfowl that occur in Refuge sanctuary areas. Brown Pelicans are sometimes observed flying over the Refuge and along the shoreline of East Bay. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. No impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of the grazing program on the Refuge.

Habitats: Grazing (integrated with fire and water management) in wetland habitats on the Refuge promotes the germination, growth and reproduction of several “early successional” target plant

communities which are especially beneficial to migratory birds as food sources (Allen 1956, Gosselink *et al.* 1979). Target plant communities in intermediate and brackish marsh habitats on the Refuge include olney bulrush (*Scirpus americanus*), saltmarsh bulrush (Scirpus robustus), seashore paspalum (*Paspalum vaginatum*), seashore saltgrass (*Distichlis spicata*) and annual grasses including millets (*Echinochloa* spp.) and sprangletops (*Leptochloa* spp.), several sedges, and several annual forbs such as purple ammenia (*Ammania coccinea*). Moderate grazing following burns in marshes also prolongs the availability of new grass shoots, a valuable food for snow geese (Gosselink *et al.* 1979). Grazing also helps provide optimal physical structure of vegetation for waterfowl utilization in emergent marshes and other vegetated wetlands (flooded moist soil and rice fields) by creating openings in otherwise dense stands of vegetation and maintaining plant communities such as seashore paspalum which grow low to the ground. These conditions also provide excellent habitat for many invertebrate species, another important food source for waterfowl and other migratory birds. Proper grazing of salty prairie seems to produce favorable nesting structure for Mottled Ducks.

Savory and Butterfield (1998) make an important distinction between what they call brittle and non-brittle landscapes. Brittleness is a term used to describe ecosystem resilience to disturbance and forms a continuum from brittle to non-brittle. Non-brittle environments have relatively high, evenly distributed rainfall, rapid recycling of nutrients through decaying plant and animal material and active microorganisms. Brittle environments tend to dry out quickly, have low nutrient recycling and low microorganism activity. Coastal marshes of the upper Texas coast are very much toward the non-brittle end of the spectrum. These marshes experience high annual rainfall distributed throughout the year, a long growing season, very fast nutrient recycling, and vegetation recoveries quickly following disturbances. These conditions require protracted disturbance events, such as grazing, to maintain early successional conditions for any length of time.

Studies conducted on Sabine National Wildlife Refuge in Cameron Parish, Louisiana (Valentine 1961) determined that increased grazing can change tall climax marshhay cordgrass stands to more diverse community such as seashore paspalum, Setaria, and longtom (*Paspalum lividum*), that are more beneficial to certain types of wildlife. Depending on site conditions (elevation, soil, and hydrology) annual grasses and forbs (including millets, fall Panicum (*Panicum dichotomiflorum*), sprangletop, and Setaria) can be produced through proper grazing.

Pate (2001) found that grazed marshes remained in a sub-climax state, while habitat within grazing exclosures reverted to marshhay cordgrass. At the onset of the study Spartina spp. made up 20% of the plant community, while seashore paspalum comprised 80%. By the end of the study, communities within grazing exclosures changed to 65% Spartina spp. and 25% seashore paspalum. In contrast, the grazed area maintained high cover of seashore paspalum throughout the study. Seashore paspalum provides habitat for many species of waterfowl, wading birds and shorebirds, depending on hydrology, while marshhay cordgrass largely precludes these species.

The detrimental affects of grazing in coastal marsh environments includes the risk of overgrazing if units are not closely monitored, bank erosion, excessive trampling of vegetation, compaction of soils reducing percolation rates, and the deposition of nutrients in the form of manure in areas where livestock concentrate (USFWS 1994). Warm-season grazing of wetland areas can reduce seed production of annual grasses (Chabreck1968).

Prairie ecosystems in North America are adapted to episodic short duration and high intensity grazing followed by periods of rest, as bison and other native herbivores concentrated on recently burned areas feeding on new growth and moved on to new recently burned areas as the vegetation matured. Fire and grazing regimes generated a mosaic of prairie habitats, ranging from recently burned and heavily grazed areas to areas with mature grassland plant communities with no recent history of fire or grazing. On a landscape level, this diverse habitat mosaic supported a wide variety of grassland-dependent wildlife species. Fuhlendorf and Engle (2001, 2004) found that the strategic application of fire can focus grazing pressure and that shifting burned patches spatially and temporally creates landscape level habitat heterogeneity that benefits grassland-dependent flora and fauna.

Overgrazing in prairie habitats, usually caused by prolonged moderate to heavy grazing during warm season, can reduce native prairie plant diversity. While prairie ecosystems are adapted to short duration high intensity grazing patterns, grazing over extended periods can reduce native grasses and some native forbs, particularly those that are more palatable and are preferentially selected by livestock. To lessen this impact, the Refuge grazing program will incorporate more short duration, high intensity grazing regimes on upland grazing units. Lastly, soil disturbance by excessive hoof action can provide conditions favorable for establishment of exotic and invasive plant species such as Chinese tallow, and cattle can spread seed of undesirable plant species by physically carrying them or ingesting them. Increased monitoring and expanded invasive species control efforts may be needed to counter these impacts.

Migratory Birds and Other Biological Resources: Proper grazing can promote habitat for snow geese, puddle ducks, Wilson's snipe and rails (Chabreck 1968). Chabreck notes that anything more than light grazing would be detrimental to muskrats. Yeargan (2001) determined that the number of shorebirds, herons and egrets was greater in grazed than ungrazed marshes on Galveston Island, Texas, while the number of gulls, terns, sparrows, rails and other species was not different. Mizell (1998) studied wintering yellow rails on Anahuac NWR and suggested that cattle grazing may increase availability of yellow rail habitat.

Management tools used to set back plant succession (grazing, fire, mechanical disturbance, and herbicides) benefit most wetland-dependent species. The extent to which these tools are applied can be detrimental to some species, while benefiting others. An example of this would be an intensive grazing regime that reduces emergent wetland vegetation, benefiting waterfowl, shorebirds and wading birds, but detrimental to species desiring ranker conditions, such as sedge wrens and seaside sparrows. In the practical application of a tool like grazing, the available herd is focused in certain areas to achieve the moderate grazing regime desired, leaving large areas lightly grazed or ungrazed to the benefit of the species desiring the cover of emergent vegetation. Neither intensive grazing nor the lack of grazing is desired over the whole Refuge. Rather, a mosaic of heavily, moderately, and ungrazed habitats is the target of the grazing management program on the Refuge.

Wildlife-Dependent Recreational Uses: A major goal of Anahuac NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. Conflicts can occur between these uses and the controlled livestock grazing program, but conflicts and potential safety issues are minimized through management which includes regular and recurring maintenance of infrastructure (fences, gates, and cattleguards). In addition, grazing is excluded from refuge units supporting trails, boardwalks, observation platforms and other infrastructure used for wildlife observation and photography, environmental education and interpretation. Grazing units and refuge hunt areas do overlap without negative impacts to either program.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The controlled grazing program provides the Refuge with a management tool to improve habitat quality for migratory birds. The grazing program must assist the Refuge in meeting management objectives.

The grazing program is governed through the issuance of Special Use Permits to permittees. Stipulations necessary to ensure compatibility with Refuge establishment purposes and the mission of the NWRS are included as the Special Conditions of the Special Use Permit. Permittees must adhere to all conditions set forth in Special Use Permit, including the following:

Permittees will graze cattle in only designated locations of the Refuge. Stocking rates and pasture rotations will be specified by the Refuge Manager.

The Refuge Manager must be notified in advance of any introduction or removal of cattle. Permittees must annually provide a written record of cattle numbers and movements on an off the Refuge. Fences, gates, and cattleguards must be maintained by the Permittee with materials provided by the Refuge.

Permittees must comply with all state and federal livestock health laws.

Refuge staff and grazing permittees must continually monitor habitat conditions and communicate throughout the adaptive management cycle. Factors such as stocking rate, duration, and seasonality must be adjusted as necessary to meet Refuge objectives under changing environmental conditions. To be successful, all participants must understand successional relationships of plant communities and effects of decisions under changing environmental conditions to keep the program aligned with Refuge goals and management objectives. Both short- and long-term monitoring of grazing impacts on Refuge habitats is needed to guide this adaptive management approach.

Justification:

Controlled cattle grazing is an inexpensive, dependable, and effective tool for managing habitats on Anahuac National Wildlife Refuge. Applications of other disturbance tools, such as fire, are strongly influenced by weather conditions and numerous regulatory restrictions and are less likely to be available when needed. Grazing is a management tool that, in most instances, can be more dependably implemented to assist in maintaining habitat diversity by creating sub-climax vegetative conditions. This habitat diversity is critical to maintaining natural biological diversity on the Refuge. In the Refuge's coastal marshes, properly applied controlled grazing creates high quality habitat for wintering and resident waterfowl, shorebirds, wading birds and other migratory birds. High, well-distributed rainfall, rapid decomposition and recycling of nutrients, and long growing seasons makes coastal marshes a less brittle ecosystem (Savory and Butterfield 1998). When properly managed, there are few detrimental effects of grazing coastal marshes, most being aesthetic in nature. When conducted in accordance with the stipulations listed herein, controlled cattle grazing is compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Audrey J. Lorenzo 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Allan, P. F. 1956. A system for evaluating coastal marshes as duck winter range. Journal of Wildlife Management 20(3):247-252.

Chabreck, R. H. 1968. The relation of cattle and cattle grazing to marsh wildlife and plants in Louisiana. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 22:55-58.

Fuhlendorf, S. D. and D. M. Engle. 2001. Restoring heterogeneity on rangelands: Ecosystem management based on evolutionary grazing patterns. Bioscience 51(8): 625-632.

Fuhlendorf, S. D. and D. M. Engle. 2004. Application of the fire-grazing interaction to restore a shifting mosaic on tallgrass prairie. Journal of Applied Ecology 41:604-614.

Gosselink, J.G., C.L. Cordes, and J.W. Parsons. 1979. An ecological characterization study of the Chenier Plain coastal ecosystem of Louisiana and Texas. 3 vols. U.S. Fish and Wildlife Service, Office of Biological Services. USFWS/OBS-78/9 through 78/11.

Holechek, J. L. 1982. Manipulation of grazing to improve or maintain wildlife habitat. Wildlife Society Bulletin 10:204-210.

Mizell, K. L. 1998. Effects of fire and grazing on yellow rail habitat in a Texas coastal marsh. Dissertation, Texas A&M University.

Pate, J. 2001. Effects of cattle grazing on vegetation and wildlife resources at Sabine National Wildlife Refuge. USDA Natural Resources Conservation Services. 21p.

Savory, A. and J. Butterfield. 1998. Holistic Resource Management, A New Framework for Decision Making. Island Press, Washington, DC, USA.

U.S. Fish and Wildlife Service. 1994. Final Environmental Assessment of Alternatives for Management of Grasslands on the Anahuac National Wildlife Refuge Complex, Chambers and Jefferson counties, Texas.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Valentine, J. M. 1961. Grazing on the Sabine National Wildlife Refuge. Unpublished report, Bureau of Sport Fisheries and Wildlife, Lafayette, Louisiana.

Yeargan, C. A. 2001. The effects of cattle grazing on Texas coastal saltmarsh plants and birds. Thesis, Texas A&M University.

COMPATIBILITY DETERMINATION: ANAHUAC NWR – COOPERATIVE RICE FARMING PROGRAM

Use: Cooperative Rice Farming Program

Refuge Name: Anahuac National Wildlife Refuge

County: Chambers County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act, Emergency Wetlands Resources Act, Refuge Recreation Act, Fish and Wildlife Act of 1956

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act)

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

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Anahuac National Wildlife Refuge (NWR or Refuge) proposes to continue the cooperative rice farming program in designated areas that are compatible with Refuge purposes. Farming on the Refuge is accomplished through cooperative agreements with local farmers. This is an economic use of Refuge lands and provides a critical tool for Refuge management. Rice farming provides shallow freshwater wetland habitat, primarily for wintering and migrating migratory birds. This Compatibility Determination considers continuation of cooperative rice farming program on Anahuac NWR as proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

The Refuge has agreements with three local farmers who farm rice on approximately 500 to 700 acres annually on a three-year rotation, leaving approximately 1,000 to 1,200 acres of the Refuge farm as "maintenance" acreage. The farmers are required to disc, spray, or mow noxious weeds on all maintenance acres each year according the USDA farm program. Cooperators are allowed to take the first rice crop and are required to maintain levees and flood fields after harvest. Generally rice is harvested in September or October. Several farmers have produced organically grown rice on the Refuge during the past ten years. Today almost 80% of the rice produced on the Refuge is organically grown. Organically produced rice reduces the overall input of pesticides on the Refuge.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage the cooperative rice farming program at existing and projected levels. Costs associated with this activity are primarily staff time.

Anticipated Impacts of Use:

Threatened and Endangered Species: Federally-listed Threatened and Endangered species (T&E species) known to use Refuge habitats include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), and American alligator (*Alligator mississippiensis*, Threatened). Bald Eagles are not observed in high numbers on the Refuge. They typically feed on wounded or sick birds, and are usually associated with large concentrations of wintering waterfowl that occur in Refuge sanctuary areas. Rice fields that support large numbers of wintering waterfowl may provide foraging habitat for bald eagles. Brown Pelicans are sometimes observed flying over the Refuge and along the shoreline of East Bay. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. The cooperative rice farming program should pose no threat to alligators on the Refuge. Overall, no impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of the cooperative rice farming program on the Refuge.

Migratory Birds and other Biological Resources: The cooperative rice farming program on Anahuac NWR provides shallow freshwater wetland habitat and serves several management outcomes for migratory bird management on the Refuge: creating forage for migrating and wintering waterfowl, habitat for migrating shorebirds, and fresh water habitat for breeding and brood rearing king rails, Mottled Ducks and fulvous and black-bellied whistling ducks. Fields are prepared and planted in the spring, providing hundreds of acres of bare ground and shallow water habitat for migrating shorebirds. During the summer, irrigated fields and associated canals and drains provides emergent wetland nesting habitat commonly used by purple gallinules, fulvous whistling-ducks, king rails, common moorhens and least bitterns (Pierluissi 2006). Rice fields and infrastructure often provide the majority of freshwater nesting habitat for some of these species on the Refuge during drought years when sources of fresh water are a limiting factor. Flooding after harvest makes existing waste grain available to waterfowl and often produces a second crop of rice, which is also left for wildlife. During migration and wintering periods, waterfowl and waterbirds extensively use post-harvest rice fields that were cultivated and at least partially flooded (Czech and Parsons 2002). During the winter, flooded rice fields can provide waterbird habitat similar to natural wetlands (Elphick 2000).

Rice production has declined during the last decade in counties surrounding the Refuge, reducing this type of agricultural wetland habitat for waterfowl, shorebirds and other wetland-dependent species. Abandoned rice fields and pasturelands are susceptible to invasion by Chinese tallow, eastern baccharis, and deep-rooted sedge, all of which decrease habitat quality and require extensive restoration efforts. In the absence of the cooperative rice farming program, the acres involved would invariably become infested with Chinese tallow without intensive restoration and invasive species management.

Use of pesticides in the cooperative rice farming program has potential impacts to fish and wildlife, and in particular to aquatic resources. Careful oversight and monitoring of pesticide use by the Refuge

minimizes the potential for long-term impacts. All applications are done in accordance with state and federal laws and regulations, and using only Service-approved pesticides. Pesticide use is monitored and reported. Integrated pest management strategies which also include mechanical soil manipulation and water management are used to control plant and insect pests, with an overall goal of reducing pesticide use on the Refuge. Additionally, approximately 80% of the acres farmed annually on the Refuge are now farmed organically, thereby substantially reducing overall pesticide use.

Wildlife-Dependent Recreational Uses: A major goal of Anahuac NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. Several managed rice fields and adjacent public use facilities on the Refuge help support these uses, particularly wildlife observation and photography and waterfowl hunting.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Permittees must adhere to all stipulations and special conditions set forth in the Cooperative Farming Agreement/Special Use Permit. These include the following:

- Cooperators are allowed to take the first rice crop, but leave the second or ratoon crop for wildlife.
- Cooperators must maintain levees and flood fields after harvest.
- Cooperators must disc, spray, or mow noxious weeds on all maintenance acres each year according the USDA Farm Program.
- Cooperators must use only those pesticides approved by the USFWS. Written records of pesticide applications must be provided annually.
- Use of any variety of genetically-modified rice seed is prohibited.

Changes in timing of field preparation and harvest, more efficient harvest technology, and more precise field leveling may, over time, reduce the value of rice farming to wildlife. Changes in the cooperative rice farming program must be evaluated in terms of wildlife benefits and economic viability. It is essential that Refuge staff evaluate new methods and technologies as they develop, and work with permittees to ensure that the program continues to support Refuge management objectives. Regular reevaluation of the program will be necessary to ensure compatibility in the long term.

Justification:

Rice agriculture provides many benefits to a variety of wildlife on the upper Texas coast. The cooperative rice farming program on Anahuac National Wildlife Refuge provides critical freshwater wetland habitat for shorebirds, rails, raptors, ducks, geese, wading birds and other waterbirds. Many rice fields play important roles in public use programs on the Refuge, particularly wildlife observation and public waterfowl hunting. In the absence of the cooperative rice farming program, the acres involved would invariably become infested with Chinese tallow without intensive restoration and invasive species

management. When conducted in accordance with the stipulations listed herein, the cooperative rice farming program is compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: 5-4-07
(Signature and Date)

Literature Cited:

Czech H. A., K. C. Parsons. 2002. Agricultural wetlands and waterbirds: A review. Waterbirds. 25:56–65.

Elphic, C. S. 2000. Functional equivalency between rice fields and seminatural wetland habitats. Conservation Biology 14(1): 181-191.

Pierluissi, S. 2006. Breeding waterbird use of rice fields in southwestern Louisiana. Unpublished Thesis, Louisiana State University, Baton Rouge, LA.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

COMPATIBILITY DETERMINATION: ANAHUAC NWR – COMMERCIAL ALLIGATOR HARVEST

Use: Commercial Alligator Harvest

Refuge Name: Anahuac National Wildlife Refuge

County: Chambers County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act, Emergency Wetlands Resources Act, Refuge Recreation Act, Fish and Wildlife Act of 1956

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

"... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. § 3901(b), 100 Stat. 3583 (Emergency Wetlands Resources Act)

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

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

The commercial harvest of American alligators (*Alligator mississippiensis*) is administered on the Anahuac National Wildlife Refuge (NWR or Refuge) as a compatible refuge economic use. Additionally, the alligator harvest program supports meeting migratory bird management objectives, specifically for Mottled Ducks *(Anas fulvigula)*, and is considered important for protecting public safety and water management infrastructure. This Compatibility Determination considers continuation of commercial alligator harvest on the Refuge, and includes consideration of modifications to the Refuge commercial alligator harvest program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/ Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

An overall goal of the alligator harvest is to maintain a healthy alligator populations, at densities consistent with the primary establishment propose of the Refuge. Under this goal, the specific objectives include:

1. Maintain overall alligator population age structure which maintains natural alligator social structure. Social structure and related interactions may be an important mechanism affecting overall alligator population dynamics by affecting recruitment and survival, influencing factors such as fecundity (reproductive age, clutch sizes and egg viability), overall breeding densities, and rates of cannibalism by adults on juvenile and subadult alligators.
2. Maintain alligator population density and distribution consistent with meeting population objectives for Mottled Ducks, a resident waterfowl species for which wetlands on the Refuge provide key nesting, brood-rearing and molting habitats.
3. Maintain alligator population density and distribution consistent with providing the public with opportunities for compatible wildlife-dependent recreational opportunities, specifically wildlife observation, photography, environmental education and interpretation.
4. Minimize adverse risks to public safety by minimizing the potential for negative alligator-human conflicts. This involves both public education and when necessary, removal of alligators from locations where conflicts are occurring or are likely to occur.
5. Maintain alligator population density consistent with acceptable levels of damage to water management infrastructure including levees and water control structures.

The Refuge alligator harvest program is conducted under the regulatory frameworks established by the State of Texas Alligator Management Program, administered by the Texas Parks and Wildlife Department (TPWD). In addition to establishing licensing requirements and harvest regulations, the TPWD annually determines the number and allocates hide tags to the Refuge (and other participating landowners). This annual allocation is based on alligator densities per designated habitat type, as indexed by the annual aerial nesting surveys, supplemented by nighttime spotlight surveys when available.

Individuals participating in the Refuge alligator harvest program are chosen randomly from a qualified group of applicants, and are issued Refuge Special Use Permits (SUP). The SUP contains special provisions and conditions which detail refuge-specific regulations and requirements governing alligator harvest on the Refuge.

Permittees are assigned specific target areas to remove alligators. These areas include moist soil units, reservoirs and areas within marsh units which are especially important as Mottled Duck brooding and molting habitats and adjacent canals and ditches. Selected areas where alligators are in frequent contact with the public and where there is potential for alligators to damage levees and other Refuge infrastructure are also targeted.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage the commercial alligator harvest at existing and projected levels. Costs associated with this activity are primarily staff time.

Anticipated Impacts of Use:

Threatened and Endangered Species: Federally-listed Threatened and Endangered (T&E species) known to use the Refuge hunt units include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), and American alligator (Threatened). No impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of commercial alligator harvest on the Refuge. Bald Eagles are not observed in high numbers on the Refuge. They typically feed on wounded or sick birds, and are usually associated with large concentrations of wintering waterfowl that occur in refuge sanctuary areas. Brown Pelicans are sometimes observed flying over the Refuge and along the shoreline of East Bay.

American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. The most direct effect of the commercial alligator harvest program on the Refuge is the mortality of harvested alligators. From 1998-2006, annual harvest on the Refuge has ranged from 81 to 310 alligators (Table E-2). This program is administered under regulations promulgated by Texas Parks and Wildlife Department, and these regulations are designed to ensure that viable alligator populations are sustained over the long-term. Continuation of the commercial alligator harvest program should not have any measurable effect on the long-term viability of alligator populations on the Refuge.

Table E-2. Number of alligators harvested on Anahuac NWR, 1998 to 2006.

Year	Number alligators harvested		
	Male	Female	Total
1998	47	34	81
1999	58	33	91
2000	50	40	90
2001	94	83	177
2002	145	165	310
2003	88	87	175
2004	96	101	197
2005	42	45	87
2006	54	50	104

In the late 1990's, harvest trends and some nighttime survey data suggested that that the number of mature adult alligators on the Refuge was decreasing in harvested areas. To counter this trend, the USFWS worked to increase the percentage of subadult alligators in the harvest through a variety of means in order to reduce harvest pressure on mature adult alligators. Primarily because the traditional and most commonly used harvest methodology, the baited hook and line set overnight, is non-selective, these efforts were only moderately successful. A second factor limiting success is economic in nature. Subadult alligators are lower in value per foot in Texas, and the higher prices being paid by Texas commercial buyers/processors for the larger adult alligators creates an incentive for permittees to harvest larger adult alligators and a disincentive to harvest the smaller subadult alligators.

In recent years, administration of the alligator harvest program on the Refuge has been further modified to increase the percentage of subadult alligators in the overall harvest, and concurrently decrease harvest of the larger adult alligators. This is being accomplished by implementing experimental alligator harvest programs in cooperation with the TPWD, utilizing the Management Hide Tags available through the Texas Alligator Management Program for harvest of subadult alligators. Subadult alligators are considered to be those alligators 6' and less in length. The short-term goal is to ensure that subadult alligators comprise a minimum of 50% of the overall harvest on the Refuge, with a long-term goal for the harvest program is for subadult alligators to comprise a minimum of 70% of the annual harvest. Allocations of Management Hide Tags and the traditional CITES Hide Tags to Refuge permittees are geared toward meeting this new harvest objective.

The experimental harvest is conducted by Refuge permittees during the regular alligator season, using only TPWD-approved selective harvest methodologies. These include: 1) baited wooden dowel and line; 2) line with grappling hook; 3) bow and arrow; 4) baited hook and line only when permittee is present and fishing for a specific subadult alligator.

Since implementing the experimental harvest in 2004, harvest of subadult alligators has increased substantially, and now represents approximately 56% of overall harvest on the Refuge. Alligators less than 7' in length now constitute 80% of the harvest. Alligators greater than 7' in length now comprise only

20% of the harvest. This harvest strategy is expected to help ensure that the Refuge alligator population maintains a natural age distribution and social structure.

Migratory Birds and other Biological Resources: Commercial harvest of alligators could result in some disturbance to wildlife adjacent to hunted areas, especially those areas associated with canals. Some trampling of vegetation may also occur near harvest sites. However, it is anticipated that this disturbance would be minimal.

Various studies report differing predation rates on various types of wildlife (Giles and Childs 1949, Valentine *et al.* 1972, Elsey *et al.* 2004). The mixed results of these studies are likely a result of varying seasonality, habitat, and prey availability. McNease and Joanen (1977) reported that alligator diets are mainly determined by availability and vulnerability of the prey species. Elsey *et al.,* (2004) reported a relatively high frequency (20.9%) of Mottled Ducks in alligator stomachs taken from animals present in preferred Mottled Duck habitat with broods and molting birds present. This study indicates that alligators may have a deleterious effect on Mottled Ducks in certain habitats during certain phases of their life cycle (primarily flightless molting birds and broods). Additionally, this study found that smaller alligators consumed Mottled Ducks while larger alligators did not. Based on these data it is expected that managing the commercial alligator harvest to focus on smaller alligators and harvest in areas with high Mottled Duck use will have a beneficial impact on survival and annual recruitment on the Refuge.

Wildlife-dependent Recreational Uses: A major goal of Anahuac NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. Some potential for conflicts between the commercial alligator harvest program and wildlife observation and photography does exist, but is minimized through spatial separation of these uses. In addition, visitation to the refuge for these uses is very low in September, when the commercial alligator harvest program is conducted.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The commercial harvest of alligators provides the Refuge with a management tool to improve habitat quality for target organisms while ensuring the long term viability of alligator populations. The harvest program must remain consistent with ensuring the conservation of alligators and assist the Refuge in meeting Refuge management objectives. The commercial alligator harvest program is governed through the issuance of Special Use Permits to approved permittees. Stipulations necessary to ensure compatibility with Refuge establishment purposes and the mission of the NWRS are included as the Special Conditions of the Special Use Permit. These include the following stipulations aimed at ensuring protection of Refuge resources and public safety:

- Permittee and their assistants must follow all State and Federal laws regarding alligator harvest as well as all conditions stated in the Special Use Permit. Violation of any Federal, State, or

Refuge regulation, or of any special condition of the SUP will result in immediate revocation of the SUP.

- Permittees must be experienced and pre-qualified to participate in this program. Final approval of eligibility rests with the U.S. Fish and Wildlife Service.
- No hunting will be allowed within 100 yards of a known alligator nest.
- Each Permittee may only take as many alligators as they are assigned tags. Within the frameworks set by the Texas Parks and Wildlife Department, harvest quotas for each Permittee will be set by the Refuge Manager, including harvest targets for subadult alligators.
- Permittees must take alligators only from designated areas as assigned by the Refuge Manager.
- Permittees must check sets and/or attempt to harvest alligators using approved methods on a daily basis until all tags are used.
- Allowed modes of motorized access will be specified by the Refuge Manager on an area-by-area basis.
- Permittee may only take alligators by using methods approved by the Texas Parks and Wildlife Department. Wildlife is not permitted to be used as bait.
- All alligators on hook and line sets will be killed immediately. Each alligator must be tagged immediately after being killed. Transport of an untagged alligator is prohibited.
- Firearms (minimum caliber of 22 magnum) may only be used to kill hooked alligators. If shotguns are used, only federally approved non-toxic shot will be permitted. All weapons must be unloaded and encased while in Refuge parking areas, boat launches, or in route to and from designated harvest areas.
- No alligator sets will be allowed in areas that jeopardize public safety.

Compliance with these and all other Special Conditions of the Special Use Permit is necessary to ensure the compatibility of the commercial alligator harvest program.

Justification:

The commercial harvest of alligators is managed on the Anahuac NWR so as to ensure the long-term conservation of healthy alligator populations, while providing the Refuge with a management tool to help meet migratory bird management objectives, protect important management infrastructure, and protect public safety. This program is administered under regulations promulgated by Texas Parks and Wildlife Department, and these regulations are designed to ensure that viable alligator populations are sustained over the long-term. In addition, the USFWS regulates the alligator harvest program on the Refuge through issuance of a Special Use Permit which contains stipulations also designed to conserve alligator populations and best meet management objectives. For example, special regulations are in place to restrict harvest of reproductive-aged alligators and maintain a natural age structure within the Refuge alligator population. Continuation of the commercial alligator harvest program should not have any measurable effect on the long-term viability of alligator populations on the Refuge. When conducted in accordance with the stipulations listed herein, the commercial alligator harvest program is compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Audie T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Elsey, R.M., P.L. Trosclair, and J.T. Linscombe. 2004. The American alligator as a predator of Mottled Ducks. Southeastern Naturalist 3: 381-390.

Giles, L., and V.L. Childs. 1949. Alligator management on the Sabine National Wildlife Refuge. Journal of Wildlife Management 13(1):16-28.

McNease, L., and T. Joanen. 1974. A study of immature alligators on Rockefeller Refuge, Louisiana. Proc. 28th Ann. Conf. Southeast. Assoc. Game and Fish Comm. 28:482-500.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Valentine, J.M., Jr., J.R. Walther, K.M. McCartney, and L.M. Ivy. 1972. Alligator diets on the Sabine National Wildlife Refuge, Louisiana. Journal of Wildlife Management 36(3):809-815.

COMPATIBILITY DETERMINATION: MCFADDIN NWR – WATERFOWL HUNTING

Use: Waterfowl Hunting

Refuge Name: McFaddin National Wildlife Refuge

Counties: Jefferson, Galveston, and Chambers counties, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

McFaddin National Wildlife Refuge (NWR or Refuge) proposes to continue to provide waterfowl hunting opportunities (for ducks, geese, and coots) in designated areas that are compatible with Refuge purposes. Hunting is a wildlife-dependent, priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. Waterfowl hunting is a long-standing traditional use on and around McFaddin NWR. This Compatibility Determination considers continuation of waterfowl hunting on the Refuge and includes consideration of modifications to the Refuge hunting program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP).

Waterfowl hunting on McFaddin NWR is supported by several modes of access, including motorized vehicles, outboard motor boats, airboats, non-motorized boats, bicycles, and by foot. Because they are highly interrelated, this compatibility determination includes an assessment of these other activities in conjunction with waterfowl hunting.

Opportunities for waterfowl hunting on McFaddin NWR will be available within the season set by Texas Parks and Wildlife Department in compliance with annually published regulations. Designated hunting areas will be open during established State waterfowl seasons, with the exception that hunting for ducks and coots will not be allowed on the Refuge until the last Saturday in October (not including the September teal and youth-only seasons). If the State-specified duck and coot regular season opens later than the last Saturday in October, then hunting on the Refuge will open consistent with the State-specified season date.

In addition, if the light goose conservation order is in effect, these season dates may be reduced on the Refuge in accordance with the timing of the departure of geese from the area, typically late February. All applicable State and Federal regulations are enforced.

The waterfowl hunting season generally falls within the period September- February. Traditionally, the hunting season on the Texas coast begins in September with the early teal season. The regular waterfowl season follows, often beginning in late October and running through January. The light goose conservation order typically begins at the end of the regular waterfowl season in January and runs through March.

Four different hunt units are open to waterfowl hunting on McFaddin NWR (Figure E.2.), including the Spaced Hunt Unit (5,050 acres), the Star Lake/Clam Lake Hunt Unit (10,800 acres), the Central Hunt Unit (4,850 acres), and the Mud Bayou Hunt Unit (2,210 acres). These four hunt units total approximately 22,900 acres. These units occur primarily in coastal marsh habitats, including saline, brackish and intermediate marshes.

The four hunt units are open on different days of the week to provide hunting opportunities throughout the week, as well as periods of rest for waterfowl. The Central Hunt Unit, the Star Lake/Clam Lake Hunt Unit and the Mud Bayou Hunt Unit will be open daily during the early teal season. The Spaced Hunt Unit, the Central Hunt Unit, and the Star Lake/Clam Lake Hunt Unit will be open for waterfowl hunting on Saturdays, Sundays and Tuesdays of the regular waterfowl season. The Mud Bayou Hunt Unit will be open on Sundays, Wednesdays, and Fridays during the regular waterfowl season.
All hunt units are closed on Thanksgiving, Christmas and New Year's Day.

Hunters may enter Refuge hunt units between 4:00 am and ½ hour before shooting time. All hunts are morning-only hunts. Hunting is permitted from legal shooting time (1/2 hour before sunrise) until 12:00 pm. Hunters must be off the Refuge hunt units by 12:30 pm.

A waterfowl hunting permit must be signed and in the possession of the hunter while hunting on any of the Refuge hunt units. This permit is available at no charge and serves to inform the hunter of Refuge-specific regulations. In addition, a reservation is required for hunting the Spaced Hunt Unit during the regular waterfowl season. A daily user fee is currently required for those hunting the Spaced Hunt Unit. In FY02, approximately 5,000 hunters utilized the Refuge for waterfowl hunting.

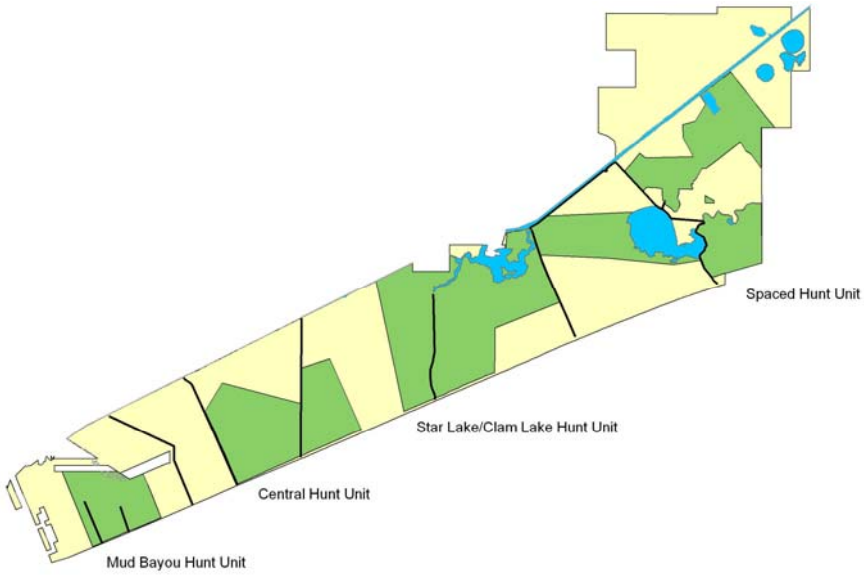

Figure E.2. Location of waterfowl hunt units on McFaddin NWR.

Waterfowl hunting is a long and established tradition in the coastal marshes of southeast Texas, and occurred on Refuge lands long before the establishment of the Refuge. Additional public waterfowl hunting opportunities exist in the area at the State managed J.D. Murphree Wildlife Management Area, the Wallisville Lake Project managed by the U.S. Army Corps of Engineers, and the Texas Point, Anahuac and Sabine National Wildlife Refuges managed by the USFWS. With more than 97% of the state privately owned (TPWD 2005), limited public hunting opportunities are available in Texas. State and Federal public hunting areas provide important wildlife-dependent recreational opportunities for the general public.

Availability of Resources:

Costs to administer the hunt program will mostly be salaries and facilities maintenance. This would include staffing the waterfowl check station throughout the season to issue permits, collect fees, provide information and collect harvest data. A staffed check station improves visitor services and the quality of a visitor's experience by providing orientation and guidance. Additionally, valuable biological data on migratory birds are collected by Refuge staff at waterfowl check stations. Other costs to administer the program includes law enforcement throughout the season by Refuge law enforcement staff, as well as sign posting, development and publishing of Refuge-specific regulations and permits, and responding to public inquiries and requests for permits. Existing facilities requiring regular maintenance include the accessible hunt blind, the waterfowl check station, parking areas, portable restrooms, roads, and boat ramps. The length of the season as determined annually by the State may result in an increase or decrease in the number of staff days required to administer the program.

User fees for waterfowl hunting on McFaddin NWR assist with costs associated with running the hunt program, however as previous years have demonstrated, these funds have been insufficient to cover all costs associated with the program. Base funding will also be needed to manage the program. Volunteer workdays will continue to be organized in order to help prepare the hunt units for the upcoming seasons.

In addition to season length, hunter trends, either up or down, will result in an increase or decrease in staffing needed. If hunter use considerably declines on the Refuge, along with associated fees, the Refuge may need to consider alternatives for staffing the check station. Though not preferred, a self-registering procedure may be developed in response to such trends.

Anticipated Impacts of Use:

The potential impacts of the McFaddin NWR waterfowl hunt program on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and Endangered species (T&E species) known to use the Refuge hunt units during waterfowl season include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), piping plover (*Charadrius melodus*, Threatened), and American alligator (*Alligator mississippiensis*, Threatened). It is expected that impacts to these species will be negligible. Bald Eagles are rarely observed on the Refuge. They typically feed on wounded or sick birds, and in the past were associated with large concentrations of wintering waterfowl. Brown Pelicans are commonly observed flying over the Refuge and resting along the shoreline of the Gulf of Mexico. Piping plovers winter primarily along the Texas Gulf Coast, though are seldom reported on McFaddin NWR beaches. They utilize beaches, sand flats, mud flats, and dunes along the coast, offshore islands, and spoil islands. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. The waterfowl hunt program should pose no threat to alligators on the Refuge. Overall, no impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of waterfowl hunting on the Refuge.

Habitats: The greatest potential for impacts to vegetation resources and habitats on the Refuge likely comes from motorized boating activities. Many Refuge hunt areas are accessible only or primarily by motorized boat. Wetland vegetation, especially submerged aquatic vegetation, can be impacted by motorboat activity. For example, propeller scarring has been shown to detrimentally impact seagrass beds in the Laguna Madre in South Texas (Pulich *et al.* 1997, Dunton *et al.* 1998) and in Florida (Madley *et al.* 2004). Propeller scarring leaving permanent channels in shallow pond and waterway bottoms on the Refuge has also raised concerns about the potential for increased saltwater intrusion, with concurrent negative impacts on emergent and submergent aquatic vegetation. Boating, either motorized or non-motorized, also has the potential to introduce or redistribute non-native invasive species.

Foot traffic in areas open to hunting can lead to vegetation trampling, and in heavy use areas, cause plant mortality. Some vegetation trampling and trailing from hunter foot traffic occurs in marsh habitats in hunt areas, although these impacts tend to be short-term.

These impacts are expected to be localized and minimal. Regulations, including motorboat and horsepower restrictions are used to protect wetland habitats and public safety.

Migratory Birds and Other Biological Resources: The most direct effect of hunting on the Refuge is the mortality of harvested waterfowl species resulting from hunting activities. Regulations governing harvest in states in the Central and Mississippi Flyways are developed annually through the Federal framework process for harvest of migratory birds in the U.S. This process is designed to ensure that viable waterfowl populations are sustained over the long-term. Overall, harvest on the Refuge, and cumulatively on all national wildlife refuges open to migratory bird hunting, constitutes a very small percentage of the overall harvest of migratory birds in these Flyways. The continuation of the waterfowl hunting program on the Refuge under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex EIS/CCP/LPP (USFWS 2007) will not have any measurable effect on overall populations of hunted waterfowl species and the long-term viability of these populations.

Harvest statistics for the Spaced Hunt and Star Lake/Clam Lake hunt units of the McFaddin NWR are collected annually through the operation of hunter check station. Annual harvest statistics for the years 2000-2007 are presented in Table E-3 below. These data do not represent total harvest on the Refuge, as harvest information is not collected from hunters utilizing the Mud Bayou and Central hunt units. Green-winged teal, gadwall, lesser scaup, blue-winged teal and Northern shoveler are the principal duck species harvested on the Refuge. Snow geese and Greater white-fronted geese comprise the majority of the refuge goose harvest.

Many studies have documented the effects of hunting intensity on the number of birds utilizing an area (Madsen *et al.* 1992 as cited by Fox and Madsen 1997). This study demonstrated that relatively light hunting pressure can reduce waterfowl abundance in hunted areas. Distribution and habitat use, feeding patterns, and the nutritional status of waterfowl have also been shown to be affected by hunting activities. Hunting activity can cause birds to alter habitat use, change feeding locations (Madsen 1995), feed more at night (Thornburg 1973, Morton *et al.* 1989) and reduce the amount of time spent feeding (Korschgen *et al.* 1985, Madsen 1995). Collectively, these changes in behavior have the potential to adversely impact the nutritional status of waterfowl (Bélanger and Bédard 1995).

Hunting may have a more significant impact on resident Mottled Ducks. Pair bonds for Mottled Ducks begin earlier than northern nesting birds and disturbance caused by hunting may disrupt the reproductive cycle for this species. Additionally, opening the regular waterfowl season before the arrival of migrating ducks from northern breeding areas allows for disproportionate harvest of resident birds, primarily Mottled Ducks. Refuge-specific regulations prohibit the opening of the general waterfowl season on the Refuge any earlier than the third Saturday in October in order to prevent this impact.

Monthly aerial surveys of wintering waterfowl on the Refuge have documented the disproportionate use of established sanctuary areas by waterfowl, as compared to the areas open to hunting. This further supports the above studies and indicates that hunting affects the overall distribution of wintering waterfowl on the Refuge. It has been shown that sanctuary areas on the wintering grounds are effective in maintaining local waterfowl populations in a landscape subject to hunting pressure (Bellrose 1954, Madsen 1998). Heitmeyer and Raveling (1988) found that waterfowl used sanctuaries during the day and local rice fields at night. Similarly, Fleskes *et al.* (2005) found northern pintail used areas closed to hunting during the day and dispersed throughout the area at night. These data indicate that while sanctuaries are effective in maintaining local waterfowl populations through the hunting season, birds must disperse at night to feed.

Sanctuary areas tend to support greater numbers of waterfowl the longer they have been established. Bellrose (1954) found that traditional sanctuary areas support higher populations of migrating ducks than newly established sanctuary areas. Similarly, Madsen (1998) found that it took two to six years between

Table E-3. Waterfowl harvest on the Spaced and Star Lake-Clam Lake hunt units, McFaddin NWR, 2000 – 2006. Data collected at the McFaddin NWR waterfowl hunter check station.*							
Species	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	2006/ 2007
Whistling-Duck species	0	3	1	0	0	2	7
Greater White-Fronted Goose	80	11	3	8	3	3	4
Light Goose	142	37	60	16	25	82	75
Canada/Cackling Goose	1	1	3	4	0	0	3
Wood Duck	34	42	32	11	6	5	13
Gadwall	734	860	276	442	206	968	452
American Wigeon	89	129	40	75	43	113	83
Mallard	191	130	118	51	46	100	48
Mottled Duck	142	92	94	121	101	133	153
Blue-winged Teal	261	212	334	328	291	297	390
Northern Shoveler	587	236	97	236	105	233	193
Northern Pintail	154	111	16	10	21	128	68
Green-winged Teal	1557	720	346	509	383	927	763
Canvasback	27	1	0	1	1	56	59
Redhead	16	11	4	11	6	34	18
Ring-necked Duck	40	75	57	35	28	37	124
Scaup species	713	277	591	169	338	1015	274
Bufflehead	5	4	2	2	0	6	1
Hooded Merganser	5	15	11	3	5	20	8
Ruddy Duck	13	6	2	0	1	17	4
Other	8	26	11	17	16	39	111
Total Birds	4799	2999	2098	2049	1625	4215	2851

*Harvest statistics collected during the regular waterfowl season only.

the creation of sanctuary areas and the time when peak numbers of dabbling ducks were reached. These data indicate that traditional, long-term sanctuary areas are more valuable to maintaining local waterfowl populations than sanctuary areas that shift from year to year.

Presumably, providing waterfowl with predictable undisturbed sanctuary areas increases the ability of birds to meet the obligations of their annual cycle. Waterfowl undergo considerable physiological demands during winter. Heitmeyer (1988) estimated that prebasic molt in female mallards required an additional three grams per day of protein over base metabolic rates. These demands approach the estimated five grams per day associated with reproduction. Pair formation for most North American waterfowl takes place away from the breeding grounds. Waterfowl must accumulate endogenous energy reserves to meet the demands of courtship (Afton and Sayler in Baldassarre and Bolen 1994). Baldassarre and Bolen (1994) proposed that birds that do not accumulate energy reserves may have less time and energy at their disposal to initiate courtship and/or may be unable to maintain previously established pair bonds. Clearly, birds must meet high energy demands to successfully fulfill critical wintering components of their annual cycle. Further, Heitmeyer and Fredrickson (1981) build a scenario where endogenous reserves established on wintering grounds return mallards to breeding areas in better condition to begin nesting, leading to larger clutch sized and earlier nests, which tend to be more successful. Providing sanctuary areas of adequate size adjacent to quality feeding areas may contribute to the ability of birds to meet the physiological demands required during winter and possibly the subsequent nesting cycle.

The size, location and habitat quality of sanctuary areas on the Refuge remains critically important to ensure that migrating and wintering populations of waterfowl maintain sound nutritional and physiological status. Overall, it is expected that the maintenance of traditional sanctuary areas on the Refuge

adequately mitigates for impacts from hunting activities. In years of particularly poor habitat quality due to climatic extremes or tidal flooding from tropical disturbances, however, it is possible that hunting activities would result in reduced abundance of wintering waterfowl on the Refuge.

Although the impacts of waterfowl hunting on wetland-dependent migratory and resident birds which are not hunted is likely less than for waterfowl, studies have demonstrated that hunting (including accessing hunt areas) does affect abundance and distribution of these other avian species. The noise associated with shooting likely reduces habitat utilization by shorebirds, wading birds, other marsh and waterbirds, and landbirds using wetland habitats within hunt areas, at least while hunting is occurring.

Incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels and based on past history, incidental take is expected to be small and will not directly or cumulatively impact current or future populations of wildlife on the Refuge.

Means of access to and within Refuge hunt areas include motorized boating (primarily in Star Lake, Clam Lake, Mud Bayou and the Spaced Hunt Unit), non-motorized boating, motorized vehicles, and walking. Motorized boating has been shown to affect the abundance, distribution and habitat use of waterfowl and other birds (Dahlgren and Korschgen 1992, Knight and Cole 1995). Non-motorized boats, vehicles on roads, and walking also have potential to disturb birds and influence distribution and habitat use (Burger 1981, Knight 1984, Klein 1993). Compared to motor and airboats, canoe, kayak and rowboat travel appears to have the least disturbance effects on most wildlife species (Jahn and Hunt 1964). Non-motorized boats can still cause significant disturbance effects based on the ability to penetrate into shallower areas (Speight 1973). Vos *et al.* (1985) reported that slow-moving boats caused disturbance to nesting great blue herons when maneuvering directly below the heronries, where most other boats could not access due to shallow water. Kaiser and Fritzell (1984) reported that green-backed heron activity declined on three of four survey routes when canoes and boat use increased on the main river channel of the Ozark National Scenic Riverway.

McFaddin NWR has a special regulation allowing the use of airboats powered by 10 horsepower or less with direct drive, with a propeller length of 48 inches or less. Airboat engines may not exceed 2 cylinders and 484 cc. These types of airboats are limited to traveling in open water where all other motorized boating occurs. They are not capable of cross-country travel, and therefore should not cause damage to wetland vegetation or disturbance to wildlife in areas outside of boating activity.

A variety of regulations govern means of access to hunt areas, including boat motor and horsepower restrictions, and prohibition of all-terrain vehicle use. While these regulations are in place primarily to protect habitats and public safety, they also reduce overall disturbance impacts to waterfowl and other migratory birds.

Other Wildlife-Dependent Recreational Uses: A major goal of McFaddin NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. Few conflicts among users of the Refuge have been documented in relation to waterfowl hunting. Where the potential for conflicts is greatest, seasonal closures of Refuge hunt units to other recreational uses during the waterfowl season minimizes potential conflicts and safety issues among users of the Refuge.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the

Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

To reduce the impact of hunting on the resident Mottled Duck, modifications may be placed on opening dates for the regular waterfowl season. Season dates on the Refuge will be concurrent with Texas Parks and Wildlife Department for the September teal season, youth-only season, and duck and coot regular season in the Texas South Zone, and goose regular season in the Texas East Zone, with the exception that hunting for duck (not including the September teal and youth-only seasons) and coot will not be allowed on the Refuge until the last Saturday in October. If the State-specified duck and coot regular season opens later than the last Saturday in October, then hunting on the Refuge will open consistent with the State-specified season date.

All waterfowl hunters must follow the stipulations set forth in the waterfowl hunting regulations published annually by the Refuge.

The Central Hunt Unit, the Star Lake/Clam Lake Hunt Unit and the Mud Bayou Hunt Unit will be open daily during the early teal season. The Spaced Hunt Unit, the Central Hunt Unit, and the Star Lake/Clam Lake Hunt Unit will be open for waterfowl hunting on Saturdays, Sundays and Tuesdays of the regular waterfowl season. The Mud Bayou Hunt Unit will be open on Sundays, Wednesdays, and Fridays during the regular waterfowl season.

All hunts are morning-only hunts. Hunters may enter Refuge hunt units between 4:00 am and ½ hour before shooting time. Hunting is permitted from legal shooting time (1/2 hour before sunrise) until 12:00 pm. Hunters must be off the Refuge hunt units by 12:30 pm.

All other refuge units are closed to waterfowl hunting. Long-term, traditional sanctuary areas will remain as sanctuary, with no public access permitted in those areas.
Access into hunt areas may be by foot, bicycle, non-motorized boat, outboard motorboat, or airboat. Bicycles are permitted on refuge roads open to motorized vehicles and designated levees only. Airboats may not exceed 10 hp with direct drive with a propeller length of 48 inches or less, and engines may not exceed 2 cylinders and 484 cc.

On inland waters of Refuge hunt areas open to motorized boats, the operation of motorized boats is restricted to lakes, ponds, ditches, and other waterways. Motorized boats are prohibited on or through emergent wetland vegetation. In addition, the use of boats powered by air-cooled or radiator-cooled engines is restricted to those powered by a single engine of 25 horsepower or less and utilizing a propeller 9 inches (22.5 cm) in diameter or less. By year 2011, all motorized boats on inland waters of Refuge hunt units will be restricted to 25 hp or less. Boat motor horsepower restrictions would not apply on the10-Mile Cut portion of Salt Bayou and on Mud Bayou. This grace period of 5 years is aimed to provide those hunters currently using boats with a horsepower greater than 25 ample time to prepare for this change in regulation. In areas where propellers are damaging submergent vegetation and creating permanent channels in shallow water, no prop zones may also be initiated. Regular monitoring will be required to adequately determine where these zones would best be located. Marsh buggies, all-terrain vehicles and personal watercraft are prohibited on the Refuge.

A limited number of parties will be permitted to enter the Star Lake/Clam Lake Hunt Unit and the Spaced Hunt Unit. No limits are currently in place for numbers of hunters or parties on the Central Hunt Unit and Mud Bayou Hunt Unit.

The use of retrieving dogs will continue to be allowed and encouraged in all areas open to waterfowl hunting for the conservation of downed birds. Dogs must be under the control of handlers at all times.

The Refuge will maintain an active law enforcement presence in an effort to maximize compliance with State and Federal waterfowl hunting regulations. Annual monitoring of hunter use and impacts will be implemented. The information gathered will be used to review and possibly revise hunting regulations to enhance the quality and safety of the Refuge's hunting program, and to ensure that waterfowl hunting activities will continue to be compatible with Refuge purposes and the mission of the National Wildlife Refuge System.

Justification:

The McFaddin NWR waterfowl hunting program is determined to be compatible with the establishment purposes of the Refuge and the mission of the National Wildlife Refuge System. The Refuge provides quality waterfowl habitats for thousands of migratory birds annually. Migratory bird populations and harvest parameters are monitored and managed on a flyway basis and are designed to ensure the long-term sustainability of populations. Additionally, the hunt program on the Refuge is specifically designed to provide quality public hunting opportunities while minimizing potential impacts to local populations of migratory birds and their habitats.

Refuge-specific regulations are in place to minimize potential adverse impacts from hunting-related disturbance to wildlife and habitats. Regulations govern means of access to hunt areas, including boat motor and horsepower restrictions, and prohibition of all-terrain vehicle use. Of critical importance is the USFWS' ability to manage and maintain traditional sanctuary areas. The Refuge waterfowl hunt program is also managed in such a way to minimize conflicts with other compatible recreational uses and management programs. The Refuge will continue to monitor hunter use, compliance with rules and regulations, and impacts to waterfowl and other wildlife and use this information to adjust the waterfowl hunt program as necessary to protect Refuge resources.

Hunting is a priority wildlife-dependent public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Waterfowl hunting is a long-standing traditional use on and around McFaddin NWR, and has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving habitat, thereby ultimately contributing to the overall mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: 5-4-07
(Signature and Date)

Literature Cited:

Baldassarre, G. A. and E. G. Bolen. 1994. Waterfowl Ecology and Management. John Wiley and Sons, Inc.

Bélanger, L. and J. Bédard. 1995. Hunting and waterfowl. Pages 243-256 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D. C. 372pp.

Bellrose, F. C. 1954. The value of waterfowl refuges in Illinois. Journal of Wildlife Management 18(2):160-169.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Cons. 21:231-241.

Dahlgren, R. B. and C. E. Korschgen. 1992. Human disturbances of waterfowl: an annotated bibliography. U.S. Fish and Wildlife Service Resource Publication 188. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/disturb/disturb.htm (Version 16JUL97).

Dunton, K. H., S. V. Schonberg, S. Herzka, P. A. Montagna, and S. A. Holt. 1998. Characterization of anthropogenic and natural disturbance on vegetated and unvegetated bay bottom habitats in the Corpus Christi Bay National Estuary Program study area, Volume II: Assessment of scarring in seagrass beds. Corpus Christi Bay National Estuary Program, CCBNEP-25b.

Fleskes, J. P., D. S. Gilmer, and R. L. Jarvis. 2005. Pintail distribution and selection of marsh types at Mendota Wildlife Area during fall and winter. California Fish and Game 91(4):270-285.

Fox, A. D. and J. Madsen. 1997. Behavioural and distributional effects of hunting disturbance on waterbirds in Europe: implications for refuge design. Journal of Applied Ecology 34:1-13.

Heitmeyer, M. E. 1988. Protein costs of the prebasic molt of female mallards. The Condor 90:263-266.

Heitmeyer, M. E., and L. H. Fredrickson. 1981. Do wetland conditions in the Mississippi Delta hardwoods influence mallard recruitment? Trans. North Am. Wildl. Nat. Resour. Conf. 46:44-57.

Heitmeyer, M. E. and D. G. Raveling. 1988. Winter resource use by three species of dabbling ducks in California. Dept. Wildlife and Fisheries Biology, Univ. of Calif., Davis. Final Report to Delta Waterfowl and Wetlands Research Center, Portage La Prairie, Manitoba, Canada. 200pp.

Jahn, L. R. and R. A. Hunt. 1964. Duck and coot ecology and management in Wisconsin. Wisconsin Conserv. Dep. Tech. Bull. No. 33. 212pp.

Kaiser, M. S. and E. K. Fritzell. 1984. Effects of river recreationalists on green-backed heron behavior. J. Wildl. Manage. 48(2): 561-567.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21:31-39.

Knight, R. L. 1984. Responses of wintering bald eagles to boating activity. J. Wildl. Manage. 48(3): 999-1004.

Knight, R. L. and D. N. Cole. 1995. Wildlife responses to recreationalists. Pages 51-69 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

Korschgen, C. E., L. S. George, and W. L. Green. 1985. Disturbance of diving ducks by boaters on a migrational staging area. Wildl. Soc. Bull. 13:290-296.

Madley, K., J. Krolick, and B. Sargent. 2004. Assessment of boat propeller scar damage within the Greater Charlotte Harbor region. Florida Fish and Wildlife Conservation Commission, St. Petersburg, Florida.

Madsen, J. 1995. Impacts of disturbance on migratory waterfowl. Ibis 137: S67-S74.

Madsen, J. 1998. Experimental refuges for migratory waterfowl in Danish wetlands. II. Tests of hunting disturbance effects. Journal of Applied Ecology 35:398-417.

Morton, J. M., R. L. Kirkpatrick, M. R. Vaughan, and D. F. Stauffer. 1989. Habitat use and movements of American black ducks in winter. Journal of Wildlife Management 53(2): 390-400.

Pulich, W., C. Blair and W. A. White. 1997. Current status and historical trends of seagrasses in the Corpus Christi Bay National Estuary Program study area. Corpus Christi Bay National Estuary Program, CCBNEP-20.

Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

Texas Parks and Wildlife Department. (2005). South Texas Wildlife District: Urban Wildlife Management – Texas Wildscapes. Retrieved 11 April 2006 from http://www.tpwd.state.tx.us/landwater/land/habitats/southtx_plain/urban/wildscapes.phtml

Thornburg, D. D. 1973. Diving duck movements on Keokuk Pool, Mississippi River. J. Wildl. Manage. 37(3):382-389.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Vos, D. K., R. A. Ryder, and W. D. Graul. 1985. Response of breeding great blue herons to human disturbance in northcentral Colorado. Colonial Waterbirds. 8(1):13-22.

COMPATIBILITY DETERMINATION: MCFADDIN NWR - FISHING

Use: Fishing

Refuge Name: McFaddin National Wildlife Refuge

County: Jefferson, Galveston and Chambers counties, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act

Refuge Purpose:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

McFaddin National Wildlife Refuge (NWR or Refuge) proposes to continue to provide fishing opportunities in designated areas that are compatible with Refuge purposes. Fishing is a wildlife-dependent, priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. It is a wildlife-oriented recreational use and a traditional use of McFaddin NWR. This Compatibility Determination considers continuation of fishing on the Refuge, and includes consideration of modifications to the Refuge fishing program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

Fishing on McFaddin NWR is supported by several modes of access, including motorized vehicles, outboard motor boats, airboats, non-motorized boats, and by foot. Because they are highly interrelated, this compatibility determination includes an assessment of these other activities in conjunction with fishing.

Opportunities for fishing on McFaddin NWR are available year-round in Clam Lake, 10-Mile Cut, Mud Bayou, Mud Lake and designated areas along the bank of the Gulf Intracoastal Waterway (GIWW) and roadside ditches. Seasonal fishing opportunities are available in Star Lake and 5-Mile Cut between March 15th and August 31st. The Refuge is currently open daily to the 10-Mile Cut bridge from 6:00 am to sunset. Access beyond the bridge is available Monday through Friday from 7:30 am to 4:00 pm. During fiscal year 2002, approximately 6,250 anglers utilized the Refuge for fishing or crabbing.

Saltwater fishing opportunities are found in 10-Mile Cut, Mud Bayou, Mud Lake, Star Lake, 5-Mile Cut, Clam Lake and in designated areas along the shoreline of the Gulf Intracoastal Waterway (GIWW) and roadside ditches. Five fishing piers located along the banks of Clam Lake and the bridge at 10-Mile Cut provide additional locations for fishing. Crabbing is a popular activity, especially along Clam Lake and 10-

Mile Cut. Blue crab, alligator gar, flounder, and red drum are just some of the species that anglers may catch while fishing on the Refuge.

The Refuge has five boat ramps that are available to anglers. Boat ramps are located on Star Lake, 5-Mile Cut, 10-Mile Cut and Clam Lake (2). Boat ramps facilitate launching of small, shallow-draft boats only. Personal watercraft are prohibited from launching on the Refuge.

The USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007) proposes to extend open hours beyond 10-Mile Cut to one hour before sunrise to one hour after sunset seven days a week to facilitate additional recreational fishing and other wildlife-dependent recreational opportunities. Additionally, the preferred alternative proposes to construct a new boat launch and parking facility on 10-Mile Cut; improve freshwater and youth fishing opportunities in Pond 13; construct a fishing platform to improve access for fishing near the Star Lake water control structure along the GIWW, and increase interpretive materials regarding fishery resources.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage wildlife-dependent recreational fishing activities at existing and projected levels. Costs associated with this activity are primarily staff time. Refuge law enforcement officers regularly check anglers and crabbers for compliance with State and Refuge regulations. Additional costs involve maintenance of roads, boat ramps, and fishing piers providing access for fishing. Additional funds would be needed to implement the proposed strategies listed under Refuge Management Alternative D of the EIS/CCP/LPP. The Refuge would pursue a variety of funding sources in order to fully support this use, including agreements with other agencies, and grant funding and volunteer assistance.

Anticipated Impacts of the Use:

The potential impacts of the McFaddin NWR fishing program on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and Endangered species (T&E species) known to use the Refuge include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), piping plover (*Charadrius melodus*, Threatened), and American alligator (*Alligator mississippiensis*, Threatened). It is expected that impacts to these species will be negligible. Bald Eagles are rarely observed on the Refuge. They typically feed on wounded or sick birds, and in the past were associated with large concentrations of wintering waterfowl. Brown Pelicans are commonly observed flying over the Refuge and resting along the shoreline of the Gulf of Mexico. Piping plovers winter primarily along the Texas Gulf Coast, though are seldom reported on McFaddin NWR beaches. They utilize beaches, sand flats, mud flats, and dunes along the coast, offshore islands, and spoil islands. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. Fishing activities may pose a potential conflict with American alligators, which are attracted to bait used by anglers. Alligators can become accustomed to the presence of anglers and the associated food source, thereby reducing their natural fear of humans and potentially creating a safety hazard. Overall, no impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of fishing on the Refuge.

Habitats: The greatest potential for impacts to vegetation resources and habitats likely comes from motorized boating activities. Wetland vegetation, especially submerged aquatic vegetation, can be impacted by motorboat activity. For example, propeller scarring has been shown to detrimentally impact seagrass beds in the Laguna Madre in South Texas (Pulich *et al.* 1997, Dunton *et al.* 1998) and in Florida (Madley *et al.* 2004). Propeller scarring leaving permanent channels in shallow pond and waterway bottoms on the Refuge has also raised concerns about the potential for increased saltwater intrusion, with

concurrent negative impacts on emergent and submergent aquatic vegetation. Boating, either motorized or non-motorized, also has the potential to introduce or redistribute non-native invasive species.

Foot traffic in areas open to fishing can lead to vegetation trampling. In heavy use areas, this may cause plant mortality and subsequent erosion along shoreline areas (Liddle and Scorgie 1980, Hendee *et al.* 1990).

Fishery Resources: The most direct effect of fishing on the Refuge is the mortality of harvested freshwater and saltwater fish, blue crabs, and several fish and shellfish species caught for use as bait. Fishing and crabbing on the Refuge occur under regulations promulgated by Texas Parks and Wildlife Department. These regulations are designed to ensure that viable fish and shellfish populations are sustained over the long-term. Continuation of fishing and crabbing on the Refuge should not have any measurable effect on overall populations and the long-term viability of these species' populations.

Similarly, the potential exists for over-harvest or illegal harvest of fisheries. Regular law enforcement patrols to ensure compliance with State and Federal regulations will assist in minimizing these potential impacts.

Migratory Birds and other Biological Resources: Some disturbance to wildlife from fishing activities is also expected. Fishing activities may influence the composition of bird communities (Tydeman 1977), as well as distribution, abundance, and productivity of waterbirds (Bell and Austin 1985). Jahn and Hunt (1964 as cited by Dahlgren and Korschgen 1992) reported that increases in recreational activity by anglers, boaters, and shoreline activity appeared to discourage breeding ducks and coots from using otherwise suitable habitat. Bell and Austin (1985) suggested that anglers fishing from the shoreline and boats displaced waterfowl from their preferred feeding and roosting areas and caused wigeon, green-winged teal, pochard and mallard to depart from a 174 ha reservoir prematurely. Cooke (1987) also documented that anglers on the bank and in boats often fished the shallow, sheltered bays and creeks that birds favor and negatively impacted distribution and abundance of waterfowl, grebes, and Eurasian coots. Cooke (1977 as cited by Liddle and Scorgie 1980) suggested that anglers create an area around them within which birds will not venture. Thus, an angler sitting on the shore can effectively exclude birds from his immediate vicinity. Some disturbance of roosting and feeding shorebirds probably occurs (Burger 1981) but is considered minimal.

Motorized boating has been shown to affect the abundance, distribution and habitat use of waterfowl and other birds (Dahlgren and Korschgen 1992, Knight and Cole 1995). Non-motorized boats, vehicles on roads, and walking also have potential to disturb birds and influence distribution and habitat use (Burger 1981, Knight 1984, Klein 1993). Compared to motor and airboats, canoe, kayak and rowboat travel appears to have the least disturbance effects on most wildlife species (Jahn and Hunt 1964). Non-motorized boats can still cause significant disturbance effects based on the ability to penetrate into shallower areas (Speight 1973). Vos *et al.* (1985) reported that slow-moving boats caused disturbance to nesting great blue herons when maneuvering directly below the heronries, where most other boats could not access due to shallow water. Kaiser and Fritzell (1984) reported that green-backed heron activity declined on three of four survey routes when canoes and boat use increased on the main river channel of the Ozark National Scenic Riverway.

Discarded fishing line and other fishing litter can entangle migratory birds and other wildlife and cause injury or death (Thompson 1969, Gregory 1991).

McFaddin NWR has a special regulation allowing the use of airboats powered by 10 horsepower or less with direct drive, with a propeller length of 48 inches or less. Airboat engines may not exceed 2 cylinders and 484 cc. These types of airboats are limited to traveling in open water where all other motorized boating occurs. They are not capable of cross-country travel, and therefore should not cause damage to wetland vegetation or disturbance to wildlife in areas outside of boating activity.

A variety of regulations govern means of access to public fishing areas, including boat motor and horsepower restrictions. While these regulations are in place primarily to protect habitats and public safety, they also reduce overall disturbance impacts to waterfowl and other migratory birds.

Other Wildlife-dependent Recreational Uses: A major goal of McFaddin NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. While areas on the Refuge open to fishing are also open to the other wildlife-dependent recreational uses, few conflicts between fishermen and other users of the Refuge have been documented. At current use levels, fishing occurring concurrently with wildlife observation and photography, environmental education and interpretation on some areas of the Refuge does not appear to detrimentally impact these other uses. However, litter generated from fishing activities could negatively impact the visual experience of refuge visitors (Marion and Lime 1986). The Star Lake and 5-mile Cut areas of the Refuge are seasonally closed to fishing during the waterfowl season in order to limit potential conflicts between these two uses.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible.
_X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

This section identifies the restrictions and regulations necessary to ensure compatibility of fishing on McFaddin NWR.

Fishing and crabbing is allowed in designated areas of the Refuge in accordance with State regulations and subject to Refuge-specific conditions. Fishing and crabbing is permitted year-round in 10-Mile Cut, Mud Bayou, Mud Lake, and in and along the banks of Clam Lake. Five fishing piers along Clam Lake and a bridge on 10-Mile Cut provide access for those fishing from land. Anglers may also fish from the shoreline of the GIWW and along public roadside ditches throughout the year. Seasonal fishing opportunities are available in Star Lake and 5-Mile Cut between March 15th and August 31st.

Fishing is allowed using pole and line, rod and reel, or hand-held line only. Cast-netting for bait for personal use is permitted along waterways in areas open to the public and along public roads. Trotlines, set lines, jug lines, limb lines, bows and arrows, gigs, spears, and crab traps are prohibited. Fishing from or mooring to water control structures, and the harvesting of frogs and turtles, is prohibited. Harvesting fish or crabs for commercial purposes is prohibited.

Outboard motor boats, airboats, and non-motorized boats may be used to access Mud Bayou, Mud Lake, Star Lake, 10-mile cut and Clam Lake. Airboats may not exceed 10 hp with direct drive with a propeller length of 48 inches or less, and engines may not exceed 2 cylinders and 484 cc. Non-motorized boats may be used to access 5-Mile Cut between March 15th and August 31st.

On inland waters of Refuge fishing areas open to motorized boats, the operation of motorized boats is restricted to lakes, ponds, ditches, and other waterways. Motorized boats are prohibited on or through

emergent wetland vegetation. In addition, the use of boats powered by air-cooled or radiator-cooled engines is restricted to those powered by a single engine of 25 horsepower or less and utilizing a propeller 9 inches (22.5 cm) in diameter or less. By year 2011, all motorized boats on inland waters of the Refuge will be restricted to 25 hp or less. Boat motor horsepower restrictions would no apply on the 10-Mile Cut portion of Salt Bayou and on Mud Bayou. This grace period of 5 years is aimed to provide those anglers currently using boats with a horsepower greater than 25 ample time to prepare for this change in regulation. In areas where propellers are damaging submergent vegetation and creating permanent channels in shallow water, no prop zones may also be initiated. Regular monitoring will be required to adequately determine where these zones would best be located. Marsh buggies, all-terrain vehicles and personal watercraft are prohibited on the Refuge.

Five boat ramps are available on the Refuge for launching small, shallow-draft boats only. Boat ramps are located at Clam Lake (2), 10-Mile Cut, 5-Mile Cut and Star Lake.

Continued law enforcement patrols will be necessary to ensure compliance with these and State and Federal fishing regulations.

Justification:

Continuation of fishing and crabbing on the Refuge should not have any measurable effect on overall populations of aquatic species and the long-term viability of these species' populations. The Texas Parks and Wildlife Department regularly adopts regulations in response to fish population levels and management needs. These regulations are designed to ensure that viable fish and shellfish populations are sustained over the long-term. In addition, designated areas of the Refuge remain closed to the public to provide sanctuary areas for wildlife.

If fishing activity on McFaddin NWR increases substantially, additional stipulations may be needed to protect habitats and resources. Refuge staff will continue to monitor and evaluate use and associated impacts regularly.

Fishing is a priority wildlife-dependent public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Fishing has been a traditional form of outdoor recreation on the Refuge and in southeast Texas. When conducted in accordance with the stipulations listed herein, fishing would be compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Bell, D. V. and L.W. Austin. 1985. The game-fishing season and its effects on overwintering wildfowl. Biol. Conserv. 33:65-80.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Conserv. 21:231-241.

Cooke, A. S. 1987. Disturbance by anglers of birds at Grafham Water. ITE Symposium 19:15-22.

Dahlgren, R. B. and C. E. Korschgen. 1992. Human disturbances of waterfowl: an annotated bibliography. U.S. Fish and Wildlife Service Resource Publication 188. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/disturb/disturb.htm (Version 16JUL97).

Dunton, K. H., S. V. Schonberg, S. Herzka, P. A. Montagna, and S. A. Holt. 1998. Characterization of anthropogenic and natural disturbance on vegetated and unvegetated bay bottom habitats in the Corpus Christi Bay National Estuary Program study area, Volume II: Assessment of scarring in seagrass beds. Corpus Christi Bay National Estuary Program, CCBNEP-25b.

Gregory, M. R. 1991. The Hazards of Persistent Marine Pollution: Drift Plastics and Conservation Islands. J. Royal Soc. New Zealand 21(2): 83-100.

Hendee, J.C., G. H. Stankey, and R. C. Lucas. 1990. Wilderness Management. North American Press, Golden, CO.

Jahn, L. R. and R. A. Hunt. 1964. Duck and coot ecology and management in Wisconsin. Wisconsin Conserv. Dep. Tech. Bull. No. 33. 212pp.

Kaiser, M. S. and E. K. Fritzell. 1984. Effects of river recreationalists on green-backed heron behavior. J. Wildl. Manage. 48(2): 561-567.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21:31-39.

Knight, R. L. 1984. Responses of wintering bald eagles to boating activity. J. Wildl. Manage. 48(3): 999-1004.

Knight, R. L. and D. N. Cole. 1995. Wildlife responses to recreationalists. Pages 51-69 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

Liddle, M. J. and H. R. A. Scorgie. 1980. The effects of recreation on freshwater plants and animals: a review. Biol. Cons. 17:183-206.

Madley, K., J. Krolick, and B. Sargent. 2004. Assessment of boat propeller scar damage within the Greater Charlotte Harbor region. Florida Fish and Wildlife Conservation Commission, St. Petersburg, Florida.

Marion, J. L. and D. W. Lime. 1986. Recreational Resource Impacts: Visitor Perceptions and Management Responses. Pp. 239-235. Kulhavy, D.L. and R.N. Conner, Eds. In Wilderness and Natural Areas in the Eastern United States: A Management Challenge. Center for Applied Studies, Austin State Univ., Nacogdoches, TX. 416pp.

Pulich, W., C. Blair and W. A. White. 1997. Current status and historical trends of seagrasses in the Corpus Christi Bay National Estuary Program study area. Corpus Christi Bay National Estuary Program, CCBNEP-20.

Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

Thompson, J. D. 1969. Feeding behavior of diving ducks on Keokuk Pool, Mississippi River. M.S. Thesis, Iowa State Univ., Ames. 79pp.

Tydeman, C. F. 1977. The importance of the close fishing season to breeding bird communities. J. of Environmental Management 5:289-296.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Vos, D. K., R. A. Ryder, and W. D. Graul. 1985. Response of breeding great blue herons to human disturbance in northcentral Colorado. Colonial Waterbirds. 8(1):13-22.

COMPATIBILITY DETERMINATION: MCFADDIN NWR - WILDLIFE OBSERVATION, PHOTOGRAPHY, ENVIRONMENTAL EDUCATION AND INTERPRETATION

Use: Wildlife Observation, Photography, Environmental Education and Interpretation

Refuge Name: McFaddin National Wildlife Refuge

County: Jefferson, Galveston and Chambers counties, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

McFaddin National Wildlife Refuge (NWR or Refuge) proposes to continue to provide wildlife observation, photography, environmental education and interpretation opportunities in designated areas of the Refuge that are compatible with Refuge purposes. These activities are wildlife-dependent, priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The continuation and enhancement of these programs will be addressed in this compatibility determination.

Wildlife Observation and Photography: Means of access for wildlife observation and photography opportunities on McFaddin NWR are supported by motorized vehicles, outboard motor boats, airboats, non-motorized boats, bicycles, horseback, and by foot. Because they are highly interrelated, this compatibility determination includes an assessment of these other activities in conjunction with wildlife observation and photography.

During FY02, approximately 1,150 visitors to McFaddin NWR participated in wildlife observation and photography activities. McFaddin NWR offers eight miles of graveled roads to view and photograph wildlife year-round along Clam Lake, the Gulf Intracoastal Waterway (GIWW), and adjacent marshes. All Refuge roads open to vehicle traffic are available for wildlife observation and photography, unless weather conditions make roads impassable. The Refuge is currently open daily to the 10-Mile Cut bridge from 6:00 am to sunset. Access beyond the bridge is available Monday through Friday from 7:30 am to 4:00 pm. A trail behind Refuge headquarters leads to Pond 11 and an observation deck, which is open to wildlife watchers and photographers seasonally outside of the waterfowl hunt season. Opportunities for wildlife observation and photography on McFaddin NWR are available year-round in Clam Lake, 10-Mile Cut, Mud Bayou, and Mud Lake from boats. Seasonal viewing opportunities are available in Star Lake

and 5-Mile Cut between March 15th and August 31st. Five boat ramps provide access to Star Lake, 5-Mile Cut, 10-Mile Cut and Clam Lake (2).

Other Non-priority Uses in Support of Wildlife Observation and Photography: Bicycling and horseback riding occur in very limited numbers on the Refuge. Bicycling in support of wildlife observation is permitted on roads open to motorized vehicles only. Because Refuge roads are gravel, conditions are not ideal for biking and use is therefore limited. Horseback riding in support of wildlife observation occurs very infrequently on the Refuge. Individuals interested in utilizing horses to view wildlife must stay on public roads open to motorized vehicles only. Horseback riding as an organized trail ride is prohibited.

Environmental Education and Interpretation: "Marsh Madness!", an annual educational event held on the Refuge since 2003, promotes an awareness and understanding of the important natural resources found along the Texas Gulf coast. Interpretive tours and programs are also provided by Refuge staff to interested schools and organizations upon request.

Additional strategies to support wildlife observation, photography, environmental education and interpretation are identified under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex EIS/CCP/LPP (USFWS 2007). These strategies include the addition of trails, information kiosks, interpretive signs and exhibits, an observation platform, photography blind, brochures, and interpretive tours. The development of educational programs for Sabine Pass schools and students are also included in these strategies. The USFWS also proposes to extend open hours beyond 10-Mile Cut to one hour before sunrise to one hour after sunset seven days a week to facilitate additional wildlife-dependent recreational opportunities.

Availability of Resources:

Direct annual costs to administer these programs and facilities are primarily in the form of staff time. The development of new facilities and programs, as well as the maintenance and upkeep of existing facilities and programs, will be the primary costs associated with wildlife observation, photography, environmental education and interpretation offered on the Refuge. Law enforcement support will continue to be necessary to ensure compliance with Refuge regulations. Additional funding will be required before the facilities and programs listed under Refuge Management Alternative D can be fully implemented. Refuge staff will pursue funding options through partnerships with other non-governmental organizations including the McFaddin and Texas Point Refuges Alliance, and pursue grants and matching funds to ensure that the strategies listed in Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain EIS/CCP/LPP (USFWS 2007) are implemented. Volunteer support will continue to be critical in the Refuge's ability to fully implement the strategies listed under Refuge Management Alternative D.

Anticipated Impacts of Use(s):

The potential impacts of the McFaddin NWR wildlife observation, photography, environmental education and interpretation programs on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and Endangered species (T&E species) known to use the Refuge include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), piping plover (*Charadrius melodus*, Threatened), and American alligator (*Alligator mississippiensis*, Threatened). It is expected that impacts to these species will be negligible. Bald Eagles are rarely observed on the Refuge. They typically feed on wounded or sick birds, and in the past were associated with large concentrations of wintering waterfowl. Brown Pelicans are commonly observed flying over the Refuge and resting along the shoreline of the Gulf of Mexico. Piping plovers winter primarily along the Texas Gulf Coast, though are seldom reported on McFaddin NWR beaches. They utilize beaches, sand flats, mud flats, and dunes along the coast, offshore islands, and spoil islands. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator

populations on and around the Refuge are currently at relatively high levels. Some disturbance to basking alligators may occur from visitor use. Overall, no impacts to Federally-listed Threatened and Endangered species populations are expected to occur due to Refuge visitors conducting wildlife observation, photography, environmental education or interpretation.

Primary means of access to areas on the Refuge used for wildlife observation and photography include motorized vehicles on Refuge roads open to the public, walking on trails and roads, and motorized and non-motorized boating. A very small number of visitors use bicycles on public roads. An even smaller number ride horses on roads. Motorized vehicles, walking, and motorized and non-motorized boats are used to access areas used for environmental education and interpretation on McFaddin NWR. Impacts associated with wildlife observation, photography, environmental education and interpretation activities vary based on mode of access. Walking, vehicles on roads, motorized and non-motorized boating, bicycling, and horseback riding all have the potential to disturb wildlife and influence distribution and habitat use.

Habitats: The greatest potential for impacts to vegetation resources and habitats likely comes from motorized boating activities. Wetland vegetation, especially submerged aquatic vegetation, can be impacted by motorboat activity. For example, propeller scarring has been shown to detrimentally impact seagrass beds in the Laguna Madre in South Texas (Pulich *et al.* 1997, Dunton *et al.* 1998) and in Florida (Madley *et al.* 2004). Propeller scarring leaving permanent channels in shallow pond and waterway bottoms on the Refuge has also raised concerns about the potential for increased saltwater intrusion, with concurrent negative impacts on emergent and submergent aquatic vegetation. Boating, either motorized or non-motorized, also has the potential to introduce or redistribute non-native invasive species (i.e. giant salvinia, water hyacinth, etc).

Migratory Birds and other Biological Resources: Disturbance of wildlife by visitors is likely to be greatest in concentrated areas of use, including along trails, boardwalks, observation platforms and along roads (Klein 1993). While some species appear to acclimate to vehicular traffic, and even presence of visitors on trails, boardwalks, and observation platforms, other species are less tolerant of disturbance. Overall it is likely that species composition and abundance is decreased in areas supporting these recreational uses.

Disturbance impacts to birds from visitation are often magnified during the breeding season. Color of clothing worn can attract or repel different passerine species based on breeding plumages of those species (Gutzwiller and Marcum 1997). Primary song occurrence and consistency of certain passerines can be impacted by a single visitor (Gutzwiller *et al.* 1994). Human disturbance may also limit the number of breeding pairs and production of certain passerine species (Reijnen and Foppen 1994). Predation on songbird, raptor, colonial nesting species and waterfowl nests tends to increase near more frequently visited areas (Dwernychuk and Boag 1972, Buckley and Buckley 1978, Lenington 1979, Boyle and Samson 1985, Miller *et al.* 1998). Glinski (1976) suggests that attracting wildlife using taped vocalizations may increase energy expenditures of wildlife, disrupt territory establishment, and increase susceptibility to predation.

In general, activities that occur outside of vehicles (along walking trails, etc), tend to increase disturbance potential for most wildlife species (Burger 1981, Klein 1993, Gabrielsen and Smith 1995). In wetland habitats, disturbance from out of vehicle approaches can reduce the time spent foraging or even cause avoidance of areas disturbed (Klein 1993). Similarly, walking tends to displace birds and can cause localized declines in species richness and abundance (Riffell *et al.* 1996).

Walking with pets can cause additional disturbances to wildlife. Pets are known to both chase and kill wildlife (George 1974, Lowry and McArthur 1978). The greatest increase in heart rates of bighorn sheep occurred when approached by humans with a dog (MacArthur *et al.* 1982). Prairie chickens showed a stronger fear response to domestic dogs than to native predators such as foxes (Hamerstrom *et al.* 1965).

Vehicular use along Refuge roads can impact Refuge wildlife and habitats directly or indirectly. Vehicles can cause wildlife mortality through direct impact (Dowler and Swanson 1982, Adams and Geis 1983,

Rosen and Lowe 1994, Ashley and Robinson 1996). Reptiles are most likely to be impacted by vehicles as they sun themselves on or cross Refuge roads; however birds, mammals and amphibians are also susceptible. Vehicles can also cause disturbance to wildlife. Noise, vibration and visual stimuli may cause animals to avoid the vicinity of roads, and noise may mask communications (Busnel 1978, Zande *et al.* 1980, Reijnen and Foppen 1994, Spellerberg 1998). Although vehicles themselves can cause wildlife disturbance, wildlife often habituate to the presence of slow moving vehicles which ultimately can act as viewing blinds for those within.

Motorized boating has been shown to affect the abundance, distribution and habitat use of waterfowl and other birds (Dahlgren and Korschgen 1992, Knight and Cole 1995). Non-motorized boats, vehicles on roads, and walking also have potential to disturb birds and influence distribution and habitat use (Burger 1981, Knight 1984, Klein 1993). Compared to motor and airboats, canoe, kayak and rowboat travel appears to have the least disturbance effects on most wildlife species (Jahn and Hunt 1964). Non-motorized boats can still cause significant disturbance effects based on the ability to penetrate into shallower areas (Speight 1973). Vos *et al.* (1985) reported that slow-moving boats caused disturbance to nesting great blue herons when maneuvering directly below the heronries, where most other boats could not access due to shallow water. Kaiser and Fritzell (1984) reported that green-backed heron activity declined on three of four survey routes when canoes and boat use increased on the main river channel of the Ozark National Scenic Riverway.

McFaddin NWR has a special regulation allowing the use of airboats powered by 10 horsepower or less with direct drive, with a propeller length of 48 inches or less. Airboat engines may not exceed 2 cylinders and 484 cc. These types of airboats are limited to traveling in open water where all other motorized boating occurs. They are not capable of cross-country travel, and therefore should not cause damage to wetland vegetation or disturbance to wildlife in areas outside of boating activity.

Impacts related to horseback riding may include exotic plant seed dispersal (Hammitt and Cole 1987), soil compaction and erosion (Bainbridge 1974, Hammitt and Cole 1987, Hendee *et al.* 1990) aesthetic concerns relative to horse manure (Lee 1975), direct wildlife disturbance (Owen 1973, Carlson and McLean 1996), and potential conflicts with other recreationalists. As horseback riding is limited to Refuge roads, and use is very low, these impacts are expected to be minimal.

A variety of regulations govern means of access to public use areas, including boat motor and horsepower restrictions, and prohibition of all-terrain vehicle use. While these regulations are in place primarily to protect habitats and public safety, they also reduce overall disturbance impacts to waterfowl and other migratory birds.

Disturbance impacts caused by wildlife photographers tend to be greater than other wildlife observation techniques (Klein 1993, Morton 1995, Dobb 1998). Photographers are much more likely to leave their vehicles and approach wildlife on foot (Klein 1993). Other impacts include the potential for photographers to remain close to wildlife for extended periods of time in an attempt to habituate the wildlife subject to their presence (Dobb 1998) and the tendency of casual photographers with low power lenses to get much closer to their subject than other activities would require (Morton 1995).

Litter improperly discarded by visitors can entangle wildlife or be ingested, potentially resulting in injury or death (Gregory 1991). Efforts to educate the public about such issues are incorporated into outreach efforts and educational programs.

The above impacts are minimized on the Refuge by locating public use facilities away from sensitive areas, restricting public access to existing roads and trails, and through the strategic placement of trails, observation decks, boardwalks, and photography blinds. While some disturbance impacts occur along these linear corridors, extensive tracts of undisturbed habitats remain available for wildlife in areas adjacent to public use facilities and throughout the Refuge. Additionally, impacts are minimized through development and active enforcement of refuge-specific rules and regulations, including seasonal closures and emergency closures if warranted, and through educational materials made available to the visiting public. As of result of active management of these wildlife-dependent recreational uses, direct, indirect

and cumulative impacts to migratory birds and other biological resources from these uses remain at acceptable levels and will not affect the viability of any fish, wildlife or plant population on the Refuge.

Other Wildlife-dependent Recreational Uses: A major goal of McFaddin NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. While all uses occur concurrently on some portions of the refuge open to the public, few conflicts between users have been documented. Where potential for conflicts or safety issues exists areas on the refuge open to hunting are seasonally closed to other uses. Public use trends and associated impacts from human activity will continue to be monitored on the Refuge. If significant increases in use are found, the program will be reevaluated.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Stipulations designed to ensure compatibility for wildlife observation, photography, environmental education and interpretive programs outlined in the description of use section should minimize impacts to a point where these activities would be compatible with the purposes established for McFaddin NWR.

Designated public use areas on McFaddin NWR will be open from one hour before sunrise to one hour after sunset daily.

Although wildlife observation, photography, environmental education and interpretation occur via several different modes of access, all visitors must stay on designated roads, trails or waterways. By concentrating disturbances to these designated areas, large areas of undisturbed habitat are still available for wildlife.

Designated trails will be open for wildlife observation and photography seasonally outside of waterfowl season.

Outboard motor boats, airboats, and non-motorized boats may be used to access Mud Bayou, Mud Lake, 10-Mile Cut and Clam Lake year-round, and seasonally between March 15th and August 31st on Star Lake. 5-Mile Cut is open for wildlife observation and photography via non-motorized boat only between March 15th and August 31st. Airboats may not exceed 10 hp with direct drive with a propeller length of 48 inches or less, and engines may not exceed 2 cylinders and 484 cc. On inland waters of the Refuge open to motorized boats, the operation of motorized boats is restricted to lakes, ponds, ditches, and other waterways. Motorized boats are prohibited on or through emergent wetland vegetation. In addition, the use of boats powered by air-cooled or radiator-cooled engines is restricted to those powered by a single engine of 25 horsepower or less and utilizing a propeller 9 inches (22.5 cm) in diameter or less. By year 2011, all motorized boats on inland waters of the Refuge will be restricted to 25 hp or less. Boat motor horsepower restrictions would not apply on the 10-Mile Cut portion of Salt Bayou and on Mud Bayou. This grace period of 5 years is aimed to provide those visitors currently using boats with a horsepower greater than 25 ample time to prepare for this change in regulation. In areas where propellers are

damaging submergent vegetation and creating permanent channels in shallow water, no prop zones may also be initiated. Regular monitoring will be required to adequately determine where these zones would best be located. Marsh buggies, all-terrain vehicles and personal watercraft are prohibited on the Refuge.

Five boat ramps are available on the Refuge for launching small, shallow-draft boats only. Boat ramps are located at Clam Lake (2), 10-Mile Cut, 5-Mile Cut and Star Lake.

Bicycling and horseback riding in support of wildlife observation is permitted on public roads open to motorized vehicles only. Horseback riding as an organized trail ride is prohibited.

Recordings to attract wildlife are prohibited. The collection of plants or animals, or feeding or disturbing wildlife, is prohibited. Pets must be leashed at all times.

Continued law enforcement patrols will be necessary to ensure compliance with these and State and Federal regulations.

Justification:

These programs are determined to be compatible with the establishment purposes of the Refuge and the mission of the National Wildlife Refuge System. Wildlife observation, photography, environmental education and interpretation are wildlife-dependent, priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Facilities and activities related to wildlife observation, photography, environmental education and interpretation occur in designated areas of the Refuge, leaving large areas of undisturbed habitat available for wildlife. The stipulations outlined above are specifically designed to and should minimize potential impacts of these activities. The Refuge will continue to monitor uses and adjust programs as necessary to protect Refuge resources. The educational benefits gained from these activities are expected to outweigh their associated impacts. Providing opportunities for wildlife observation, photography, environmental education and interpretation has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving habitat, thereby further contributing to the overall mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Adams, L. W. and A. D. Geis. 1983. Effects of roads on small mammals. J. Appl. Ecol. 20(2):403-415.

Ashley, E. P., and J. T. Robinson. 1996. Road mortality of amphibians, reptiles and other wildlife on the Long Point causeway, Lake Erie, Ontario. Canadian Field-Naturalist 110:403-412.

Bainbridge, D.A. 1974. Trail Management. Bulletin of the Ecological Society of America. 55:8-10.

Boyle, S. A. and F. B. Samson. 1985. Effects of nonconsumptive recreation on wildlife: a review. Wildl. Soc. Bull. 13(2): 110-116.

Buckley, P. A. and F. G. Buckley. 1978. Guidelines for protection and management of colonially nesting waterbirds. North Atlantic Regional Office, National Park Service, Boston, MA. 52pp.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Cons. 21:231-241.

Busnel, R. (Ed). 1978. Effects of Noise on Wildlife. Fletcher, J.L. and R.G. Busnel eds. Academic Press, New York.

Carlson, B. A. and E. B. McLean. 1996. Buffer zones and disturbance types as predictors of fledging success in great blue herons, *Ardea herodias*. Colonial Waterbirds 19(1): 124-127.

Dahlgren, R. B. and C. E. Korschgen. 1992. Human disturbances of waterfowl: an annotated bibliography. U.S. Fish and Wildlife Service Resource Publication 188. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/disturb/disturb.htm (Version 16JUL97).

Dobb, E. 1998. Reality check: the debate behind the lens. Audubon: Jan.-Feb.

Dowler, R. C. and G. A. Swanson. 1982. High mortality of Cedar Waxwings associated with highway plantings. Wilson Bull. 94: 602-603.

Dunton, K. H., S. V. Schonberg, S. Herzka, P. A. Montagna, and S. A. Holt. 1998. Characterization of anthropogenic and natural disturbance on vegetated and unvegetated bay bottom habitats in the Corpus Christi Bay National Estuary Program study area, Volume II: Assessment of scarring in seagrass beds. Corpus Christi Bay National Estuary Program, CCBNEP-25b.

Dwernychuk, L. W. and D. A. Boag. 1972. How vegetative cover protects duck nests from egg-eating birds. J. Wildl. Manage. 36:955-958.

Gabrielsen, G. W. and E. N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

George, W. G. 1974. Domestic cats as predators and factors in winter shortages of raptor prey. Wilson Bulletin 86(4):384-396.

Glinski, R. L. 1976. Birdwatching Etiquette: the need for a developing philosophy. Am. Bird 30(3):655-657.

Gregory, M. R. 1991. The hazards of persistent marine pollution: Drift plastics and conservation islands. J. Royal Soc. New Zealand. 21(2):83-100.

Gutzwiller, K. J. and H. A. Marcum. 1997. Bird reactions to observer clothing color: applications for distance sampling techniques. J. Wildl. Manage. 61:935-947.

Gutzwiller, K. J., R. T. Wiedenmann, K. L. Clements, and S. H. Anderson. 1994. Effects of human intrusion on song occurrence and singing consistency in subalpine birds. The Auk 111(1):28-37.

Hamerstrom, F., D. D. Berger, and F. N. Hamerstrom Jr. 1965. The effect of mammals on prairie chickens on booming grounds. Journal of Wildlife Management 29:536-542.

Hammitt, W. E. and D. N. Cole. 1987. Wildland recreation: ecology and management. John Wiley and Sons, New York, NY. 341 pp.

Hendee, J.C., G. H. Stankey, and R. C. Lucas. 1990. Wilderness Management. North American Press, Golden, CO.

Jahn, L. R. and R. A. Hunt. 1964. Duck and coot ecology and management in Wisconsin. Wisconsin Conserv. Dep. Tech. Bull. No.33 212pp. http://digital.library.wisc.edu/1711.dl/EcoNatRes.DNRBull33

Kaiser, M. S. and E. K. Fritzell. 1984. Effects of river recreationalists on green-backed heron behavior. J. Wildl. Manage. 48(2): 561-567.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21:31-39.

Knight, R. L. 1984. Responses of wintering bald eagles to boating activity. J. Wildl. Manage. 48(3): 999-1004.

Knight, R. L. and D. N. Cole. 1995. Wildlife responses to recreationalists. Pages 51-69 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

Lee, R. G. 1975. The management of human components in the Yosemite National Park ecosystem. Yosemite National Park, CA. 134 pp.

Lenington, S. 1979. Predators and blackbirds: The “uncertainty principle” in field biology. The Auk 96:190-192.

Lowry, D. A. and K. L. McArthur. 1978. Domestic dogs as predators on deer. Wildlife Society Bulletin 6:38-39.

MacArthur, R. A., V. Geist, and R. H. Johnston. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. Journal of Wildlife Management 46:351-358.

Madley, K., J. Krolick, and B. Sargent. 2004. Assessment of boat propeller scar damage within the Greater Charlotte Harbor region. Florida Fish and Wildlife Conservation Commission, St. Petersburg, Florida.

Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. Ecological Applic. 8(1):162-169.

Morton, J. M. 1995. Management of human disturbance and its effects on waterfowl. Pages F59-F86 *in* W. R. Whitman, T. Strange, L. Widjeskog, R. Whittemore, P. Kehoe, and L. Roberts (eds.). Waterfowl habitat restoration, enhancement and management in the Atlantic Flyway. Third Ed. Environmental Manage. Comm., Atlantic Flyway Council Techn. Sect., and Delaware Div. Fish and Wildl., Dover, DE. 1114pp.

Owen, M. 1973. The management of grassland areas for wintering geese. Wildfowl. 24:123-130.

Pulich, W., C. Blair and W. A. White. 1997. Current status and historical trends of seagrasses in the Corpus Christi Bay National Estuary Program study area. Corpus Christi Bay National Estuary Program, CCBNEP-20.

Reijnen, R. and R. Foppen. 1994. The effects of car traffic on breeding bird populations in woodland. I. Evidence of reduced habitat quality for willow warblers (*Phylloscopus trochilus*) breeding close to a highway. J. Applied Ecol. 31(1):85-94.

Riffell, S. K., K. J. Gutzwiller, and S. H. Anderson. 1996. Does repeated human intrusion cause cumulative declines in avian richness and abundance? Ecol. Appli. 6(2):492-505.

Rosen, P. C. and C. H. Lowe. 1994. Highway mortality of snakes in the Sonoran Desert of southern Arizona. Biol. Conserv. 68:143-148.

Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

Spellerberg, I. F. 1998. Ecological effects of roads and traffic: a literature review. Global Ecology and Biogeography Letters. 7(5):317-333.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Vos, D. K., R. A. Ryder, and W. D. Graul. 1985. Response of breeding great blue herons to human disturbance in northcentral Colorado. Colonial Waterbirds. 8(1):13-22.

Zande, A. N. van der, W. J. ter Keurs, and W. J. Van der Weijden. 1980. The impact of roads on the densities of four bird species in an open field habitat – evidence of a long-distance effect. Biol. Conserv. 18:299-321.

COMPATIBILITY DETERMINATION: MCFADDIN NWR – CONTROLLED LIVESTOCK GRAZING

Use: Controlled Livestock Grazing

Refuge Name: McFaddin National Wildlife Refuge

County: Jefferson, Galveston and Chambers counties, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act, Emergency Wetlands Resources Act, Refuge Recreation Act, Fish and Wildlife Act of 1956

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

McFaddin National Wildlife Refuge (NWR) proposes to continue the controlled grazing program in designated areas that are compatible with Refuge purposes. Permittee cattle operations are an economic use of Refuge lands and provide a critical tool for Refuge management. This Compatibility Determination considers continuation of the controlled grazing program on the Refuge, and includes consideration of modifications to the program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

Cattle grazing is an inexpensive, dependable, and effective tool used to accomplish Refuge goals, specifically for management of migratory birds including wintering and resident waterfowl, shorebirds and wading birds. Grazing is used to: 1) open up dense vegetation; 2) depress perennial plants; 3) encourage growth of annual grasses and sedges; and 4) reduce tall, rank grass types and encourage creeping grass species. This program is implemented to encourage a mosaic of heavily, moderately, and ungrazed areas to provide habitats in multiple successional stages on the Refuge.

The grazing program on McFaddin NWR is a cow-calf operation with some bulls introduced for breeding. The cow bloodline is a mixed breed of Zebu ancestry, with Brahma, Angus or Charolais bulls used for breeding. The majority of the habitat on McFaddin NWR is coastal marsh that is managed with cool-season grazing. Using a graze-rest strategy, permittees typically graze October through April. A small amount of warm season grazing is used in fresh water marshes to manage high successional situations. An average of 10,489 (range 4,778 – 14,275) animal unit months (AUMs) occurred annually on McFaddin NWR between FY 1998-2005. Grazing strategies include variations in stocking rates, timing (cool vs. warm season) and duration. Stocking rates and rotations are determined annually according to

management objectives for the various grazing units and the quantity and condition of forage in those units, and are often influenced by the availability of freshwater.

Grazing does not take place uniformly across units, particularly in coastal marshes. Cattle tend to concentrate grazing pressure adjacent to upland areas with decreased grazing pressure with increasing distance from high ground. Acres grazed and grazing pressure varies from year to year. In a typical year, cattle graze approximately 35,000 acres on McFaddin NWR.

Prescribed burning is an integral part of using cattle to meet management objectives. Fire can be used to create favorable foraging conditions for cattle and focus grazing pressure. Excluding high priority uplands, such as salty prairie sites, from burning can reduce grazing pressure where it is less desirable while focusing it on adjacent wetlands.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage the grazing program at existing and projected levels. Costs associated with this activity are primarily staff time. Some additional expenses are incurred through site preparation required to protect grazing infrastructure from fire operations. The cost of new or replaced infrastructure is shared between the permittee and the USFWS.

Anticipated Impacts of Use:

Controlled grazing can be an effective and inexpensive tool in wetland and grassland management providing habitat components that benefit waterfowl and other wildlife species. The relation of cattle grazing to wildlife varies considerably, depending on stocking rate, seasonality, plant community, and wildlife concerned (Chabreck 1968). Research indicates that dual use of grasslands by wildlife and livestock is often compatible when livestock grazing is carefully managed and wildlife needs are considered (Holechek 1982).

Threatened and Endangered Species: Federally-listed Threatened and Endangered species (T&E species) known to use Refuge habitats include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), piping plover (*Charadrius melodus*, Threatened), and American alligator (*Alligator mississippiensis*, Threatened). It is expected that impacts to these species will be negligible. Bald Eagles are rarely observed on the Refuge. They typically feed on wounded or sick birds, and in the past were associated with large concentrations of wintering waterfowl. Brown Pelicans are commonly observed flying over the Refuge and resting along the shoreline of the Gulf of Mexico. Piping plovers winter primarily along the Texas Gulf Coast, though are seldom reported on McFaddin NWR beaches. They utilize beaches, sand flats, mud flats, and dunes along the coast, offshore islands, and spoil islands. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. The grazing program should pose no threat to alligators on the Refuge. Overall, no impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of the grazing program on the Refuge.

Habitats: Grazing (integrated with fire and water management) in wetland habitats on the Refuge promotes the germination, growth and reproduction of several “early successional” target plant communities which are especially beneficial to migratory birds as food sources (Allen 1956, Gosselink *et al.* 1979). Target plant communities in intermediate and brackish marsh habitats on the Refuge include olney bulrush (*Scirpus americanus*), saltmarsh bulrush (Scirpus robustus), seashore paspalum (*Paspalum vaginatum*), seashore saltgrass (*Distichlis spicata*) and annual grasses including millets (*Echinochloa* spp.) and sprangletops (*Leptochloa* spp.), several sedges, and several annual forbs such as purple ammenia (*Ammania coccinea*). Moderate grazing following burns in marshes also prolongs the availability of new grass shoots, a valuable food for snow geese (Gosselink *et al.* 1979). Grazing also helps provide optimal physical structure of vegetation for waterfowl utilization in emergent marshes and other vegetated wetlands by creating openings in otherwise dense stands of vegetation and maintaining plant communities such as seashore paspalum which grow low to the ground. These conditions also

provide excellent habitat for many invertebrate species, another important food source for waterfowl and other migratory birds. Proper grazing of salty prairie seems to produce favorable nesting structure for Mottled Ducks.

Savory and Butterfield (1998) make an important distinction between what they call brittle and non-brittle landscapes. Brittleness is a term used to describe ecosystem resilience to disturbance and forms a continuum from brittle to non-brittle. Non-brittle environments have relatively high, evenly distributed rainfall, rapid recycling of nutrients through decaying plant and animal material and active microorganisms. Brittle environments tend to dry out quickly, have low nutrient recycling and low microorganism activity. Coastal marshes of the upper Texas coast are very much toward the non-brittle end of the spectrum. These marshes experience high annual rainfall distributed throughout the year, a long growing season, very fast nutrient recycling, and vegetation recoveries quickly following disturbances. These conditions require protracted disturbance events, such as grazing, to maintain early successional conditions for any length of time.

Studies conducted on Sabine National Wildlife Refuge in Cameron Parish, Louisiana (Valentine 1961) determined that increased grazing can change tall climax marshhay cordgrass stands to more diverse community such as seashore paspalum, Setaria, and longtom (*Paspalum lividum*), that are more beneficial to certain types of wildlife. Depending on site conditions (elevation, soil, and hydrology) annual grasses and forbs (including millets, fall Panicum (*Panicum dichotomiflorum*), sprangletop, and Setaria) can be produced through proper grazing.

Pate (2001) found that grazed marshes remained in a sub-climax state, while habitat within grazing exclosures reverted to marshhay cordgrass. At the onset of the study Spartina spp. made up 20% of the plant community, while seashore paspalum comprised 80%. By the end of the study, communities within grazing exclosures changed to 65% Spartina spp. and 25% seashore paspalum. In contrast, the grazed area maintained high cover of seashore paspalum throughout the study. Seashore paspalum provides habitat for many species of waterfowl, wading birds and shorebirds, depending on hydrology, while marshhay cordgrass largely precludes these species.

The detrimental affects of grazing in coastal marsh environments includes the risk of overgrazing if units are not closely monitored, bank erosion, excessive trampling of vegetation, compaction of soils reducing percolation rates, and the deposition of nutrients in the form of manure in areas where livestock concentrate (USFWS 1994). Warm-season grazing of wetland areas can reduce seed production of annual grasses (Chabreck 1968).

Migratory Birds and Other Biological Resources: Proper grazing can promote habitat for snow geese, puddle ducks, Wilson's snipe and rails (Chabreck 1968). Chabreck notes that anything more than light grazing would be detrimental to muskrats. Yeargan (2001) determined that the number of shorebirds, herons and egrets was greater in grazed than ungrazed marshes on Galveston Island, Texas, while the number of gulls, terns, sparrows, rails and other species was not different. Mizell (1998) studied wintering yellow rails on Anahuac NWR and suggested that cattle grazing may increase availability of yellow rail habitat.

Management tools used to set back succession (grazing, fire, mechanical disturbance, and herbicides) benefit most wetland-dependent species. The extent to which these tools are applied can be detrimental to some species, while benefiting others. An example of this would be an intensive grazing regime that reduces emergent wetland vegetation, benefiting waterfowl, shorebirds and wadingbirds, but detrimental to species desiring ranker conditions, such as sedge wrens and seaside sparrows. In the practical application of a tool like grazing, the available herd is focused in certain areas to achieve the moderate grazing regime desired, leaving large areas lightly grazed or ungrazed to the benefit of the species desiring the cover of emergent vegetation. Neither intensive grazing nor the lack of grazing is desired over the whole Refuge. Rather, a mosaic of heavily, moderately, and ungrazed wetlands is the target of the grazing management program.

Wildlife-Dependent Recreational Uses: A major goal of McFaddin NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. Conflicts can occur between these uses and the controlled livestock grazing program, but conflicts and potential safety issues are minimized through management which includes regular and recurring maintenance of infrastructure (fences, gates, and cattleguards). In addition, grazing is excluded from refuge units supporting trails, boardwalks, observation platforms and other infrastructure used for wildlife observation and photography, environmental education and interpretation. Grazing units and refuge hunt areas do overlap without negative impacts to either program.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The controlled grazing program provides the Refuge with a management tool to improve habitat quality for migratory birds. The grazing program must assist the Refuge in meeting management objectives.

The grazing program is governed through the issuance of Special Use Permits to permittees. Stipulations necessary to ensure compatibility with Refuge establishment purposes and the mission of the NWRS are included as the Special Conditions of the Special Use Permit. Permittees must adhere to all conditions set forth in Special Use Permit, including the following:

- Permittees will graze cattle in only designated locations of the Refuge. Stocking rates and pasture rotations will be specified by the Refuge Manager.
- The Refuge Manager must be notified in advance of any introduction or removal of cattle.
- Permittees must annually provide a written record of cattle numbers and movements on and off the Refuge.
- Fences, gates, and cattleguards must be maintained by the Permittee with materials provided by the Refuge.
- Permittees must comply with all state and federal livestock health laws.

Refuge staff and grazing permittees must continually monitor habitat conditions and communicate throughout the adaptive management cycle. Factors such as stocking rate, duration, and seasonality must be adjusted as necessary to meet Refuge objectives under changing environmental conditions. To be successful, all participants must understand successional relationships of plant communities and effects of decisions under changing environmental conditions to keep the program aligned with Refuge goals and management objectives. Both short- and long-term monitoring of grazing impacts on Refuge habitats is needed to guide this adaptive management approach.

Justification:

Prescribed cattle grazing is an inexpensive, dependable, and effective tool for managing habitats on McFaddin National Wildlife Refuge. Applications of other disturbance tools, such as fire, are strongly influenced by weather conditions and numerous regulatory restrictions and are less likely to be available

when needed. Grazing is a management tool that, in most instances, can be more dependably implemented to assist in creating sub-climax conditions. High, well-distributed rainfall, rapid decomposition and recycling of nutrients, and long growing seasons makes coastal marshes a less brittle ecosystem (Savory and Butterfield 1998). When properly managed, there are few detrimental effects of grazing coastal marshes, most being aesthetic in nature. When conducted in accordance with the stipulations listed herein, managed cattle grazing is compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Allan, P. F. 1956. A system for evaluating coastal marshes as duck winter range. Journal of Wildlife Management 20(3):247-252.

Chabreck, R. H. 1968. The relation of cattle and cattle grazing to marsh wildlife and plants in Louisiana. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 22:55-58.

Fuhlendorf, S. D. and D. M. Engle. 2001. Restoring heterogeneity on rangelands: Ecosystem management based on evolutionary grazing patterns. Bioscience 51(8): 625-632.

Fuhlendorf, S. D. and D. M. Engle. 2004. Application of the fire-grazing interaction to restore a shifting mosaic on tallgrass prairie. Journal of Applied Ecology 41:604-614.

Gosselink, J.G., C.L. Cordes, and J.W. Parsons. 1979. An ecological characterization study of the Chenier Plain coastal ecosystem of Louisiana and Texas. 3 vols. U.S. Fish and Wildlife Service, Office of Biological Services. USFWS/OBS-78/9 through 78/11.

Holechek, J. L. 1982. Manipulation of grazing to improve or maintain wildlife habitat. Wildlife Society Bulletin 10:204-210.

Mizell, K. L. 1998. Effects of fire and grazing on yellow rail habitat in a Texas coastal marsh. Dissertation, Texas A&M University.

Pate, J. 2001. Effects of cattle grazing on vegetation and wildlife resources at Sabine National Wildlife Refuge. USDA Natural Resources Conservation Services. 21p.

Savory, A. and J. Butterfield. 1998. Holistic Resource Management, A New Framework for Decision Making. Island Press, Washington, DC, USA.

U.S. Fish and Wildlife Service. 1994. Final Environmental Assessment of Alternatives for Management of Grasslands on the Anahuac National Wildlife Refuge Complex, Chambers and Jefferson counties, Texas.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Valentine, J. M. 1961. Grazing on the Sabine National Wildlife Refuge. Unpublished report, Bureau of Sport Fisheries and Wildlife, Lafayette, Louisiana.

Yeargan, C. A. 2001. The effects of cattle grazing on Texas coastal saltmarsh plants and birds. Thesis, Texas A&M University.

COMPATIBILITY DETERMINATION: MCFADDIN NWR – COMMERCIAL ALLIGATOR HARVEST

Use: Commercial Alligator Harvest

Refuge Name: McFaddin National Wildlife Refuge

County: Jefferson, Galveston and Chambers counties, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

The commercial harvest of American alligators (*Alligator mississippiensis*) is administered on the McFaddin National Wildlife Refuge (NWR or Refuge) as a compatible refuge economic use. Additionally, the alligator harvest program supports meeting migratory bird management objectives, specifically for Mottled Ducks *(Anas fulvigula)*, and is considered important for protecting public safety and water management infrastructure. This Compatibility Determination considers continuation of commercial alligator harvest on the Refuge, and includes consideration of modifications to the Refuge commercial alligator harvest program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/ Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

An overall goal of the alligator harvest is to maintain a healthy alligator populations, at densities consistent with the primary establishment propose of the Refuge. Under this goal, the specific objectives include:

1. Maintain overall alligator population age structure which maintains natural alligator social structure. Social structure and related interactions may be an important mechanism affecting overall alligator population dynamics by affecting recruitment and survival, influencing factors such as fecundity (reproductive age, clutch sizes and egg viability), overall breeding densities, and rates of cannibalism by adults on juvenile and subadult alligators.
2. Maintain alligator population density and distribution consistent with meeting population objectives for Mottled Ducks, a resident waterfowl species for which wetlands on the Refuge provide key nesting, brood-rearing and molting habitats.
3. Maintain alligator population density and distribution consistent with providing the public with opportunities for compatible wildlife-dependent recreational opportunities, specifically wildlife observation, photography, environmental education and interpretation.

4. Minimize adverse risks to public safety by minimizing the potential for negative alligator-human conflicts. This involves both public education and when necessary, removal of alligators from locations where conflicts are occurring or are likely to occur.
5. Maintain alligator population density consistent with acceptable levels of damage to water management infrastructure including levees and water control structures.

The Refuge alligator harvest program is conducted under the regulatory frameworks established by the State of Texas Alligator Management Program, administered by the Texas Parks and Wildlife Department (TPWD). In addition to establishing licensing requirements and harvest regulations, the TPWD annually determines the number and allocates hide tags to the Refuge (and other participating landowners). This annual allocation is based on alligator densities per designated habitat type, as indexed by the annual aerial nesting surveys, supplemented by nighttime spotlight surveys when available.

Individuals participating in the Refuge alligator harvest program are chosen randomly from a qualified group of applicants, and are issued Refuge Special Use Permits (SUP). The SUP contains special provisions and conditions which detail refuge-specific regulations and requirements governing alligator harvest on the Refuge.

Permittees are assigned specific target areas to remove alligators. These areas include moist soil units, reservoirs and areas within marsh units which are especially important as Mottled Duck brooding and molting habitats and adjacent canals and ditches. Selected areas where alligators are in frequent contact with the public and where there is potential for alligators to damage levees and other Refuge infrastructure are also targeted.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage the commercial alligator harvest at existing and projected levels. Costs associated with this activity are primarily staff time.

Anticipated Impacts of Use:

The most direct effect of the commercial alligator harvest program on the Refuge is the mortality of harvested alligators. From 1998-2006, annual harvest on the Refuge has ranged from (Table 1). This program is administered under regulations promulgated by Texas Parks and Wildlife Department, and these regulations are designed to ensure that viable alligator populations are sustained over the long-term. Continuation of the commercial alligator harvest program should not have any measurable effect on the long-term viability of alligator populations on the Refuge.

Threatened and Endangered Species: Federally-listed Endangered or Threatened species known to use the Refuge hunt units include bald eagle (*Haliaeetus leucocephalus*, threatened), brown pelican (*Pelecanus occidentalis*, endangered), piping plover (*Charadrius melodus*, threatened), and American alligator (threatened). It is expected that impacts to populations of these species will be negligible. Bald Eagles are rarely observed on the Refuge. They typically feed on wounded or sick birds, and in the past were associated with large concentrations of wintering waterfowl. Brown Pelicans are sometimes observed flying over the Refuge and along the shoreline of East Bay. Piping plovers winter primarily along the Texas Gulf Coast, though are seldom reported on McFaddin NWR beaches. They utilize beaches, sand flats, mud flats, and dunes along the coast, offshore islands, and spoil islands.

American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. The most direct effect of the commercial alligator harvest program on the Refuge is the mortality of harvested alligators. From 1998-2006, annual harvest on the Refuge has ranged from 120 to 339 alligators (Table 1). This program is administered under regulations promulgated by Texas Parks and Wildlife Department, and these regulations are designed to ensure that viable alligator populations are sustained over the long-term. Continuation of the commercial alligator harvest program should not have any measurable effect on the long-term viability of alligator

Table E-4. Alligator harvest on McFaddin NWR, 1998 – 2006.			
Year	**Number Alligators Harvested**		
	Male	Female	Total
1998	73	66	139
1999	61	59	120
2000	106	57	163
2001	120	121	241
2002	174	165	339
2003	145	134	279
2004	113	139	252
2005	80	85	165
2006	84	142	226

populations on the Refuge. Overall, no impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of commercial alligator harvest on the Refuge.

In the late 1990's, harvest trends and some nighttime survey data suggested that that the number of mature adult alligators on the Refuge was decreasing in harvested areas. To counter this trend, the USFWS worked to increase the percentage of subadult alligators in the harvest through a variety of means in order to reduce harvest pressure on mature adult alligators. Primarily because the traditional and most commonly used harvest methodology, the baited hook and line set overnight, is non-selective, these efforts were only moderately successful. A second factor limiting success is economic in nature. Subadult alligators are lower in value per foot in Texas, and the higher prices being paid by Texas commercial buyers/processors for the larger adult alligators creates an incentive for permittees to harvest larger adult alligators and a disincentive to harvest the smaller subadult alligators.

In recent years, administration of the alligator harvest program on the Refuge has been further modified to increase the percentage of subadult alligators in the overall harvest, and concurrently decrease harvest of the larger adult alligators. This is being accomplished by implementing experimental alligator harvest programs in cooperation with the TPWD, utilizing the Management Hide Tags available through the Texas Alligator Management Program for harvest of subadult alligators. Subadult alligators are considered to be those alligators 6' and less in length. The short-term goal is to ensure that subadult alligators comprise a minimum of 50% of the overall harvest on the Refuge, with a long-term goal for the harvest program is for subadult alligators to comprise a minimum of 70% of the annual harvest. Allocations of Management Hide Tags and the traditional CITES Hide Tags to Refuge permittees are geared toward meeting this new harvest objective.

The experimental harvest is conducted by Refuge permittees during the regular alligator season, using only TPWD-approved selective harvest methodologies. These include: 1) baited wooden dowel and line; 2) line with grappling hook; 3) bow and arrow; 4) baited hook and line only when permittee is present and fishing for a specific subadult alligator.

Since implementing the experimental harvest in 2004, harvest of subadult alligators has increased substantially, and now represents approximately 58% of overall harvest on the Refuge. Alligators less than 7' in length now constitute nearly 80% of the harvest. Alligators greater than 7' in length now comprise only 20% of the harvest. This harvest strategy is expected to help ensure that the Refuge alligator population maintains a natural age distribution and social structure.

Migratory Birds and other Biological Resources: Commercial harvest of alligators could result in some disturbance to wildlife adjacent to hunted areas, especially those areas associated with canals. Some trampling of vegetation may also occur near harvest sites. However, it is anticipated that this disturbance would be minimal. If improperly managed, the harvest could negatively impact wildlife observation opportunities in public-use areas.

Various studies report differing predation rates on various types of wildlife (Giles and Childs 1949, Valentine *et al.* 1972, Elsey *et al.* 2004). . The mixed results of these studies are likely a result of varying seasonality, habitat, and prey availability. McNease and Joanen (1977) reported that alligator diets are mainly determined by availability and vulnerability of the prey species. Elsey *et al.,* (2004) reported a relatively high frequency (20.9%) of Mottled Ducks in alligator stomachs taken from animals present in preferred Mottled Duck habitat with broods and molting birds present. This study indicates that alligators may have a deleterious effect on Mottled Ducks in certain habitats during certain phases of their life cycle (primarily flightless molting birds and broods). Additionally, this study found that smaller alligators consumed Mottled Ducks while larger alligators did not. Based on these data it is expected that managing the commercial alligator harvest to focus on smaller alligators and harvest in areas with high Mottled Duck use will have a beneficial impact on Mottled Duck viability on the Refuge.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The commercial harvest of alligators provides the Refuge with a management tool to improve habitat quality for target organisms while ensuring the long term viability of alligator populations. The harvest program must remain consistent with ensuring the conservation of alligators and assist the Refuge in meeting Refuge management objectives. The commercial alligator harvest program is governed through the issuance of Special Use Permits to approved permittees. Stipulations necessary to ensure compatibility with Refuge establishment purposes and the mission of the NWRS are included as the Special Conditions of the Special Use Permit. These include the following stipulations aimed at ensuring protection of Refuge resources and public safety:

- Permittee and their assistants must follow all State and Federal laws regarding alligator harvest as well as all conditions stated in the Special Use Permit. Violation of any Federal, State, or Refuge regulation, or of any special condition of the SUP will result in immediate revocation of the SUP.
- Permittees must be experienced and pre-qualified to participate in this program. Final approval of eligibility rests with the U.S. Fish and Wildlife Service.
- No hunting will be allowed within 100 yards of a known alligator nest.
- Each Permittee may only take as many alligators as they are assigned tags. Within the frameworks set by the Texas Parks and Wildlife Department, harvest quotas for each Permittee will be set by the Refuge Manager, including harvest targets for subadult alligators.
- Permittees must take alligators only from designated areas as assigned by the Refuge Manager.
- Permittees must check sets and/or attempt to harvest alligators using approved methods on a daily basis until all tags are used.
- Allowed modes of motorized access will be specified by the Refuge Manager on an area-by-area basis.
- Permittee may only take alligators by using methods approved by the Texas Parks and Wildlife Department. Wildlife is not permitted to be used as bait.

- All alligators on hook and line sets will be killed immediately. Each alligator must be tagged immediately after being killed. Transport of an untagged alligator is prohibited.
- Firearms (minimum caliber of 22 magnum) may only be used to kill hooked alligators. If shotguns are used, only federally approved non-toxic shot will be permitted. All weapons must be unloaded and encased while in Refuge parking areas, boat launches, or in route to and from designated harvest areas.
- No alligator sets will be allowed in areas that jeopardize public safety.

Compliance with these and all other Special Conditions of the Special Use Permit is necessary to ensure the compatibility of the commercial alligator harvest program.

Justification:

The commercial harvest of alligators is managed on the McFaddin NWR so as to ensure the long-term conservation of healthy alligator populations, while providing the Refuge with a management tool to help meet migratory bird management objectives, protect important management infrastructure, and protect public safety. This program is administered under regulations promulgated by Texas Parks and Wildlife Department, and these regulations are designed to ensure that viable alligator populations are sustained over the long-term. In addition, the USFWS regulates the alligator harvest program on the Refuge through issuance of a Special Use Permit which contains stipulations also designed to conserve alligator populations and best meet management objectives. For example, special regulations are in place to restrict harvest of reproductive-aged alligators and maintain a natural age structure within the Refuge alligator population. Continuation of the commercial alligator harvest program should not have any measurable effect on the long-term viability of alligator populations on the Refuge. When conducted in accordance with the stipulations listed herein, the commercial alligator harvest program is compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Elsey, R.M., P.L. Trosclair, and J.T. Linscombe. 2004. The American alligator as a predator of Mottled Ducks. Southeastern Naturalist 3: 381-390.

Giles, L., and V.L. Childs. 1949. Alligator management on the Sabine National Wildlife Refuge. Journal of Wildlife Management 13(1):16-28.

McNease, L., and T. Joanen. 1974. A study of immature alligators on Rockefeller Refuge, Louisiana. Proc. 28th Ann. Conf. Southeast. Assoc. Game and Fish Comm. 28:482-500.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Valentine, J.M., Jr., J.R. Walther, K.M. McCartney, and L.M. Ivy. 1972. Alligator diets on the Sabine National Wildlife Refuge, Louisiana. Journal of Wildlife Management 36(3):809-815.

COMPATIBILITY DETERMINATION: TEXAS POINT NWR – WATERFOWL HUNTING

Use: Waterfowl Hunting

Refuge Name: Texas Point National Wildlife Refuge

County: Jefferson County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Texas Point National Wildlife Refuge (NWR or Refuge) proposes to continue to provide waterfowl hunting opportunities (for ducks, geese, and coots) in designated areas that are compatible with Refuge purposes. Hunting is a wildlife-dependent, priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. Waterfowl hunting is a long-standing traditional use on and around Texas Point NWR. This Compatibility Determination considers continuation of waterfowl hunting on the Refuge, and includes consideration of modifications to the Refuge hunting program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/ Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

Waterfowl hunting on Texas Point NWR is supported by several modes of access, including outboard motor boats, airboats, non-motorized boats, bicycles, and by foot. Because they are highly interrelated, this compatibility determination includes an assessment of these other activities in conjunction with waterfowl hunting.

Opportunities for waterfowl hunting on Texas Point NWR will be available within the season set by Texas Parks and Wildlife Department in compliance with annually published regulations. Designated hunting areas will be open during established State waterfowl seasons, with the exception that hunting for ducks and coots will not be allowed on the Refuge until the last Saturday in October (not including the September teal and youth-only seasons). If the State-specified duck and coot regular season opens later than the last Saturday in October, then hunting on the Refuge will open consistent with the State-specified season date. All applicable State and Federal regulations are enforced.

The waterfowl hunting season generally falls within the period September to February. Traditionally, the hunting season on the Texas coast begins in September with the early teal season. The regular waterfowl season follows, often beginning in late October and running through January.

Approximately 3,400 acres of the Refuge are open to waterfowl hunting on Texas Point NWR. The hunt unit consists primarily of coastal marsh habitats, including saline, brackish and intermediate marshes.

Designated areas of the Refuge are open for waterfowl hunting daily during the early teal season, and on Saturdays, Mondays and Wednesdays of the regular waterfowl season. The Refuge hunt unit is closed on Thanksgiving, Christmas and New Year's Day.

Hunters may enter the Refuge hunt unit between 4:00 am and ½ hour before shooting time. All hunts are morning-only hunts. Hunting is permitted from legal shooting time (1/2 hour before sunrise) until 12:00 pm. Hunters must be off the Refuge hunt units by 12:30 pm.

A waterfowl hunting permit must be signed and in the possession of the hunter while hunting on the Refuge. This permit is available at no charge and serves to inform the hunter of Refuge-specific regulations. In Fiscal Year 2002, approximately 1,500 hunters utilized the Refuge for waterfowl hunting.

Waterfowl hunting is a long and established tradition in the coastal marshes of southeast Texas, and occurred on Refuge lands long before the establishment of the Refuge. Additional public waterfowl hunting opportunities exist in the area at the State managed J.D. Murphree Wildlife Management Area, the Wallisville Lake Project managed by the U.S. Army Corps of Engineers, and the McFaddin, Anahuac and Sabine National Wildlife Refuges managed by the U.S. Fish and Wildlife Service. With more than 97% of the state privately owned (TPWD 2005), limited public hunting opportunities are available in Texas. State and Federal public hunting areas provide important wildlife-dependent recreational opportunities for the general public.

Availability of Resources:

Costs to administer the hunt program will mostly be salaries and facilities maintenance. This would include law enforcement throughout the season by Refuge law enforcement staff, as well as sign posting, development and publishing of Refuge-specific regulations and permits, and responding to public inquiries and requests for permits. Existing facilities requiring maintenance and upkeep include parking areas and portable restrooms. The length of the season as determined annually by the State may result in an increase or decrease in the number of staff days required to administer the program. Base funding will be needed to manage the program. In addition to season length, hunter trends, either up or down, will result in an increase or decrease in staffing needed.

Anticipated Impacts of Use:

The potential impacts of the Texas Point NWR waterfowl hunt program on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and Endangered species (T&E species) known to use the Refuge hunt units during waterfowl season include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), piping plover (*Charadrius melodus*, Threatened), and American alligator (*Alligator mississippiensis*, Threatened). Bald Eagles are rarely observed on the Refuge. They typically feed on wounded or sick birds, and in the past were associated with large concentrations of wintering waterfowl that occurred on the Refuge. Brown Pelicans are commonly observed flying over the Refuge and resting along the shoreline of the Gulf of Mexico. Piping plovers winter primarily along the Texas Gulf Coast and are regularly reported on Texas Point NWR beaches. They utilize beaches, sand flats, mud flats, and dunes along the coast, offshore islands, and spoil islands. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. The waterfowl hunt program should pose no threat to alligators on the Refuge. Overall, no impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of waterfowl hunting on the Refuge.

Habitats: The greatest potential for impacts to vegetation resources and habitats on the Refuge likely comes from motorized boating activities. Wetland vegetation, especially submerged aquatic vegetation, can be impacted by motorboat activity. For example, propeller scarring has been shown to detrimentally impact seagrass beds in the Laguna Madre in South Texas (Pulich *et al.* 1997, Dunton *et al.* 1998) and in Florida (Madley *et al.* 2004). Propeller scarring leaving permanent channels in shallow pond and waterway bottoms on the Refuge has also raised concerns about the potential for increased saltwater intrusion, with concurrent negative impacts on emergent and submergent aquatic vegetation. Boating, either motorized or non-motorized, also has the potential to introduce or redistribute non-native invasive species.

Foot traffic in areas open to hunting can lead to vegetation trampling, and in heavy use areas, cause plant mortality. Some vegetation trampling and trailing from hunter foot traffic occurs in marsh habitats in hunt areas, although these impacts tend to be short-term.

These impacts are expected to be localized and minimal. Regulations, including motorboat and horsepower restrictions are used to protect wetland habitats and public safety.

Migratory Birds and Other Biological Resources: The most direct effect of hunting on the Refuge is the mortality of harvested waterfowl species resulting from hunting activities. Regulations governing harvest in states in the Central and Mississippi Flyways are developed annually through the Federal framework process for harvest of migratory birds in the U.S. This process is designed to ensure that viable waterfowl populations are sustained over the long-term. Overall, harvest on the Refuge, and cumulatively on all national wildlife refuges open to migratory bird hunting, constitutes a very small percentage of the overall harvest of migratory birds in these Flyways. The continuation of the waterfowl hunting program on the Refuge under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex EIS/CCP/LPP (USFWS 2007) will not have any measurable effect on overall populations of hunted waterfowl species and the long-term viability of these populations.

Many studies have documented the effects of hunting intensity on the number of birds utilizing an area (Madsen *et al.* 1992 as cited by Fox and Madsen 1997). This study demonstrated that relatively light hunting pressure can reduce waterfowl abundance in hunted areas. Distribution and habitat use, feeding patterns, and the nutritional status of waterfowl have also been shown to be affected by hunting activities. Hunting activity can cause birds to alter habitat use, change feeding locations (Madsen 1995), feed more at night (Thornburg 1973, Morton *et al.* 1989) and reduce the amount of time spent feeding (Korschgen *et al.* 1985, Madsen 1995). Collectively, these changes in behavior have the potential to adversely impact the nutritional status of waterfowl (Bélanger and Bédard 1995).

Hunting may have a more significant impact on resident Mottled Ducks. Pair bonds for Mottled Ducks begin earlier than northern nesting birds and disturbance caused by hunting may disrupt the reproductive cycle for this species. Additionally, opening the regular waterfowl season before the arrival of migrating ducks from northern breeding areas allows for disproportionate harvest of resident birds, primarily Mottled Ducks. Refuge-specific regulations prohibit the opening of the general waterfowl season on the Refuge any earlier than the third Saturday in October in order to prevent this impact.

It has been shown that sanctuary areas on the wintering grounds are effective in maintaining local waterfowl populations in a landscape subject to hunting pressure (Bellrose 1954, Madsen 1998). Heitmeyer and Raveling (1988) found that waterfowl used sanctuaries during the day and local rice fields at night. Similarly, Fleskes *et al.* (2005) found northern pintail used areas closed to hunting during the day and dispersed throughout the area at night. These data indicate that while sanctuaries are effective in maintaining local waterfowl populations through the hunting season, birds must disperse at night to feed.

Sanctuary areas tend to support greater numbers of waterfowl the longer they have been established. Bellrose (1954) found that traditional sanctuary areas support higher populations of migrating ducks than newly established sanctuary areas. Similarly, Madsen (1998) found that it took two to six years between the creation of sanctuary areas and the time when peak numbers of dabbling ducks were reached.

These data indicate that traditional, long-term sanctuary areas are more valuable to maintaining local waterfowl populations than sanctuary areas that shift from year to year.

Presumably, providing waterfowl with predictable undisturbed sanctuary areas increases the ability of birds to meet the obligations of their annual cycle. Waterfowl undergo considerable physiological demands during winter. Heitmeyer (1988) estimated that prebasic molt in female mallards required an additional three grams per day of protein over base metabolic rates. These demands approach the estimated five grams per day associated with reproduction. Pair formation for most North American waterfowl takes place away from the breeding grounds. Waterfowl must accumulate endogenous energy reserves to meet the demands of courtship (Afton and Sayler in Baldassarre and Bolen 1994). Baldassarre and Bolen (1994) proposed that birds that do not accumulate energy reserves may have less time and energy at their disposal to initiate courtship and/or may be unable to maintain previously established pair bonds. Clearly, birds must meet high energy demands to successfully fulfill critical wintering components of their annual cycle. Further, Heitmeyer and Fredrickson (1981) build a scenario where endogenous reserves established on wintering grounds return mallards to breeding areas in better condition to begin nesting, leading to larger clutch sized and earlier nests, which tend to be more successful. Providing sanctuary areas of adequate size adjacent to quality feeding areas may contribute to the ability of birds to meet the physiological demands required during winter and possibly the subsequent nesting cycle.

The size, location and habitat quality of sanctuary areas on the Refuge remains critically important to ensure that migrating and wintering populations of waterfowl maintain sound nutritional and physiological status. Overall, it is expected that the maintenance of traditional sanctuary areas on the Refuge adequately mitigates for impacts from hunting activities. In years of particularly poor habitat quality due to climatic extremes or tidal flooding from tropical disturbances, however, it is possible that hunting activities would result in reduced abundance of wintering waterfowl on the Refuge.

Although the impacts of waterfowl hunting on wetland-dependent migratory and resident birds which are not hunted is likely less than for waterfowl, studies have demonstrated that hunting (including accessing hunt areas) does affect abundance and distribution of these other avian species. The noise associated with shooting likely reduces habitat utilization by shorebirds, wading birds, other marsh and waterbirds, and landbirds using wetland habitats within hunt areas, at least while hunting is occurring.

Incidental take of other wildlife species, either illegally or unintentionally, may occur with any consumptive use program. At current and anticipated public use levels and based on past history, incidental take is expected to be small and will not directly or cumulatively impact current or future populations of wildlife on the Refuge.

Means of access to and within Refuge hunt areas include motorized boating (primarily in Texas Bayou), non-motorized boating, walking, and bicycling (levee only). Motorized boating has been shown to affect the abundance, distribution and habitat use of waterfowl and other birds (Dahlgren and Korschgen 1992, Knight and Cole 1995). Non-motorized boats and walking also have potential to disturb birds and influence distribution and habitat use (Burger 1981, Knight 1984, Klein 1993). Compared to motor and airboats, canoe, kayak and rowboat travel appears to have the least disturbance effects on most wildlife species (Jahn and Hunt 1964). Non-motorized boats can still cause significant disturbance effects based on the ability to penetrate into shallower areas (Speight 1973). Vos *et al.* (1985) reported that slow-moving boats caused disturbance to nesting great blue herons when maneuvering directly below the heronries, where most other boats could not access due to shallow water. Kaiser and Fritzell (1984) reported that green-backed heron activity declined on three of four survey routes when canoes and boat use increased on the main river channel of the Ozark National Scenic Riverway.

Texas Point NWR has a special regulation allowing the use of airboats powered by 10 horsepower or less with direct drive, with a propeller length of 48 inches or less. Airboat engines may not exceed 2 cylinders and 484 cc. These types of airboats are limited to traveling in open water where all other motorized boating occurs. They are not capable of cross-country travel, and therefore should not cause damage to wetland vegetation or disturbance to wildlife in areas outside of boating activity.

A variety of regulations govern means of access to hunt areas, including boat motor and horsepower restrictions, and prohibition of all-terrain vehicle use. While these regulations are in place primarily to protect habitats and public safety, they also reduce overall disturbance impacts to waterfowl and other migratory birds.

Other Wildlife-dependent Recreational Uses: A major goal of Texas Point NWR is to provide opportunities for wildlife-dependent recreation. Few conflicts among users of the Refuge have been documented in relation to waterfowl hunting. Although refuge hunt units are open for the other uses, natural spatial and temporal separations between recreational users of the Refuge minimize conflicts. Anglers fishing or crabbing on the Refuge typically utilize different habitats than those utilized by waterfowl hunters and waterfowl. Anglers most often prefer deeper waters, and are more active in the warmer months outside of the waterfowl season. Most visits for wildlife observation and photography, environmental education and interpretation occur in the spring, outside of waterfowl hunting season.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

To reduce the impact of hunting on the resident Mottled Duck, modifications may be placed on opening dates for the regular waterfowl season. Season dates on the Refuge will be concurrent with Texas Parks and Wildlife Department for the September teal season, youth-only season, and duck and coot regular season in the Texas South Zone, and goose regular season in the Texas East Zone, with the exception that hunting for duck (not including the September teal and youth-only seasons) and coot will not be allowed on the Refuge until the last Saturday in October. If the State-specified duck and coot regular season opens later than the last Saturday in October, then hunting on the Refuge will open consistent with the State-specified season date.

All waterfowl hunters must follow the stipulations set forth in the waterfowl hunting regulations published annually by the Refuge.

Portions of Texas Point NWR will be open for waterfowl hunting daily during the early teal season, and three days a week (Saturdays, Mondays, and Wednesdays) of the regular waterfowl season. All hunts are morning-only hunts. Hunters may enter Refuge hunt units between 4:00 am and ½ hour before shooting time. Hunting is permitted from legal shooting time (1/2 hour before sunrise) until 12:00 pm. Hunters must be off the Refuge hunt units by 12:30 pm. All other portions of the Refuge are closed to waterfowl hunting. Long-term, traditional sanctuary areas will remain as sanctuary, with no public access.

Access into hunt areas may be by foot, bicycle, non-motorized boat, outboard motor boat, or airboat. Bicycles are permitted on the levee only. Airboats may not exceed 10 hp with direct drive with a propeller length of 48 inches or less and engines may not exceed 2 cylinders and 484cc. Boat access is permitted only through Texas Bayou and associated waterways. On inland waters of Refuge hunt areas open to motorized boats, the operation of motorized boats is restricted to lakes, ponds, ditches, and other waterways. Motorized boats are prohibited on or through emergent wetland vegetation. In addition, the

use of boats powered by air-cooled or radiator-cooled engines is restricted to those powered by a single engine of 25 horsepower or less and utilizing a propeller 9 inches (22.5 cm) in diameter or less. By year 2011, all motorized boats on inland waters of Refuge hunt units will be restricted to 25 hp or less. Boat motor horsepower restrictions would not apply on Texas Bayou. This grace period of 5 years is aimed to provide those hunters currently using boats with a horsepower greater than 25 ample time to prepare for this change in regulation. In areas where propellers are damaging submergent vegetation and creating permanent channels in shallow water, no prop zones may also be initiated. Regular monitoring will be required to adequately determine where these zones would best be located. Marsh buggies, all-terrain vehicles and personal watercraft are prohibited on the Refuge.

No limits are currently in place for numbers of hunters or parties waterfowl hunting on Texas Point NWR. Past history indicates that hunter use on Texas Point NWR is relatively low.

The use of retrieving dogs will continue to be allowed and encouraged in all areas open to waterfowl hunting for the conservation of downed birds. Dogs must be under the control of handlers at all times.

The Refuge will maintain an active law enforcement presence in an effort to maximize compliance with State and Federal waterfowl hunting regulations. Annual monitoring of hunter use and impacts will be implemented. The information gathered will be used to review and possibly revise hunting regulations to enhance the quality and safety of the Refuge's hunting program, and to ensure that waterfowl hunting activities will continue to be compatible with Refuge purposes and the mission of the National Wildlife Refuge System.

Justification:

The Texas Point NWR waterfowl hunting program is determined to be compatible with the establishment purposes of the Refuge and the mission of the National Wildlife Refuge System. The Refuge provides quality waterfowl habitats for thousands of migratory birds annually. Migratory bird populations and harvest parameters are monitored and managed on a flyway basis and are designed to ensure the long-term sustainability of populations. Additionally, the hunt program on the Refuge is specifically designed to provide quality public hunting opportunities while minimizing potential impacts to local populations of migratory birds and their habitats.

Refuge-specific regulations are in place to minimize potential adverse impacts from hunting-related disturbance to wildlife and habitats. Regulations govern means of access to hunt areas, including boat motor and horsepower restrictions, and prohibition of all-terrain vehicle use. Of critical importance is the USFWS' ability to manage and maintain traditional sanctuary areas. The Refuge will continue to monitor hunter use, compliance with rules and regulations, and impacts to waterfowl and other wildlife and use this information to adjust the waterfowl hunt program as necessary to protect Refuge resources.

Hunting is a priority wildlife-dependent public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Waterfowl hunting is a long-standing traditional use on and around Texas Point NWR, and has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving habitat, thereby ultimately contributing to the overall mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: 5-4-07
(Signature and Date)

Literature Cited:

Baldassarre, G. A. and E. G. Bolen. 1994. Waterfowl Ecology and Management. John Wiley and Sons, Inc.

Bélanger, L. and J. Bédard. 1995. Hunting and waterfowl. Pages 243-256 in R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D. C. 372pp.

Bellrose, F. C. 1954. The value of waterfowl refuges in Illinois. Journal of Wildlife Management 18(2):160-169.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Cons. 21:231-241.

Dahlgren, R. B. and C. E. Korschgen. 1992. Human disturbances of waterfowl: an annotated bibliography. U.S. Fish and Wildlife Service Resource Publication 188. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/disturb/disturb.htm (Version 16JUL97).

Dunton, K. H., S. V. Schonberg, S. Herzka, P. A. Montagna, and S. A. Holt. 1998. Characterization of anthropogenic and natural disturbance on vegetated and unvegetated bay bottom habitats in the Corpus Christi Bay National Estuary Program study area, Volume II: Assessment of scarring in seagrass beds. Corpus Christi Bay National Estuary Program, CCBNEP-25b.

Fleskes, J. P., D. S. Gilmer, and R. L. Jarvis. 2005. Pintail distribution and selection of marsh types at Mendota Wildlife Area during fall and winter. California Fish and Game 91(4):270-285.

Fox, A. D. and J. Madsen. 1997. Behavioural and distributional effects of hunting disturbance on waterbirds in Europe: implications for refuge design. Journal of Applied Ecology 34:1-13.

Heitmeyer, M. E. 1988. Protein costs of the prebasic molt of female mallards. The Condor 90:263-266.

Heitmeyer, M. E., and L. H. Fredrickson. 1981. Do wetland conditions in the Mississippi Delta hardwoods influence mallard recruitment? Trans. North Am. Wildl. Nat. Resour. Conf. 46:44-57.

Heitmeyer, M. E. and D. G. Raveling. 1988. Winter resource use by three species of dabbling ducks in California. Dept. Wildlife and Fisheries Biology, Univ. of Calif., Davis. Final Report to Delta Waterfowl and Wetlands Research Center, Portage La Prairie, Manitoba, Canada. 200pp.

Jahn, L. R. and R. A. Hunt. 1964. Duck and coot ecology and management in Wisconsin. Wisconsin Conserv. Dep. Tech. Bull. No. 33. 212pp.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21:31-39.

Knight, R. L. 1984. Responses of wintering bald eagles to boating activity. J. Wildl. Manage. 48(3): 999-1004.

Knight, R. L. and D. N. Cole. 1995. Wildlife responses to recreationalists. Pages 51-69 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

Korschgen, C. E., L. S. George, and W. L. Green. 1985. Disturbance of diving ducks by boaters on a migrational staging area. Wildl. Soc. Bull. 13:290-296.

Madley, K., J. Krolick, and B. Sargent. 2004. Assessment of boat propeller scar damage within the Greater Charlotte Harbor region. Florida Fish and Wildlife Conservation Commission, St. Petersburg, Florida.

Madsen, J. 1995. Impacts of disturbance on migratory waterfowl. Ibis 137: S67-S74.

Madsen, J. 1998. Experimental refuges for migratory waterfowl in Danish wetlands. II. Tests of hunting disturbance effects. Journal of Applied Ecology 35:398-417.

Morton, J. M., R. L. Kirkpatrick, M. R. Vaughan, and D. F. Stauffer. 1989. Habitat use and movements of American black ducks in winter. Journal of Wildlife Management 53(2): 390-400.

Pulich, W., C. Blair and W. A. White. 1997. Current status and historical trends of seagrasses in the Corpus Christi Bay National Estuary Program study area. Corpus Christi Bay National Estuary Program, CCBNEP-20.

Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

Texas Parks and Wildlife Department. (2005). South Texas Wildlife District: Urban Wildlife Management – Texas Wildscapes. Retrieved 11 April 2006 from http://www.tpwd.state.tx.us/landwater/land/habitats/southtx_plain/urban/wildscapes.phtml

Thornburg, D. D. 1973. Diving duck movements on Keokuk Pool, Mississippi River. J. Wildl. Manage. 37(3):382-389.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

COMPATIBILITY DETERMINATION: TEXAS POINT NWR - FISHING

Use: Fishing

Refuge Name: Texas Point National Wildlife Refuge

County: Jefferson County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act

Refuge Purpose:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Texas Point National Wildlife Refuge (NWR or Refuge) proposes to continue to provide fishing opportunities in designated areas that are compatible with Refuge purposes. Fishing is a wildlife-dependent, priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. It is a wildlife-oriented recreational use and a traditional use of Texas Point NWR. This Compatibility Determination considers continuation of fishing on the Refuge, and includes consideration of modifications to the Refuge fishing program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

Fishing on Texas Point NWR is supported by several modes of access, including outboard motor boats, airboats, non-motorized boats, and by foot. Because they are highly interrelated, this compatibility determination includes an assessment of these other activities in conjunction with fishing.

Texas Point NWR provides saltwater fishing opportunities year-round via boat in Texas Bayou and associated tributaries, as well as from roadside edges bordering the Refuge. Refuge fishing areas are open from one hour before sunrise to one hour after sunset daily. Blue crab, alligator gar, flounder, and red drum are just some of the species that anglers may catch while fishing on the Refuge. Shallow water boats can launch at a private dock at Texas Bayou, or from the nearby Dick Dowling State Park for a small fee (as of June 2006, Dick Dowling State Park remains closed due to the effects of Hurricane Rita). Personal watercraft are prohibited from the Refuge. During Fiscal Year 2002, approximately 5,475 anglers utilized the Refuge for fishing.

The USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge EIS/CCP/LPP proposes to 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 the Refuge. In addition, the Refuge proposes to increase interpretive materials regarding fishery resources found on the Refuge.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage wildlife-dependent recreational fishing activities at existing and projected levels. Costs associated with this activity are primarily staff time. Refuge law enforcement officers regularly check anglers and crabbers for compliance with State and Refuge regulations. Additional funds would be needed to implement the proposed strategies listed under Refuge Management Alternative D of the Texas Chenier Plain Refuge Complex EIS/CCP/LPP. The Refuge would pursue a variety of funding sources in order to fully support this use, including agreements with other agencies, and grant funding and volunteer assistance.

Anticipated Impacts of the Use:

The potential impacts of the Texas Point NWR fishing program on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and Endangered species (T&E species) known to use Refuge habitats include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), piping plover (*Charadrius melodus*, Threatened), and American alligator (*Alligator mississippiensis*, Threatened). Bald Eagles are rarely observed on the Refuge. They typically feed on wounded or sick birds, and in the past were associated with large concentrations of wintering waterfowl that occurred on the Refuge. Brown Pelicans are commonly observed flying over the Refuge and resting along the shoreline of the Gulf of Mexico. Piping plovers winter primarily along the Texas Gulf Coast and are regularly reported on Texas Point NWR beaches. They utilize beaches, sand flats, mud flats, and dunes along the coast, offshore islands, and spoil islands. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Fishing activities may pose a potential conflict with American alligators, which are attracted to bait used by anglers. Alligators can become accustomed to the presence of anglers and the associated food source, thereby reducing their natural fear of humans and potentially creating a safety hazard. Overall, no impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of fishing on the Refuge.

Habitats: The greatest potential for impacts to vegetation resources and habitats likely comes from motorized boating activities. Wetland vegetation, especially submerged aquatic vegetation, can be impacted by motorboat activity. For example, propeller scarring has been shown to detrimentally impact seagrass beds in the Laguna Madre in South Texas (Pulich *et al.* 1997, Dunton *et al.* 1998) and in Florida (Madley *et al.* 2004). Propeller scarring leaving permanent channels in shallow pond and waterway bottoms on the Refuge has also raised concerns about the potential for increased saltwater intrusion, with concurrent negative impacts on emergent and submergent aquatic vegetation. Boating, either motorized or non-motorized, also has the potential to introduce or redistribute non-native invasive species.

Foot traffic in areas open to fishing can lead to vegetation trampling. In heavy use areas, this may cause plant mortality and subsequent erosion along shoreline areas (Liddle and Scorgie 1980, Hendee *et al.* 1990).

Fishery Resources: The most direct effect of fishing on the Refuge is the mortality of harvested saltwater fish, blue crabs, and several fish and shellfish species caught for use as bait. Fishing and crabbing on the Refuge occur under regulations promulgated by Texas Parks and Wildlife Department. These regulations are designed to ensure that viable fish and shellfish populations are sustained over the long-term. Continuation of fishing and crabbing on the Refuge should not have any measurable effect on overall populations and the long-term viability of these species' populations.

Similarly, the potential exists for over-harvest or illegal harvest of fisheries. Regular law enforcement patrols to ensure compliance with State and Federal regulations will assist in minimizing these potential impacts.

Migratory Birds and other Biological Resources: Some disturbance to wildlife from fishing activities is also expected. Fishing activities may influence the composition of bird communities (Tydeman 1977), as well as distribution, abundance, and productivity of waterbirds (Bell and Austin 1985). Jahn and Hunt (1964 as cited by Dahlgren and Korschgen 1992) reported that increases in recreational activity by anglers, boaters, and shoreline activity appeared to discourage breeding ducks and coots from using otherwise suitable habitat. Bell and Austin (1985) suggested that anglers fishing from the shoreline and boats displaced waterfowl from their preferred feeding and roosting areas and caused wigeon, green-winged teal, pochard and mallard to depart from a 174 ha reservoir prematurely. Cooke (1987) also documented that anglers on the bank and in boats often fished the shallow, sheltered bays and creeks that birds favor and negatively impacted distribution and abundance of waterfowl, grebes, and Eurasian coots. Cooke (1977 as cited by Liddle and Scorgie 1980) suggested that anglers create an area around them within which birds will not venture. Thus, an angler sitting on the shore can effectively exclude birds from his immediate vicinity. Some disturbance of roosting and feeding shorebirds probably occurs (Burger 1981) but is considered minimal.

Motorized boating has been shown to affect the abundance, distribution and habitat use of waterfowl and other birds (Dahlgren and Korschgen 1992, Knight and Cole 1995). Non-motorized boats, vehicles on roads, and walking also have potential to disturb birds and influence distribution and habitat use (Burger 1981, Knight 1984, Klein 1993). Compared to motor and airboats, canoe, kayak and rowboat travel appears to have the least disturbance effects on most wildlife species (Jahn and Hunt 1964). Non-motorized boats can still cause significant disturbance effects based on the ability to penetrate into shallower areas (Speight 1973). Vos *et al.* (1985) reported that slow-moving boats caused disturbance to nesting great blue herons when maneuvering directly below the heronries, where most other boats could not access due to shallow water. Kaiser and Fritzell (1984) reported that green-backed heron activity declined on three of four survey routes when canoes and boat use increased on the main river channel of the Ozark National Scenic Riverway.

Texas Point NWR has a special regulation allowing the use of airboats powered by 10 horsepower or less with direct drive, with a propeller length of 48 inches or less. Airboat engines may not exceed 2 cylinders and 484 cc. These types of airboats are limited to traveling in open water where all other motorized boating occurs. They are not capable of cross-country travel, and therefore should not cause damage to wetland vegetation or disturbance to wildlife outside of areas open to boating.

Discarded fishing line and other fishing litter can entangle migratory birds and other wildlife and cause injury or death (Thompson 1969, Gregory 1991).

A variety of regulations govern means of access to public fishing areas, including boat motor and horsepower restrictions. While these regulations are in place primarily to protect habitats and public safety, they also reduce overall disturbance impacts to waterfowl and other migratory birds.

Other Wildlife-dependent Recreational Uses: A major goal of Texas Point NWR is to provide opportunities for wildlife-dependent recreation. Few conflicts among users of the Refuge have been documented in relation to fishing. Natural spatial and temporal separations between recreational users of the Refuge minimize conflicts. Anglers fishing or crabbing on the Refuge typically utilize different habitats than those utilized by waterfowl hunters and waterfowl. Anglers most often prefer deeper waters, and are more active in the warmer months outside of the waterfowl season. Most visits for wildlife observation and photography, environmental education and interpretation also occur in the spring, but are concentrated along established trails in small refuge woodlands.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible.
_X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

This section identifies the restrictions and regulations necessary to ensure compatibility of fishing on Texas Point NWR.

Fishing and crabbing is allowed in designated areas of the Refuge in accordance with State regulations and subject to Refuge-specific conditions. Fishing and crabbing is permitted year-round via boat in Texas Bayou and associated tributaries, as well as from roadside edges bordering the Refuge. Refuge fishing areas are open from one hour before sunrise to one hour after sunset daily.

Fishing is allowed using pole and line, rod and reel, or hand-held line only. Cast-netting for bait for personal use is permitted along waterways in areas open to the public. Trotlines, set lines, jug lines, limb lines, bows and arrows, gigs, spears, and crab traps are prohibited. Fishing from or mooring to water control structures, and the harvesting of frogs and turtles, is prohibited. Harvesting fish or crabs for commercial purposes is prohibited.

Outboard motor boats, airboats, and non-motorized boats may be used to access fishing areas in Texas Point NWR. Airboats may not exceed 10 hp with direct drive with a propeller length of 48 inches or less, and engines may not exceed 2 cylinders and 484 cc. On inland waters of Refuge fishing areas open to motorized boats, the operation of motorized boats is restricted to lakes, ponds, ditches, and other waterways. Motorized boats are prohibited on or through emergent wetland vegetation. In addition, the use of boats powered by air-cooled or radiator-cooled engines is restricted to those powered by a single engine of 25 horsepower or less and utilizing a propeller 9 inches (22.5 cm) in diameter or less. By year 2011, all motorized boats on inland waters of the Refuge will be restricted to 25 hp or less. Boat motor horsepower restrictions would not apply on Texas Bayou. This grace period of 5 years is aimed to provide those anglers currently using boats with a horsepower greater than 25 ample time to prepare for this change in regulation. In areas where propellers are damaging submergent vegetation and creating permanent channels in shallow water, no prop zones may also be initiated. Regular monitoring will be required to adequately determine where these zones would best be located. Marsh buggies, all-terrain vehicles and personal watercraft are prohibited on the Refuge.

Shallow water boats can launch at a private dock at Texas Bayou, or from the nearby Dick Dowling State Park for a small fee.

Continued law enforcement patrols will be necessary to ensure compliance with these and State and Federal fishing regulations.

Justification:

Continuation of fishing and crabbing on the Refuge should not have any measurable effect on overall populations of aquatic species and the long-term viability of these species' populations. The Texas Parks and Wildlife Department regularly adopts regulations in response to fish population levels and

management needs. These regulations are designed to ensure that viable fish and shellfish populations are sustained over the long-term. In addition, designated areas of the Refuge remain closed to the public to provide sanctuary areas for wildlife.

If fishing activity on Texas Point NWR increases substantially, additional stipulations may be needed to protect habitats and resources. Refuge staff will continue to monitor and evaluate use and associated impacts regularly.

Fishing is a priority wildlife-dependent public use of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Fishing has been a traditional form of outdoor recreation on the Refuge and in southeast Texas. When conducted in accordance with the stipulations listed herein, fishing would be compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Bell, D. V. and L.W. Austin. 1985. The game-fishing season and its effects on overwintering wildfowl. Biol. Conserv. 33:65-80.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Conserv. 21:231-241.

Cooke, A. S. 1987. Disturbance by anglers of birds at Grafham Water. ITE Symposium 19:15-22.

Dahlgren, R. B. and C. E. Korschgen. 1992. Human disturbances of waterfowl: an annotated bibliography. U.S. Fish and Wildlife Service Resource Publication 188. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/disturb/disturb.htm (Version 16JUL97).

Dunton, K. H., S. V. Schonberg, S. Herzka, P. A. Montagna, and S. A. Holt. 1998. Characterization of anthropogenic and natural disturbance on vegetated and unvegetated bay bottom habitats in the Corpus Christi Bay National Estuary Program study area, Volume II: Assessment of scarring in seagrass beds. Corpus Christi Bay National Estuary Program, CCBNEP-25b.

Gregory, M. R. 1991. The Hazards of Persistent Marine Pollution: Drift Plastics and Conservation Islands. J. Royal Soc. New Zealand 21(2): 83-100.

Hendee, J.C., G. H. Stankey, and R. C. Lucas. 1990. Wilderness Management. North American Press, Golden, CO.

Jahn, L. R. and R. A. Hunt. 1964. Duck and coot ecology and management in Wisconsin. Wisconsin Conserv. Dep. Tech. Bull. No. 33. 212pp.

Kaiser, M. S. and E. K. Fritzell. 1984. Effects of river recreationalists on green-backed heron behavior. J. Wildl. Manage. 48(2): 561-567.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21:31-39.

Knight, R. L. 1984. Responses of wintering bald eagles to boating activity. J. Wildl. Manage. 48(3): 999-1004.

Knight, R. L. and D. N. Cole. 1995. Wildlife responses to recreationalists. Pages 51-69 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

Liddle, M. J. and H. R. A. Scorgie. 1980. The effects of recreation on freshwater plants and animals: a review. Biol. Cons. 17:183-206.

Madley, K., J. Krolick, and B. Sargent. 2004. Assessment of boat propeller scar damage within the Greater Charlotte Harbor region. Florida Fish and Wildlife Conservation Commission, St. Petersburg, Florida.

Marion, J. L. and D. W. Lime. 1986. Recreational Resource Impacts: Visitor Perceptions and Management Responses. Pp. 239-235. Kulhavy, D.L. and R.N. Conner, Eds. In Wilderness and Natural Areas in the Eastern United States: A Management Challenge. Center for Applied Studies, Austin State Univ., Nacogdoches, TX. 416pp.

Pulich, W., C. Blair and W. A. White. 1997. Current status and historical trends of seagrasses in the Corpus Christi Bay National Estuary Program study area. Corpus Christi Bay National Estuary Program, CCBNEP-20.

Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

Thompson, J. D. 1969. Feeding behavior of diving ducks on Keokuk Pool, Mississippi River. M.S. Thesis, Iowa State Univ., Ames. 79pp.

Tydeman, C. F. 1977. The importance of the close fishing season to breeding bird communities. J. of Environmental Management 5:289-296.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Vos, D. K., R. A. Ryder, and W. D. Graul. 1985. Response of breeding great blue herons to human disturbance in northcentral Colorado. Colonial Waterbirds. 8(1):13-22.

COMPATIBILITY DETERMINATION: TEXAS POINT NWR - WILDLIFE OBSERVATION, PHOTOGRAPHY, ENVIRONMENTAL EDUCATION AND INTERPRETATION

Use: Wildlife Observation, Photography, Environmental Education and Interpretation

Refuge Name: Texas Point National Wildlife Refuge

County: Jefferson County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Texas Point National Wildlife Refuge (NWR or Refuge) proposes to continue to provide wildlife observation, photography, environmental education and interpretation opportunities in designated areas of the Refuge that are compatible with Refuge purposes. These activities are wildlife-dependent, priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The continuation and enhancement of these programs will be addressed in this compatibility determination.

Wildlife observation and photography on Texas Point NWR are supported by several modes of access, including outboard motor boats, airboats, non-motorized boats, bicycles, and by foot. Because they are highly interrelated, this compatibility determination includes an assessment of these other activities in conjunction with wildlife observation and photography.

Designated areas of the Refuge are open to wildlife observation, photography, environmental education and interpretation year-round from one hour before sunrise to one hour after sunset. They include a primitive ¼ mile trail through a small woodland providing viewing opportunities for migrant songbirds in the spring and fall, and a two mile levee extending south from the parking area south of Highway 87 providing viewing opportunities in surrounding Refuge marshes. City roads south of Sabine Pass and adjacent to the marshes of Texas Point NWR provide similar opportunities to look and listen for secretive rails, wrens, and sparrows, as well as flocks of wintering waterfowl. Opportunities for wildlife observation and photography are also available from boat in Texas Bayou and associated tributaries. Limited environmental education and interpretation currently occur on the Refuge. During fiscal year 2002, approximately 250 visitors to Texas Point NWR participated in wildlife observation and photography activities on the Refuge.

Additional strategies to support wildlife observation, photography, environmental education and interpretation are identified under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007). These strategies include the addition of a trail, information kiosk, interpretive signs, brochures, and interpretive tours. The development of educational programs for Sabine Pass schools and students is also included in these strategies.

Availability of Resources:

Direct annual costs to administer these programs and facilities are primarily in the form of staff time. The development of new facilities and programs, as well as the maintenance and upkeep of existing facilities and programs, will be the primary costs associated with wildlife observation, photography, environmental education and interpretation offered on the Refuge. Law enforcement support will continue to be necessary to ensure compliance with Refuge regulations. Additional funding will be required before the facilities and programs listed under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex EIS/CCP/LPP can be fully implemented. Refuge staff will pursue funding options through partnerships with other non-governmental organizations including the McFaddin and Texas Point Refuges Alliance, and pursue grants and matching funds to ensure that these strategies are implemented. Volunteer support will be critical to the Refuge's ability to fully implement the strategies listed under Refuge Management Alternative D.

Anticipated Impacts of Use(s):

The potential impacts of the Texas Point NWR wildlife observation, photography, environmental education and interpretation programs on the USFWS' ability to achieve Refuge purposes and the National Wildlife Refuge System mission are evaluated here.

Threatened and Endangered Species: Federally-listed Threatened and species (T&E species) known to use the Refuge include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), piping plover (*Charadrius melodus*, Threatened), and American alligator (*Alligator mississippiensis*, Threatened). No impacts to Federally-listed Threatened and Endangered species populations are expected to occur due to wildlife observation, photography, environmental education or interpretation. Bald Eagles are rarely observed on the Refuge. They typically feed on wounded or sick birds, and in the past were associated with large concentrations of wintering waterfowl. Brown Pelicans are commonly observed flying over the Refuge and resting along the shoreline of the Gulf of Mexico. Piping plovers winter primarily along the Texas Gulf Coast, and are regularly reported on Texas Point NWR beaches. They utilize beaches, sand flats, mud flats, and dunes along the coast, offshore islands, and spoil islands. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Some disturbance to basking alligators may occur from visitor use.

Habitats: The greatest potential for impacts to vegetation resources and habitats likely comes from motorized boating activities. Wetland vegetation, especially submerged aquatic vegetation, can be impacted by motorboat activity. For example, propeller scarring has been shown to detrimentally impact seagrass beds in the Laguna Madre in South Texas (Pulich *et al.* 1997, Dunton *et al.* 1998) and in Florida (Madley *et al.* 2004). Propeller scarring leaving permanent channels in shallow pond and waterway bottoms on the Refuge has also raised concerns about the potential for increased saltwater intrusion, with concurrent negative impacts on emergent and submergent aquatic vegetation. Boating, either motorized or non-motorized, also has the potential to introduce or redistribute non-native invasive species.

Migratory Birds and other Biological Resources: Primary means of access to areas on the Refuge used for wildlife observation and photography are by foot on trails and levee, and by motorized boats, airboats, and non-motorized boats in Texas Bayou and associated tributaries. Walking is the primary means of access for environmental education and interpretation programs on Texas Point NWR. Impacts associated with wildlife observation, photography, environmental education and interpretation activities

vary based on mode of access. Walking, bicycling, and motorized and non-motorized boating all have the potential to disturb wildlife and influence distribution and habitat use.

Disturbance of wildlife by visitors is likely to be greatest in concentrated areas of use, including along trails, boardwalks, observation platforms and along roads (Klein 1993). While some species appear to acclimate to vehicular traffic, and even presence of visitors on trails, boardwalks, and observation platforms, other species are less tolerant of disturbance. Overall it is likely that species composition and abundance is decreased in areas supporting these recreational uses.

Disturbance impacts to birds from visitation are often magnified during the breeding season. Color of clothing worn can attract or repel different passerine species based on breeding plumages of those species (Gutzwiller and Marcum 1997). Primary song occurrence and consistency of certain passerines can be impacted by a single visitor (Gutzwiller *et al.* 1994). Predation on songbird, raptor, colonial nesting species and waterfowl nests tends to increase near more frequently visited areas (Dwernychuk and Boag 1972, Buckley and Buckley 1978, Lenington 1979, Boyle and Samson 1985, Miller *et al.* 1998,). Glinski (1976) suggests that attracting wildlife using taped vocalizations may increase energy expenditures of wildlife, disrupt territory establishment, and increase susceptibility to predation.

In general, activities that occur outside of vehicles (along walking trails, etc), tend to increase disturbance potential for most wildlife species (Burger 1981, Klein 1993, Gabrielsen and Smith 1995). In wetland habitats, disturbance from out of vehicle approaches can reduce the time spent foraging or even cause avoidance of areas disturbed (Klein 1993). Similarly, walking tends to displace birds and can cause localized declines in species richness and abundance (Riffell *et al.* 1996).

Walking with pets can cause additional disturbances to wildlife. Pets are known to both chase and kill wildlife (George 1974, Lowry and McArthur 1978). The greatest increase in heart rates of bighorn sheep occurred when approached by humans with a dog (MacArthur *et al.* 1982). Prairie chickens showed a stronger fear response to domestic dogs than to native predators such as foxes (Hamerstrom *et al.* 1965).

Motorized boating has been shown to affect the abundance, distribution and habitat use of waterfowl and other birds (Dahlgren and Korschgen 1992, Knight and Cole 1995). Non-motorized boats, vehicles on roads, and walking also have potential to disturb birds and influence distribution and habitat use (Burger 1981, Knight 1984, Klein 1993). Compared to motor and airboats, canoe, kayak and rowboat travel appears to have the least disturbance effects on most wildlife species (Jahn and Hunt 1964). Non-motorized boats can still cause significant disturbance effects based on the ability to penetrate into shallower areas (Speight 1973). Vos *et al.* (1985) reported that slow-moving boats caused disturbance to nesting great blue herons when maneuvering directly below the heronries, where most other boats could not access due to shallow water. Kaiser and Fritzell (1984) reported that green-backed heron activity declined on three of four survey routes when canoes and boat use increased on the main river channel of the Ozark National Scenic Riverway.

Texas Point NWR has a special regulation allowing the use of airboats powered by 10 horsepower or less with direct drive, with a propeller length of 48 inches or less. Airboat engines may not exceed 2 cylinders and 484 cc. These types of airboats are limited to traveling in open water where all other motorized boating occurs. They are not capable of cross-country travel, and therefore should not cause damage to wetland vegetation or disturbance to wildlife in areas outside of boating activity.

A variety of regulations govern means of access to public use areas, including boat motor and horsepower restrictions, and prohibition of all-terrain vehicle use. While these regulations are in place primarily to protect habitats and public safety, they also reduce overall disturbance impacts to waterfowl and other migratory birds.

Disturbance impacts caused by wildlife photographers tend to be greater than other wildlife observation techniques (Klein 1993, Morton 1995, Dobb 1998). Photographers are much more likely to leave their vehicles and approach wildlife on foot (Klein 1993). Other impacts include the potential for photographers to remain close to wildlife for extended periods of time in an attempt to habituate the wildlife subject to

their presence (Dobb 1998) and the tendency of casual photographers with low power lenses to get much closer to their subject than other activities would require (Morton 1995).

Litter improperly discarded by visitors can entangle wildlife or be ingested, potentially resulting in injury or death (Gregory 1991). Efforts to educate the public about such issues are incorporated into outreach efforts and educational programs.

Other Wildlife-dependent Recreational Uses: A major goal of Texas Point NWR is to provide opportunities for wildlife-dependent recreation. Few conflicts among users of the Refuge have been documented in relation to recreational activities. Natural spatial and temporal separations between recreational users of the Refuge help minimize conflicts. Most visits for wildlife observation and photography, environmental education and interpretation occur in the spring, outside of the waterfowl hunting season. Visits for wildlife observation and photography, environmental education and interpretation occur primarily on established trails in small refuge woodlands, and along the north-south levee which bisects the Refuge. There is potential for some conflicts between motorized and non-motorized boaters using waterways on portions of the Refuge open for fishing and wildlife observation and photography. Overall, visitation by boat in support of wildlife observation and photography is low and no known conflicts between uses have occurred.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Stipulations designed to ensure compatibility for wildlife observation, photography, environmental education and interpretive programs outlined in the description of use section should minimize impacts to a point where these activities would be compatible with the purposes established for Texas Point NWR.

Designated areas of the Refuge will be open for wildlife observation, photography, environmental education and interpretation from one hour before sunrise to one hour after sunset daily. By concentrating disturbances to these designated areas, large areas of undisturbed habitat are available for wildlife.

Visitors may walk the designated trails and levee to view and observe wildlife. Bicycles are permitted on the levee only. Opportunities for wildlife observation and photography are also available from boat in Texas Bayou and associated tributaries. Outboard motor boats, airboats, and non-motorized boats may be used to access these waterways in Texas Point NWR. Airboats may not exceed 10 hp with direct drive with a propeller length of 48 inches or less, and engines may not exceed 2 cylinders and 484 cc. On inland waters of the Refuge open to motorized boats, the operation of motorized boats is restricted to lakes, ponds, ditches, and other waterways. Motorized boats are prohibited on or through emergent wetland vegetation. In addition, the use of boats powered by air-cooled or radiator-cooled engines is restricted to those powered by a single engine of 25 horsepower or less and utilizing a propeller 9 inches (22.5 cm) in diameter or less. By year 2011, all motorized boats on inland waters of the Refuge will be restricted to 25 hp or less. Boat motor horsepower restrictions would not apply on Texas Bayou. This grace period of 5 years is aimed to provide those visitors currently using boats with a horsepower greater

than 25 ample time to prepare for this change in regulation. In areas where propellers are damaging submergent vegetation and creating permanent channels in shallow water, no prop zones may also be initiated. Regular monitoring will be required to adequately determine where these zones would best be located. Marsh buggies, all-terrain vehicles and personal watercraft are prohibited on the Refuge.

Shallow water boats can launch at a private dock at Texas Bayou, or from the nearby Dick Dowling State Park for a small fee.

Recordings to attract wildlife are prohibited. The collection of plants or animals, or feeding or disturbing wildlife, is prohibited. Pets must be leashed at all times.

Continued law enforcement patrols will be necessary to ensure compliance with these and State and Federal regulations. Public use trends and associated impacts from human activity will continue to be monitored. If significant increases in use are found, and/or if impacts to resources are determined significant, the program will be reevaluated and modified as necessary to ensure compatibility.

Justification:

These programs are determined to be compatible with the establishment purposes of the Refuge and the mission of the National Wildlife Refuge System. Wildlife observation, photography, environmental education and interpretation are wildlife-dependent, priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1997. The USFWS strives to provide priority public uses when compatible with the purpose of the Refuge and the mission of the System. Facilities and activities related to wildlife observation, photography, environmental education and interpretation occur in designated areas of the Refuge, leaving large areas of undisturbed habitat available for wildlife. The stipulations outlined above are specifically designed to and should minimize potential impacts of these activities. The Refuge will continue to monitor uses and adjust programs as necessary to protect Refuge resources. The educational benefits gained from these activities are expected to outweigh their associated impacts. Providing opportunities for wildlife observation, photography, environmental education and interpretation has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving habitat, thereby further contributing to the overall mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: [signature] 5-4-07
(Signature and Date)

Literature Cited:

Boyle, S. A. and F. B. Samson. 1985. Effects of nonconsumptive recreation on wildlife: a review. Wildl. Soc. Bull. 13(2): 110-116.

Buckley, P. A. and F. G. Buckley. 1978. Guidelines for protection and management of colonially nesting waterbirds. North Atlantic Regional Office, National Park Service, Boston, MA. 52pp.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biol. Cons. 21:231-241.

Dahlgren, R. B. and C. E. Korschgen. 1992. Human disturbances of waterfowl: an annotated bibliography. U.S. Fish and Wildlife Service Resource Publication 188. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/literatr/disturb/disturb.htm (Version 16JUL97).

Dobb, E. 1998. Reality check: the debate behind the lens. Audubon: Jan.-Feb.

Dunton, K. H., S. V. Schonberg, S. Herzka, P. A. Montagna, and S. A. Holt. 1998. Characterization of anthropogenic and natural disturbance on vegetated and unvegetated bay bottom habitats in the Corpus Christi Bay National Estuary Program study area, Volume II: Assessment of scarring in seagrass beds. Corpus Christi Bay National Estuary Program, CCBNEP-25b.

Dwernychuk, L. W. and D. A. Boag. 1972. How vegetative cover protects duck nests from egg-eating birds. J. Wildl. Manage. 36:955-958.

Gabrielsen, G. W. and E. N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

George, W. G. 1974. Domestic cats as predators and factors in winter shortages of raptor prey. Wilson Bulletin 86(4):384-396.

Glinski, R. L. 1976. Birdwatching Etiquette: the need for a developing philosophy. Am. Bird 30(3):655-657.

Gregory, M. R. 1991. The hazards of persistent marine pollution: Drift plastics and conservation islands. J. Royal Soc. New Zealand. 21(2):83-100.

Gutzwiller, K. J. and H. A. Marcum. 1997. Bird reactions to observer clothing color: applications for distance sampling techniques. J. Wildl. Manage. 61:935-947.

Gutzwiller, K. J., R. T. Wiedenmann, K. L. Clements, and S. H. Anderson. 1994. Effects of human intrusion on song occurrence and singing consistency in subalpine birds. The Auk 111(1):28-37.

Hamerstrom, F., D. D. Berger, and F. N. Hamerstrom Jr. 1965. The effect of mammals on prairie chickens on booming grounds. Journal of Wildlife Management 29:536-542.

Jahn, L. R. and R. A. Hunt. 1964. Duck and coot ecology and management in Wisconsin. Wisconsin Conserv. Dep. Tech. Bull. No.33 212pp. http://digital.library.wisc.edu/1711.dl/EcoNatRes.DNRBull33

Kaiser, M. S. and E. K. Fritzell. 1984. Effects of river recreationalists on green-backed heron behavior. J. Wildl. Manage. 48(2): 561-567.

Klein, M. L. 1993. Waterbird behavioral responses to human disturbances. Wildl. Soc. Bull. 21(1):31-39.

Knight, R. L. 1984. Responses of wintering bald eagles to boating activity. J. Wildl. Manage. 48(3): 999-1004.

Knight, R. L. and D. N. Cole. 1995. Wildlife responses to recreationalists. Pages 51-69 *in* R. L. Knight and K. J. Gutzwiller, ed. Wildlife and Recreationalists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

Lenington, S. 1979. Predators and blackbirds: The "uncertainty principle" in field biology. The Auk 96:190-192.

Lowry, D. A. and K. L. McArthur. 1978. Domestic dogs as predators on deer. Wildlife Society Bulletin 6:38-39.

MacArthur, R. A., V. Geist, and R. H. Johnston. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. Journal of Wildlife Management 46:351-358.

Madley, K., J. Krolick, and B. Sargent. 2004. Assessment of boat propeller scar damage within the Greater Charlotte Harbor region. Florida Fish and Wildlife Conservation Commission, St. Petersburg, Florida.

Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. Ecological Applic. 8(1):162-169.

Morton, J. M. 1995. Management of human disturbance and its effects on waterfowl. Pages F59-F86 *in* W. R. Whitman, T. Strange, L. Widjeskog, R. Whittemore, P. Kehoe, and L. Roberts (eds.). Waterfowl habitat restoration, enhancement and management in the Atlantic Flyway. Third Ed. Environmental Manage. Comm., Atlantic Flyway Council Techn. Sect., and Delaware Div. Fish and Wildl., Dover, DE. 1114pp.

Pulich, W., C. Blair and W. A. White. 1997. Current status and historical trends of seagrasses in the Corpus Christi Bay National Estuary Program study area. Corpus Christi Bay National Estuary Program, CCBNEP-20.

Riffell, S. K., K. J. Gutzwiller, and S. H. Anderson. 1996. Does repeated human intrusion cause cumulative declines in avian richness and abundance? Ecol. Appli. 6(2):492-505.

Speight, M. C. D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Vos, D. K., R. A. Ryder, and W. D. Graul. 1985. Response of breeding great blue herons to human disturbance in northcentral Colorado. Colonial Waterbirds. 8(1):13-22.

COMPATIBILITY DETERMINATION: TEXAS POINT NWR – CONTROLLED LIVESTOCK GRAZING

Use: Controlled Livestock Grazing

Refuge Name: Texas Point National Wildlife Refuge

County: Jefferson County, Texas

Establishing and Acquisition Authorities:

Migratory Bird Conservation Act, Emergency Wetlands Resources Act, Refuge Recreation Act, Fish and Wildlife Act of 1956

Refuge Purpose (s):

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. § 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16U.S.C. 668dd-668ee].

Description of Use:

Texas Point National Wildlife Refuge (NWR) proposes to continue the controlled grazing program in designated areas that are compatible with Refuge purposes. Permittee cattle operations are an economic use of Refuge lands and provide a critical tool for Refuge management. This Compatibility Determination considers continuation of the controlled grazing program on the Refuge, and includes consideration of modifications to the program proposed by the USFWS under Refuge Management Alternative D (Preferred Alternative) of the Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan (EIS/CCP/LPP) (USFWS 2007).

Cattle grazing is an inexpensive, dependable, and effective tool used to accomplish Refuge goals, specifically for management of migratory birds including wintering and resident waterfowl, shorebirds and wading birds. Grazing is used to: 1) open up dense vegetation; 2) depress perennial plants; 3) encourage growth of annual grasses and sedges; and 4) reduce tall, rank grass types and encourage creeping grass species. This program is implemented to encourage a mosaic of heavily, moderately, and ungrazed areas to provide habitats in multiple successional stages on the Refuge.

The grazing program on Texas Point NWR is a cow-calf operation with some bulls introduced for breeding. The cow bloodline is a mixed breed of Zebu ancestry, with Brahma or Charolais bulls used for breeding. The majority of the habitat on Texas Point NWR is coastal marsh that is managed with cool-season grazing. Using a graze-rest strategy, permittees typically graze October through April. An average of 761 (range 0 – 1,140) animal unit months (AUMs) occurred annually on Texas Point NWR between FY 1999-2005. Grazing strategies include variations in stocking rates, timing (cool vs. warm season) and duration. Stocking rates and rotations are determined annually according to management objectives for the various grazing units and the quantity and condition of forage in those units, and are often influenced by the availability of freshwater.

Grazing does not take place uniformly across units, particularly in coastal marshes. Cattle tend to concentrate grazing pressure adjacent to upland areas with decreased grazing pressure with increasing distance from high ground. Acres grazed and grazing pressure varies from year to year. In a typical year, cattle graze approximately 2,500 acres on Texas Point NWR.

Prescribed burning is an integral part of using cattle to meet management objectives. Fire can be used to create favorable foraging conditions for cattle and focus grazing pressure. Excluding high priority uplands, such as salty prairie sites, from burning can reduce grazing pressure where it is less desirable while focusing it on adjacent wetlands.

Availability of Resources:

Adequate refuge personnel and base operational funds are available to manage the grazing program at existing and projected levels. Costs associated with this activity are primarily staff time. Some additional expenses are incurred through site preparation required to protect grazing infrastructure from fire operations. The cost of new or replaced infrastructure is shared between the permittee and the USFWS.

Anticipated Impacts of Use:

Controlled grazing can be an effective and inexpensive tool in wetland and grassland management providing habitat components that benefit waterfowl and other wildlife species. The relation of cattle grazing to wildlife varies considerably, depending on stocking rate, seasonality, plant community, and wildlife concerned (Chabreck 1968). Research indicates that dual use of grasslands by wildlife and livestock is often compatible when livestock grazing is carefully managed and wildlife needs are considered (Holechek 1982).

Threatened and Endangered Species: Federally-listed Threatened and Endangered species (T&E species) known to use Refuge habitats include bald eagle (*Haliaeetus leucocephalus*, Threatened), brown pelican (*Pelecanus occidentalis*, Endangered), piping plover (*Charadrius melodus*, Threatened), and American alligator (*Alligator mississippiensis*, Threatened). Bald Eagles are rarely observed on the Refuge. They typically feed on wounded or sick birds, and in the past were associated with large concentrations of wintering waterfowl that occurred on the Refuge. Brown Pelicans are commonly observed flying over the Refuge and resting along the shoreline of the Gulf of Mexico. Piping plovers winter primarily along the Texas Gulf Coast and are regularly reported on Texas Point NWR beaches. They utilize beaches, sand flats, mud flats, and dunes along the coast, offshore islands, and spoil islands. American alligators are Federally-listed as Threatened due to their similarity in appearance to the American crocodile (*Crocodylus acutus*), an Endangered species. Alligator populations on and around the Refuge are currently at relatively high levels. The grazing program should pose no threat to alligators on the Refuge. Overall, no impacts to Federally-listed Threatened and Endangered species are expected to occur as a result of the grazing program on the Refuge.

Habitats: Grazing (integrated with fire and water management) in wetland habitats on the Refuge promotes the germination, growth and reproduction of several “early successional” target plant communities which are especially beneficial to migratory birds as food sources (Gosselink *et al.,* 1979; Allen 1956). Target plant communities in intermediate and brackish marsh habitats on the Refuge include olney bulrush (*Scirpus americanus*), saltmarsh bulrush (Scirpus robustus), seashore paspalum (*Paspalum vaginatum*), seashore saltgrass (*Distichlis spicata*) and annual grasses including millets (*Echinochloa* spp.) and sprangletops (*Leptochloa* spp.), several sedges, and several annual forbs such as purple ammenia (*Ammania coccinea*). Moderate grazing following burns in marshes also prolongs the availability of new grass shoots, a valuable food for snow geese (Gosselink *et al.* 1979). Grazing also helps provide optimal physical structure of vegetation for waterfowl utilization in emergent marshes and other vegetated wetlands by creating openings in otherwise dense stands of vegetation and maintaining plant communities such as seashore paspalum which grow low to the ground. These conditions also provide excellent habitat for many invertebrate species, another important food source for waterfowl and

other migratory birds. Proper grazing of salty prairie seems to produce favorable nesting structure for Mottled Ducks.

Savory and Butterfield (1998) make an important distinction between what they call brittle and non-brittle landscapes. Brittleness is a term used to describe ecosystem resilience to disturbance and forms a continuum from brittle to non-brittle. Non-brittle environments have relatively high, evenly distributed rainfall, rapid recycling of nutrients through decaying plant and animal material and active microorganisms. Brittle environments tend to dry out quickly, have low nutrient recycling and low microorganism activity. Coastal marshes of the upper Texas coast are very much toward the non-brittle end of the spectrum. These marshes experience high annual rainfall distributed throughout the year, a long growing season, very fast nutrient recycling, and vegetation recoveries quickly following disturbances. These conditions require protracted disturbance events, such as grazing, to maintain early successional conditions for any length of time.

Studies conducted on Sabine National Wildlife Refuge in Cameron Parish, Louisiana (Valentine 1961) determined that increased grazing can change tall climax marshhay cordgrass stands to more diverse community such as seashore paspalum, Setaria, and longtom (*Paspalum lividum*), that are more beneficial to certain types of wildlife. Depending on site conditions (elevation, soil, and hydrology) annual grasses and forbs (including millets, fall Panicum (*Panicum dichotomiflorum*), sprangletop, and Setaria) can be produced through proper grazing.

Pate (2001) found that grazed marshes remained in a sub-climax state, while habitat within grazing exclosures reverted to marshhay cordgrass. At the onset of the study Spartina spp. made up 20% of the plant community, while seashore paspalum comprised 80%. By the end of the study, communities within grazing exclosures changed to 65% Spartina spp. and 25% seashore paspalum. In contrast, the grazed area maintained high cover of seashore paspalum throughout the study. Seashore paspalum provides habitat for many species of waterfowl, wading birds and shorebirds, depending on hydrology, while marshhay cordgrass largely precludes these species.

The detrimental affects of grazing in coastal marsh environments includes the risk of overgrazing if units are not closely monitored, bank erosion, excessive trampling of vegetation, compaction of soils reducing percolation rates, and the deposition of nutrients in the form of manure in areas where livestock concentrate (USFWS 1994). Warm-season grazing of wetland areas can reduce seed production of annual grasses (Chabreck1968).

Migratory Birds and Other Biological Resources: Proper grazing can promote habitat for snow geese, puddle ducks, Wilson's snipe and rails (Chabreck 1968). Chabreck notes that anything more than light grazing would be detrimental to muskrats. Yeargan (2001) determined that the number of shorebirds, herons and egrets was greater in grazed than ungrazed marshes on Galveston Island, Texas, while the number of gulls, terns, sparrows, rails and other species was not different. Mizell (1998) studied wintering yellow rails on Anahuac NWR and suggested that cattle grazing may increase availability of yellow rail habitat.

Management tools used to set back succession (grazing, fire, mechanical disturbance, and herbicides) benefit most wetland-dependent species. The extent to which these tools are applied can be detrimental to some species, while benefiting others. An example of this would be an intensive grazing regime that reduces emergent wetland vegetation, benefiting waterfowl, shorebirds and wadingbirds, but detrimental to species desiring ranker conditions, such as sedge wrens and seaside sparrows. In the practical application of a tool like grazing, the available herd is focused in certain areas to achieve the moderate grazing regime desired, leaving large areas lightly grazed or ungrazed to the benefit of the species desiring the cover of emergent vegetation. Neither intensive grazing nor the lack of grazing is desired over the whole Refuge. Rather, a mosaic of heavily, moderately, and ungrazed wetlands is the target of the grazing management program.

Wildlife-Dependent Recreational Uses: A major goal of Texas Point NWR is to provide high quality opportunities for wildlife-dependent recreation. The refuge supports all six of the Refuge System's priority

wildlife-dependent uses: hunting, fishing, wildlife observation and photography, environmental education and interpretation. Conflicts can occur between these uses and the controlled livestock grazing program, but conflicts and potential safety issues are minimized through management which includes regular and recurring maintenance of infrastructure (fences, gates, and cattleguards). In addition, grazing is excluded from refuge units supporting trails, boardwalks, observation platforms and other infrastructure used for wildlife observation and photography, environmental education and interpretation. Grazing units and refuge hunt areas do overlap without negative impacts to either program.

Public Review and Comment:

This Compatibility Determination was published with the Draft Texas Chenier Plain Refuge Complex EIS/CCP/LPP, and was available for public review and comment concurrent with the Draft EIS/CCP/LPP from October 17, 2006 through January 16, 2007. A Notice of Availability for the Draft EIS/CCP/LPP was published in the Federal Register on October 17, 2006. Formal public hearings on the Draft EIS/CCP/LPP were held in Port Arthur, Texas and Hankamer, Texas on November 28, 2006 and November 30, 2006, respectively.

Determination:

____ Use is Not Compatible
__X__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The controlled grazing program provides the Refuge with a management tool to improve habitat quality for migratory birds. The grazing program must assist the Refuge in meeting management objectives.

The grazing program is governed through the issuance of Special Use Permits to permittees. Stipulations necessary to ensure compatibility with Refuge establishment purposes and the mission of the NWRS are included as the Special Conditions of the Special Use Permit. Permittees must adhere to all conditions set forth in Special Use Permit, including the following:

- Permittees will graze cattle in only designated locations of the Refuge. Stocking rates and pasture rotations will be specified by the Refuge Manager.
- The Refuge Manager must be notified in advance of any introduction or removal of cattle.
- Permittees must annually provide a written record of cattle numbers and movements on an off the Refuge.
- Fences, gates, and cattleguards must be maintained by the Permittee with materials provided by the Refuge.
- Permittees must comply with all state and federal livestock health laws.

Refuge staff and grazing permittees must continually monitor habitat conditions and communicate throughout the adaptive management cycle. Factors such as stocking rate, duration, and seasonality must be adjusted as necessary to meet Refuge objectives under changing environmental conditions. To be successful, all participants must understand successional relationships of plant communities and effects of decisions under changing environmental conditions to keep the program aligned with Refuge goals and management objectives. Both short- and long-term monitoring of grazing impacts on Refuge habitats is needed to guide this adaptive management approach.

Justification:

Prescribed cattle grazing is an inexpensive, dependable, and effective tool for managing habitats on Texas Point National Wildlife Refuge. Applications of other disturbance tools, such as fire, are strongly influenced by weather conditions and numerous regulatory restrictions and are less likely to be available when needed. Grazing is a management tool that, in most instances, can be more dependably implemented to assist in creating sub-climax conditions. High, well-distributed rainfall, rapid

decomposition and recycling of nutrients, and long growing seasons makes coastal marshes a less brittle ecosystem (Savory and Butterfield 1998). When properly managed, there are few detrimental effects of grazing coastal marshes, most being aesthetic in nature. When conducted in accordance with the stipulations listed herein, managed cattle grazing is compatible with the purposes for which the Refuge was established and the mission of the National Wildlife Refuge System.

Signature: Refuge Complex Manager: Andrea T. Lorange 1-19-07
(Signature and Date)

Concurrence: Regional Refuge Chief: 5-4-07
(Signature and Date)

Literature Cited:

Allan, P. F. 1956. A system for evaluating coastal marshes as duck winter range. Journal of Wildlife Management 20(3):247-252.

Chabreck, R. H. 1968. The relation of cattle and cattle grazing to marsh wildlife and plants in Louisiana. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 22:55-58.

Fuhlendorf, S. D. and D. M. Engle. 2001. Restoring heterogeneity on rangelands: Ecosystem management based on evolutionary grazing patterns. Bioscience 51(8): 625-632.

Fuhlendorf, S. D. and D. M. Engle. 2004. Application of the fire-grazing interaction to restore a shifting mosaic on tallgrass prairie. Journal of Applied Ecology 41:604-614.

Gosselink, J.G., C.L. Cordes, and J.W. Parsons. 1979. An ecological characterization study of the Chenier Plain coastal ecosystem of Louisiana and Texas. 3 vols. U.S. Fish and Wildlife Service, Office of Biological Services. USFWS/OBS-78/9 through 78/11.

Holechek, J. L. 1982. Manipulation of grazing to improve or maintain wildlife habitat. Wildlife Society Bulletin 10:204-210.

Mizell, K. L. 1998. Effects of fire and grazing on yellow rail habitat in a Texas coastal marsh. Dissertation, Texas A&M University.

Pate, J. 2001. Effects of cattle grazing on vegetation and wildlife resources at Sabine National Wildlife Refuge. USDA Natural Resources Conservation Services. 21p.

Savory, A. and J. Butterfield. 1998. Holistic Resource Management, A New Framework for Decision Making. Island Press, Washington, DC, USA.

U.S. Fish and Wildlife Service. 1994. Final Environmental Assessment of Alternatives for Management of Grasslands on the Anahuac National Wildlife Refuge Complex, Chambers and Jefferson counties, Texas.

U.S. Fish and Wildlife Service. 2007. Texas Chenier Plain Refuge Complex Environmental Impact Statement/Comprehensive Conservation Plan/Land Protection Plan. Two volumes. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Valentine, J. M. 1961. Grazing on the Sabine National Wildlife Refuge. Unpublished report, Bureau of Sport Fisheries and Wildlife, Lafayette, Louisiana.

Yeargan, C. A. 2001. The effects of cattle grazing on Texas coastal saltmarsh plants and birds. Thesis, Texas A&M University.