FINAL
ENVIRONMENTAL ASSESSMENT

LOST LAKE MARSH CREATION AND HYDROLOGIC RESTORATION
TE-72

TERREBONNE PARISH, LOUISIANA

U.S. FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES

LAFAYETTE, LOUISIANA

May 2014

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SECTION 1.0 PURPOSE AND NEED FOR PROPOSED ACTION

SECTION 1.1 INTRODUCTION

Louisiana accounts for 90 percent of the coastal marsh loss in the lower 48 states (Dahl 2000). The most recent assessment of coastal land loss in Louisiana indicates an annual loss rate of approximately 16.57 square miles per year from 1985 to 2010 (Couvillion et al., 2011). Coastal land loss from 1932 to 2010 totaled 1,883 square miles (Couvillion et al., 2011). Previous assessments indicated loss rates from approximately 25 square miles per year (Dunbar et al. 1992) to 35 square miles per year (Barras et al. 1994), and statewide coastal wetland loss is projected to be over 10 square miles per year through 2050 (Barras et al. 2003). Causes of Louisiana's coastal wetlands loss include sea level rise, subsidence, sediment deprivation, canalization, saltwater intrusion, and altered hydrology (Turner and Cahoon 1987, Turner 1990). The wetland loss resulting from Hurricanes Katrina and Rita alone is estimated to be 198 square miles (Barras et al. 2008).

Concern over Louisiana's coastal wetland loss prompted President George Bush to sign into law the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) in 1990. CWPPRA provides approximately $70 million to $90 million per year for planning, design, and construction of coastal restoration projects in Louisiana. Each year, a list of projects is selected for implementation and funds are approved for engineering and design. That annual list is referred to as the Priority Project List, and the Lost Lake Marsh Creation and Hydrologic Restoration Project was funded as part of the 19th Priority Project List in 2010.

In 1998, the Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCWCRTF) and the Wetlands Conservation and Restoration Authority (WCRA) developed the Coast 2050 Plan which serves as the official restoration plan for coastal Louisiana (LCWCRTF and WCRA 1998*a*). The Coast 2050 Plan divided the Louisiana coastal zone into four regions encompassing nine hydrologic basins, and restoration strategies were developed for each region. Each basin was also divided into mapping units for which additional strategies were developed. The Coast 2050 Plan would be implemented using a number of different funding sources including the CWPPRA, the Water Resources Development Act, and the State's Coastal Wetlands Conservation and Restoration Fund.

The Lost Lake Marsh Creation and Hydrologic Restoration Project is located within Region 3, which encompasses the Terrebonne Basin, Atchafalaya Basin, and Teche-Vermilion Basin. The project area is located in the western Terrebonne Basin (Figure 1). Wetlands in the upper part of the western Terrebonne basin include swamp around the Gulf Intracoastal Waterway and fresh marsh down to Lake Decade and Carencro Lake. Intermediate marsh is encountered in the

vicinity of Lake Decade and Lost Lake but only occurs in a very narrow band and soon transitions to brackish marsh north of Lake Mechant and south of Lost Lake.

Figure 1. Project Location within the Terrebonne Basin

South of Lake Mechant and Lost Lake, brackish marsh transitions to saline marsh. A chain of barrier islands, the Isles Dernieres, separates the Terrebonne Basin from the Gulf of Mexico.

The project area is divided into several subareas lying west, north, and east of Lost Lake. Marsh creation cells are located north of Lake Pagie, north of Bayou Decade, and along the northwestern Lost Lake shoreline (Figure 2). Hydrologic restoration areas are located north and west of Lost Lake. Detailed drawings of all project features are found in Appendix A.

SECTION 1.2 PURPOSE OF PROPOSED ACTION

The purpose of the proposed project is to create emergent wetlands by hydraulically dredging sediments from Lost Lake and depositing that material in shallow open-water areas. In addition, four fixed-crest weirs and one plug will be replaced with variable-crest structures to allow greater volumes of fresh water and sediment into project area marshes. The project area has experienced tremendous loss of emergent wetlands. Land-water data from the U.S. Geological Survey (USGS) indicates a 1984 to 2011 loss rate of -1.0 percent per year (U.S. Fish and Wildlife Service 2012) in the marsh creation areas. North and west of Lost Lake, the loss rates

are -0.49 percent per year and -0.17 percent per year, respectively. The causes of marsh loss appear to be primarily from subsidence, storm damage, and possibly impoundment. The need to address coastal Louisiana's severe wetland loss has been identified in numerous restoration plans, programs, and State and Federal laws; implementation of the proposed project would help to fulfill that need.

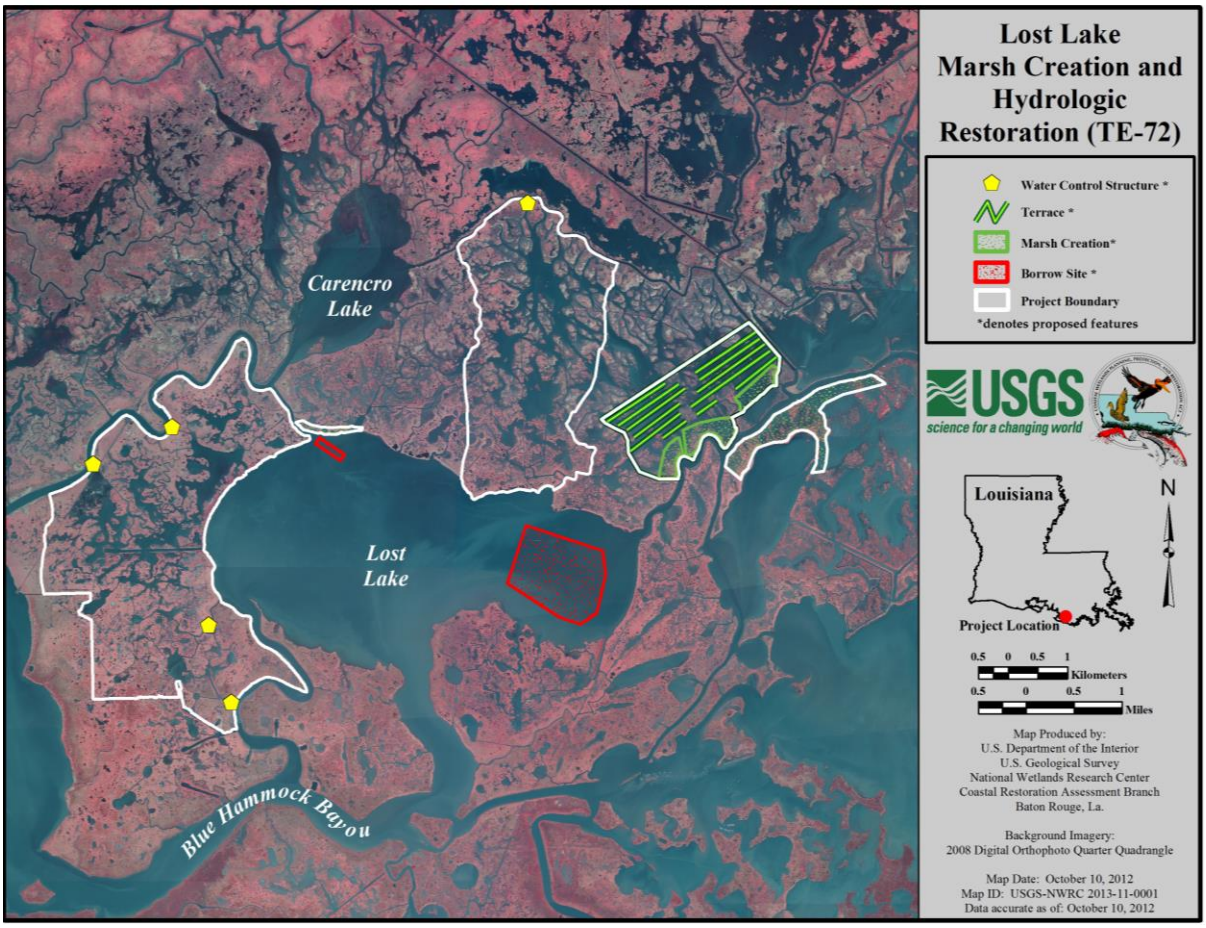

Figure 2. Project features.

The primary goals of the Lost Lake Marsh Creation and Hydrologic Restoration Project are to 1) restore an important feature of structural framework between Lake Pagie and Bayou Decade to prevent the coalescence of those two water bodies and 2) increase the delivery of fresh water, sediments, and nutrients into marshes north and west of Lost Lake. Marshes north, east, and west of Lost Lake serve an important function as an intermediate zone buffering fresh marshes to the north from the higher salinities to the south.

Specific goals of the project are: 1) Create approximately 468 acres (345 acres of marsh creation and 123 acres of marsh nourishment) of marsh with dredged material from Lost Lake; 2) increase the delivery of fresh water, sediments, and nutrients by replacing 4 fixed-crest weirs and one plug with variable-crest, flap-gated structures; and 3) create approximately 18 acres of emergent marsh via the construction of 30,000 feet of terraces.

SECTION 1.3 PROBLEM

The Terrebonne Basin lost approximately 506 square miles of land from 1932 to 2010 and has experienced the highest rate of wetland loss of any coastal basin (Couvillion et al., 2011). Causes of loss stem from subsidence, wave action, sediment deprivation, saltwater intrusion, and storm damage. The most recent analysis of land area change for the Terrebonne Basin indicates a 1985 to 2010 annual loss rate of 4.37 square miles per year.

The Coast 2050 Region 3 Plan divides the Terrebonne Basin into 22 mapping units or subbasins. The project area is located within the Mechant/DeCade mapping unit (Figure 3), which contains approximately 108,167 acres of marsh and open water habitats (LCWCRTF and WCRA 1998*b*). Within the Mechant/DeCade mapping unit, over 14,000 acres of wetlands were lost from 1932 to 1990. The primary causes of that loss were subsidence and altered hydrology from the dredging of numerous canals and waterways which allowed greater tidal exchange and saltwater intrusion. The rate of subsidence within this unit is high and ranges from 2.1 to 3.5 feet per century (LCWCRTF and WCRA 1998*b*).

Figure 3. Mapping Unit Boundaries in the western Terrebonne Basin

The project area encompasses 7,312 acres of marsh and open water habitats and has experienced significant wetland loss. Land-water data from the USGS indicates that nearly 600 acres of land were lost within the project area from 1984 to 2011. The annual loss rate during that time period

was -0.45 percent per year. The causes of marsh loss within the project area appear to be primarily from subsidence, altered hydrology, and storm damage. Implementation of this project would create and protect important wetland habitat within the project area. By offsetting the loss of emergent marsh and creating new marsh, fish and wildlife habitat quality and detrital production would increase.

SECTION 1.4 REQUIRED DECISIONS

The decision to implement the Preferred Alternative has been made only after a thorough public review and full consideration of all comments. Opportunities for public comment occurred at public meetings conducted during the project development and selection stages of the CWPPRA planning process. Public meetings which offered the opportunity for public comment occurred on January 28, 2009, April 15, 2009, November 17, 2009, November 18, 2009, December 2, 2009, and January 20, 2010. Opportunity for public comment was also provided through review of the draft Environmental Assessment (EA) which was sent to the appropriate Federal, State, and local agencies, and other interested parties in November 2012.

SECTION 1.5 COORDINATION AND CONSULTATION

Planning, engineering, and design of this project have been coordinated with all LCWCRTF agencies, Terrebonne Parish, and other natural resource agencies. This project was nominated and selected as part of the 19th Priority Project List of CWPPRA. Projects on the 19th Priority Project List were nominated and developed at a series of public meetings held in January of 2009. Meeting participants included the LCWCRTF agencies, members of the CWPPRA Academic Advisory Group, landowners, environmental groups, Parish officials, and members of the general public. The CWPPRA Technical Committee met publicly on April 15, 2009, to consider preliminary costs and project benefits, and selected 10 projects for further evaluation as candidate projects. Interagency evaluations of those projects occurred from May to August 2009. Upon completion of project evaluations, public meetings were held on November 17 and 18, 2009, to allow the opportunity for public comment. The CWPPRA Technical Committee again met publicly on December 2, 2009, to select projects for recommendation to the CWPPRA Task Force. The CWPPRA Task Force selected 4 projects, including this one, for funding of engineering and design at a public meeting on January 20, 2010. Details concerning the plan formulation process for the 19th Priority Project List and the CWPPRA Standard Operating Procedures Manual are available at www.mvn.usace.army.mil/pd/cwppra_mission.utm.

An engineering and design review meeting was held on June 19, 2012, and a final design review meeting was held on October 31, 2012. Final approval for construction was granted by the CWPPRA Task Force on January 24, 2013. All LCWCRTF agencies were invited to attend those meetings. Support for this project has been expressed by all entities involved.

SECTION 2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

SECTION 2.1 ALTERNATIVE 1 - NO ACTION

Under this alternative, no restoration funds would be spent and no action would be taken to restore or protect wetlands within the project area. Marsh loss would continue to occur resulting in a decline in fish and wildlife productivity.

SECTION 2.2 ALTERNATIVE 2 – PREFERRED ALTERNATIVE

Project design information included within this section is taken from the Final (95%) Design Report (Louisiana Coastal Protection and Restoration Authority 2012). Figure 2 displays the project features and detailed drawings of all project features are found in Appendix A.

The Preferred Alternative consists of dredging bottom sediments in Lost Lake and pumping that material into open-water and fragmented marsh areas in the project area to create approximately 468 acres of marsh. Containment dikes will be constructed around the fill sites to contain the dredged material slurry. In addition, 30,000 linear feet of earthen terraces will be constructed from *in situ* borrow material resulting in the creation of approximately 18 acres of wetlands. Approximately 448 acres of water bottom in Lost Lake would be dredged to a maximum depth of -15 feet North American Vertical Datum of 1988 (NAVD 88; all following elevations are reported in NAVD 88). Also, four fixed-crest weirs and one plug will be replaced with variable-crest structures to allow greater introduction of fresh water, sediments, and nutrients. Minimal access dredging may be required to construct one of the water control structures.

Marsh Creation

Five marsh creation sites will be filled with hydraulically dredged material from Lost Lake. Marsh creation between Lake Pagie and Bayou DeCade (Figure 4) is designed to prevent the coalescence of those two water bodies and restore/protect some key features of structural framework (i.e., lake rim and bayou bank). This feature will connect to one of the marsh creation cells recently constructed under the North Lake Mechant Landbridge Restoration Project (TE-44).

Marsh creation north of Bayou DeCade (Figure 4) is divided into three marsh creation cells. The marsh creation cells are divided so that water exchange can still occur with two water control structures on Bayou Decade constructed as part of the Penchant Basin Natural Resources Plan Project (TE-34).

A small marsh creation/nourishment cell (27 acres) is also proposed along the northwestern Lost Lake shoreline near the mouth of Crochet Canal. The shoreline in this area has deteriorated considerably in recent years and several breaches have developed.

To determine target elevations for the fill sites, marsh elevation surveys were performed. Marsh elevation surveys revealed that the average elevation of healthy marsh within the project area

was approximately +1.14 feet (Pyburn and Odom 2011). The mean high water (MHW), mean water (MW), and mean low water (MLW) elevations for the project area are +1.44 feet, 0.86 feet, and 0.27 feet, respectively. Mean water elevations are based on an analysis of water level data (August 1999 to March 2002) from USGS stage recorder #0738165067 located in Bayou Raccourci southeast of the project area. Data from the USGS gauge was correlated to data from

National Oceanic and Atmospheric Administration station #8761724 located in Grand Isle, Louisiana. Often, a goal of marsh restoration projects is for the marsh platform to settle to an elevation within the intertidal zone so that the created marsh functions similarly to natural marsh. To achieve a sustainable marsh elevation throughout the project life, the marsh platform will initially be pumped to a higher elevation during construction and allowed to settle to the desired target elevation over time.

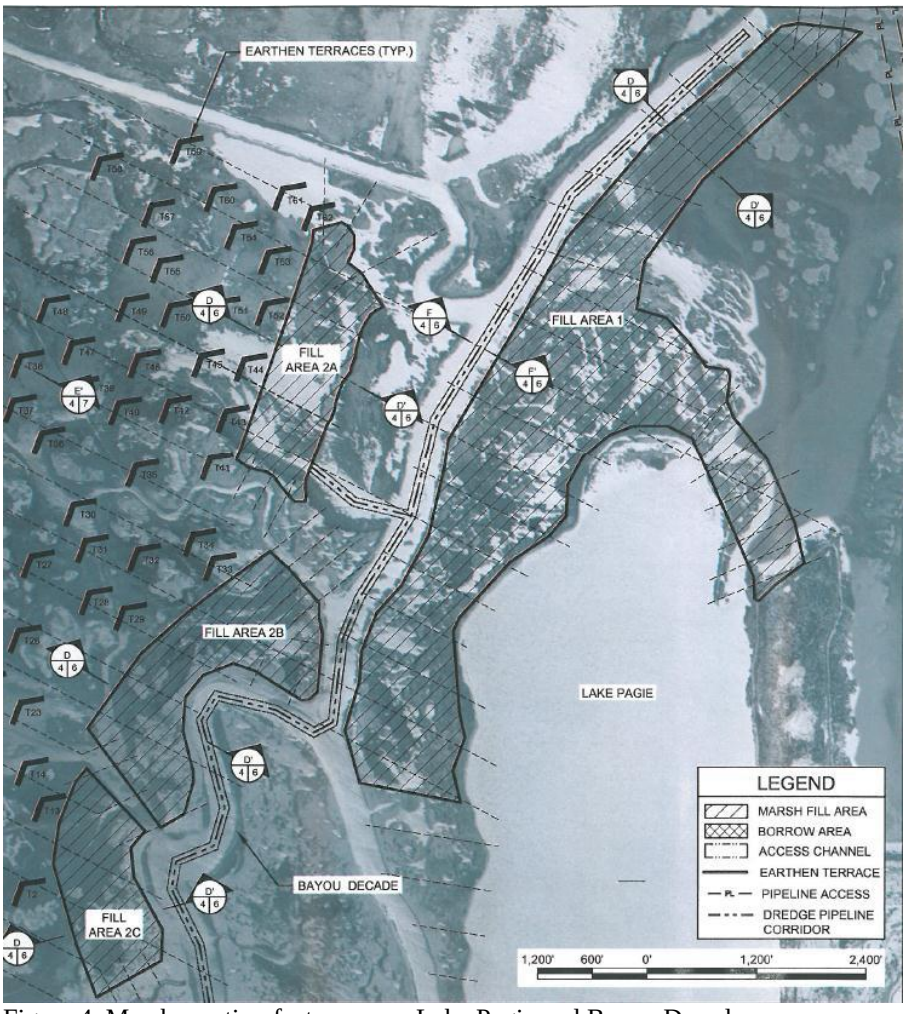

Figure 4. Marsh creation features near Lake Pagie and Bayou Decade.

The key design component of the marsh creation fill areas is the estimated volume of material required to achieve the construction marsh fill elevation. This elevation was chosen based on the mean high water elevation, mean low water elevation, and target marsh elevation. This means that the marsh elevation should be below MHW (+1.44 feet) shortly after construction and above MLW (+.27 feet) at Year 20, while staying as close to the target marsh elevation (+1.14 feet) as

possible. Several fill elevations were evaluated in order to determine the final construction marsh fill elevation. Marsh creation fill areas 1, 2A, 2B, and 2C will be initially constructed to +1.5 feet, followed by a 30 day minimum waiting period, and then constructed to +3.5 feet. Using this two-lift construction method, each of these fill areas are expected to settle to an approximate elevation of 1.1 feet by Year 20, which meets the goals of the project.

Complete perimeter containment dikes will be utilized in the construction of marsh creation cells 1, 2A, 2B, and 2C. Containment dikes will be gapped, notched, or degraded prior to construction demobilization to achieve tidal connection between the created marsh and adjacent waters. A containment dike gapping plan shall be developed in coordination with all interested natural resource agencies. Gaps will be excavated down to the surrounding marsh elevation (approximately +1.0 feet) and 25 feet wide. Gaps will be placed at the best possible locations to promote tidal exchange with the surrounding wetlands. Gaps will not be created along the Lake Pagie shoreline as wave energy which may enter through those gaps might result in excessive removal of the newly-placed dredged material.

In order to optimize costs and improve constructability, Fill Area 3 (Figure 5) will be constructed without the use of containment dikes on the northern (landward) side of the fill area. This construction technique will eliminate the need of nearly 8,000 linear feet of containment dikes. This semi-confined construction technique will create approximately 13 acres of marsh at an elevation of approximately +2.0 feet and nourish an additional 14 acres. This acreage will begin at the existing shoreline and extend approximately 150 feet northward. From this point, the marsh fill will begin a gradual slope, approximately 100H:1V until reaching the existing marsh elevation. The marsh fill material will be pumped from Borrow Area 2 by the use of a small dredge.

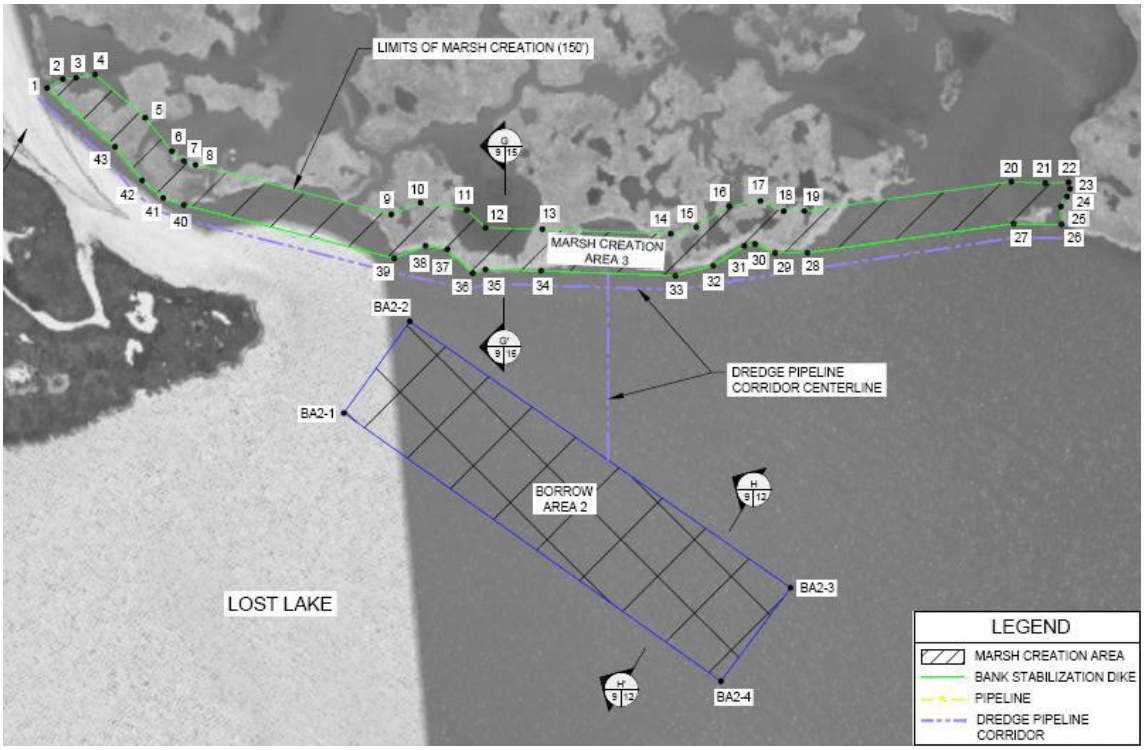

Figure 5. Marsh creation/nourishment features along the Lost Lake shoreline.

Borrow Area

The size of the borrow area is determined by the total volume of marsh fill required for the project. The borrow area should also provide sufficient latitude for the contractor to select the most effective area to dredge and access. A summary of in-place fill and cut volumes for each marsh creation fill area is presented in Table 1.

Table 1. Marsh creation quantities.

Marsh Creation Fill Area	In-place Quantity (yd^3)	Cut Quantity (yd^3)
1	1,365,620	2,048,430
2A	305,554	458,331
2B	344,751	517,126
2C	215,973	323,959
3	79,807	119,710
Total	**2,311,705**	**3,467,556**

The borrow area is approximately 448 acres and the available volume of material is approximately 7.5 million cubic yards of sediment (i.e., soft clay with varying amounts of organic matter). In order to limit the ecological impacts to the existing environment, the depth of cut has been limited to an elevation of -15 feet.

Terraces

Approximately 30,000 linear feet of earthen terraces will be constructed using in-situ material (Figure 6). The terraces will create edge habitat, provide conditions more conducive to submerged aquatic vegetation, and limit fetch in open water areas.

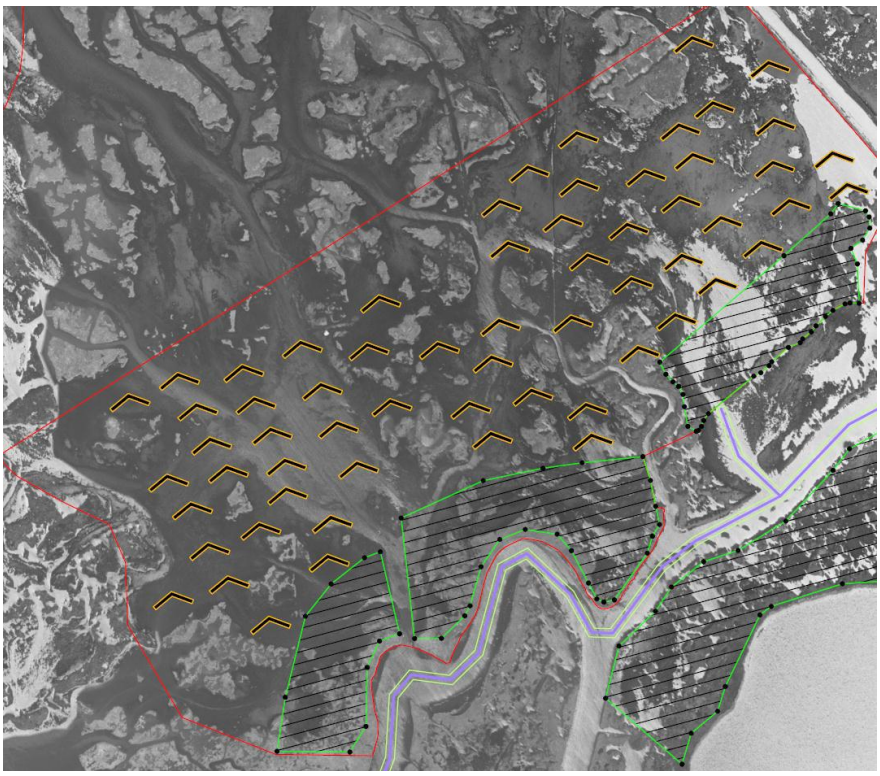

Figure 6. Earthen terrace layout.

The terraces will be constructed with a 10-foot crown width, 3H:1V side slopes, and +3.0 foot crown elevation. The earthen terraces are expected to have a maximum settlement of 12 inches over the project life. This means that the crown elevation of the terraces will be approximately 0.5 feet above MHW for the majority of the project life. The terrace slopes will be planted with two rows of smooth cordgrass and the perimeter of the terrace crowns will be planted with one row of seashore paspalum. The terraces will be constructed so that the footprint of each terrace will not impact any existing marsh.

Hydrologic Restoration

Two fixed-crest weirs (WC-1 and WC-4) along Big Carencro Bayou (Figure 7) and one plug along Carencro Bayou (Figure 8) will be replaced with structures containing variable-crest bays (Figure 9) to increase the introduction of fresh water, sediments, and nutrients. Big Carencro Bayou is an excellent source of fresh water and sediments from the Atchafalaya River/Four League Bay system. Carencro Bayou is also an excellent source of fresh water at certain times of the year. However, delivery of that water into the marshes west and north of Lost Lake is limited by existing plugs and fixed-crest weirs. Installing structures with bays/gates will increase freshwater and sediment delivery. In addition, two fixed-crest weirs (WC-5 and WC-6) near Rice Bayou (Figure 7) will be replaced with similar structures to provide flow-through conditions in the system (i.e., water enters the system from Big Carencro Bayou and exits through the structures near Rice Bayou). Water level gauges installed at sites TE-72-01, 02, 03, and 04 were used to determine flows at each structure site.

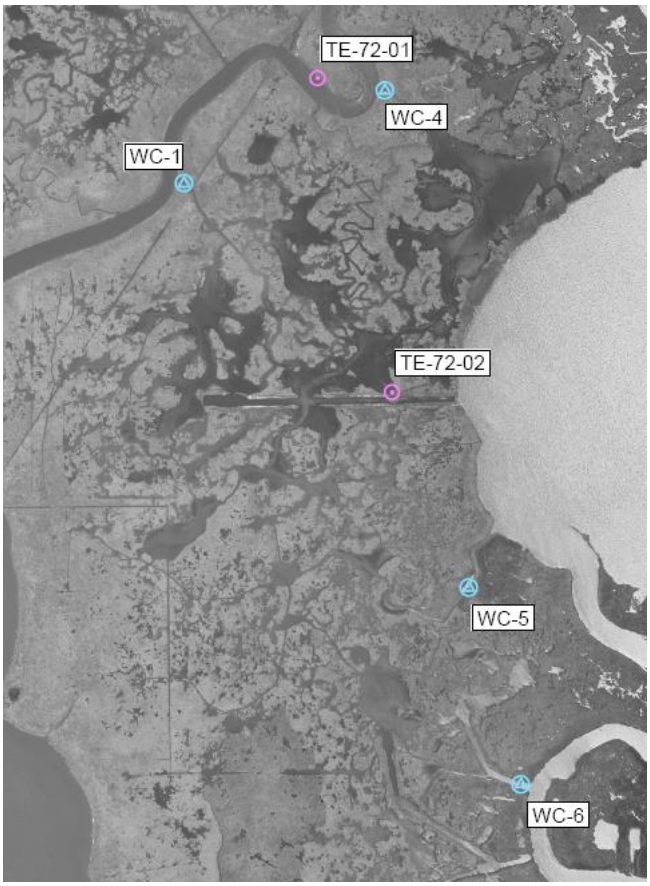

Figure 7. Water control structures and gauges west of Lost Lake.

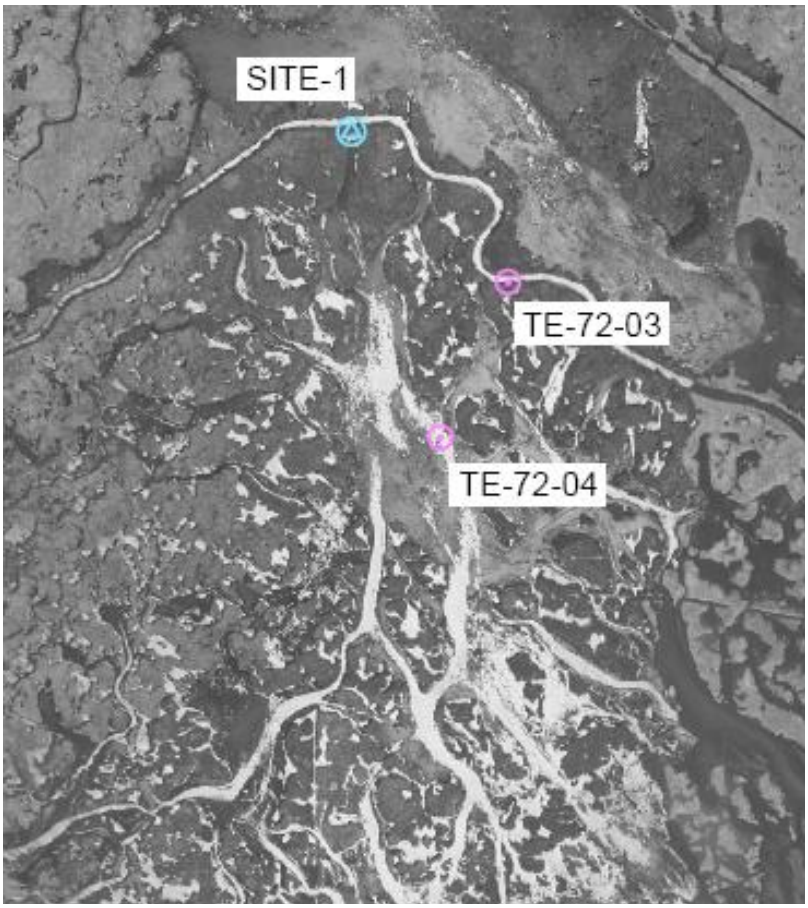

Figure 8. Water control structures and gauges north of Lost Lake.

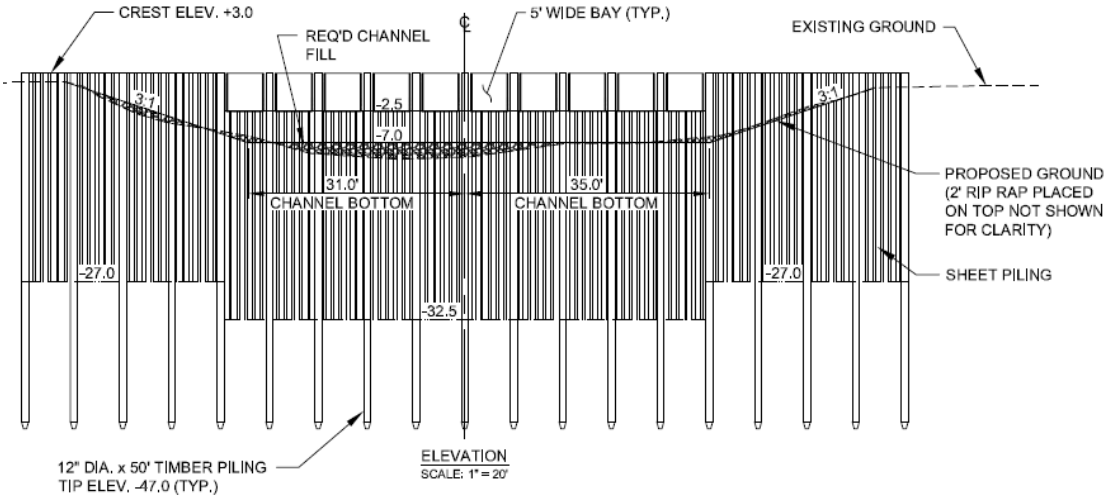

Figure 9. Proposed water control structure.

Minimal access dredging will likely be required to construct WC-6. Dredged material can be sidecast in adjacent open water to avoid impacts to wetlands

SECTION 2.3 OTHER ALTERNATIVES CONSIDERED

Shoreline protection/restoration alternatives were considered along the northern rim of Lake Pagie and Lost Lake. Alternatives consisted of a rock dike or revetment placed along the shoreline. However, shoreline erosion rates generally average less than five feet per year and the cost of rock shoreline protection would result in a project with low cost effectiveness.

The placement of additional water control structures west and north of Lost Lake was also considered. However, it was determined that the project goal of improving the distribution of fresh water, sediments, and nutrients could be accomplished by selecting only those sites which offered the best opportunity for freshwater introduction. Other sites may have been selected but a marginal increase in project benefits would have resulted.

SECTION 3.0 AFFECTED ENVIRONMENT

SECTION 3.1 PHYSICAL ENVIRONMENT

A. Hydrology

The project area is located within a band of intermediate to brackish marsh in the western Terrebonne Basin. Project area marshes are tidal with Big Carencro Bayou, Bayou Decade, Carencro Bayou, and Rice Bayou serving as the most important tidal exchange routes with surrounding lakes and bays. Important area water bodies include Lost Lake, Lake Pagie, and Four League Bay. Although primarily a tidal, estuarine system, the project area receives substantial freshwater input from the Atchafalaya River system via the vast network of bayous, oil/gas canals, and other waterways that lie north and west of the project area. At certain times of the year, the entire project area is inundated with fresh water from the Atchafalaya River system. In fact, marshes in the project area have experienced a freshening trend with an increase in fresh/intermediate marsh and a decrease in brackish marsh. However, certain areas, particularly west of Lost Lake, receive less freshwater input due to semi-impoundment of the marsh by plugs and fixed-crest weirs.

B. Water Quality

The Louisiana Department of Environmental Quality (LDEQ) surface water monitoring program is designed to measure progress towards achieving water quality goals at the state and national levels, to gather baseline data used in establishing and reviewing the state water quality standards, and to provide a database for use in determining the assimilative capacity of the waters of the State. The surface water monitoring program consists of a fixed station long-term network, intensive surveys, special studies, and wastewater discharge compliance sampling. The LDEQ routinely monitors 29 conventional parameters and fecal coliform bacteria on a monthly or bimonthly basis using a fixed station, long-term network. In addition to the conventional parameters, volatile organic compounds are sampled at each site (Louisiana Department of Environmental Quality 2010).

The Louisiana Water Quality Standards define eight designated uses for surface waters: primary contact recreation, secondary contact recreation, fish and wildlife propagation, drinking water

supply, shellfish propagation, agriculture, outstanding natural resource, and limited aquatic and wildlife use. Each water body is evaluated as fully supporting, partially supporting, or not supporting of each of its designated use(s). Water quality assessments for Lost Lake and Four League Bay are presented in Table 2. Both waterbodies are listed as fully supporting their designated uses for primary and secondary contact recreation and fish and wildlife propagation. However, it should be noted that fecal coliforms are listed as a suspected cause of impairment for oyster propagation.

Table 2. Evaluation of water quality (LDEQ 2010).

Water Body Subsegment Code	Water Body Name and Description	Primary Contact Recreation	Secondary Contact Recreation	Fish and Wildlife Propagation	Oyster Propagation
LA120708_00	Lost Lake and Four League Bay	Fully Supporting	Fully Supporting	Fully Supporting	Not Supporting

SECTION 3.2 BIOLOGICAL ENVIRONMENT

A. Vegetation

Based on the 1978 and 1988 vegetative type maps (Chabreck and Linscombe 1978, 1988), the majority of the project area was classified as brackish marsh. Since that time, the area has experienced a freshening trend with some areas transitioning to fresh marsh that were historically brackish. The 2007 marsh type survey (Sasser et al., 2008) classifies the entire project area as intermediate and brackish marsh (Figure 10). The transition from intermediate to brackish marsh lies just north of Lost Lake.

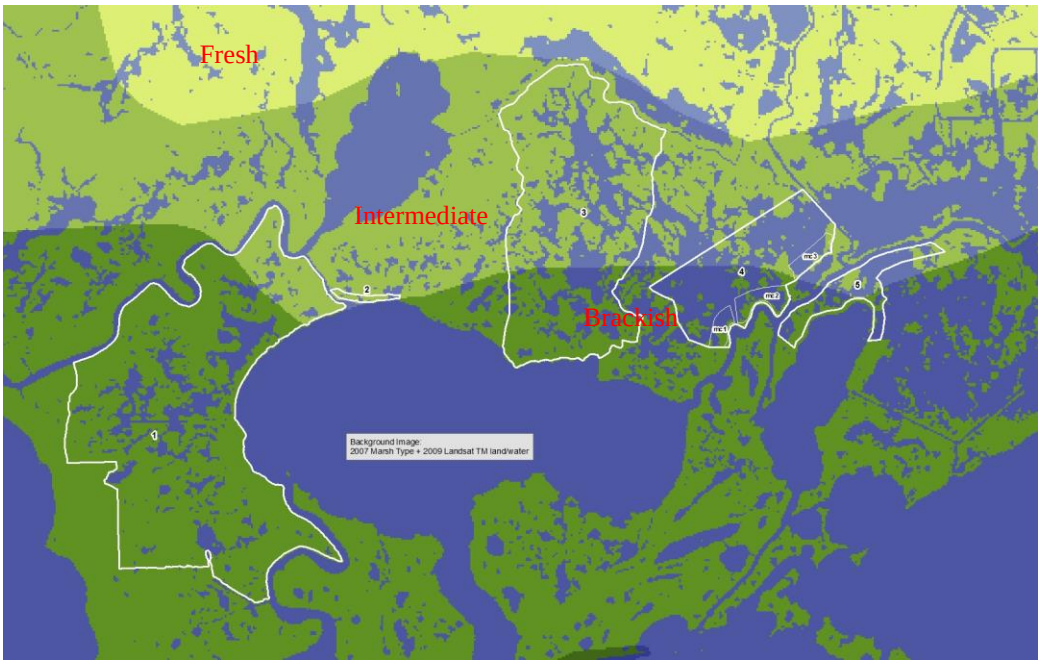

Figure 10. Marsh types per the 2007 Marsh Type Survey.

Based on field investigations conducted since 2009, the project area is primarily intermediate marsh. Common species include marshhay cordgrass, bulltongue, cattail, Roseau cane, California bulrush, and Olney bulrush. Submerged aquatic vegetation includes Eurasian water milfoil, coontail, and water celery.

Three (4045, 0354, 0399) Coastwide Reference Monitoring System (CRMS) stations (Figure 11) near the project area also provide insight as to the marsh type classification for the project area. Recent marsh type classifications and average annual salinities for each station are found in Table 3.

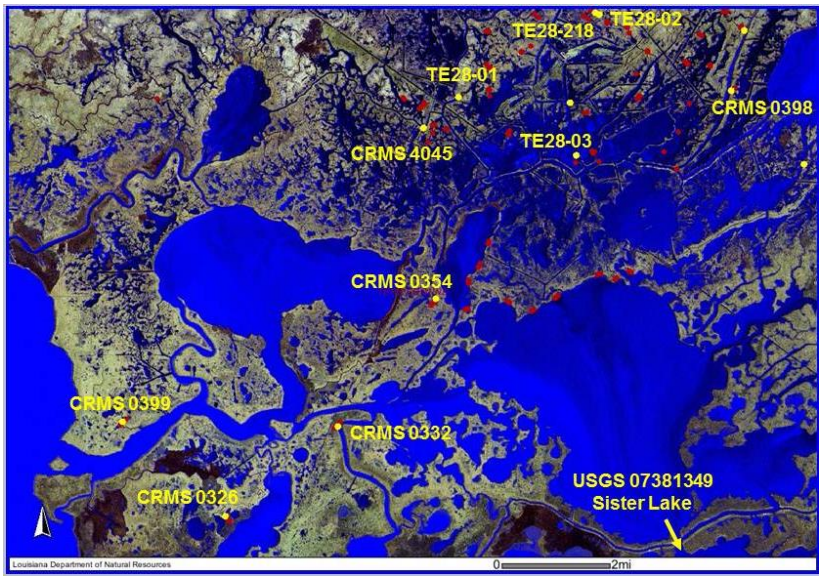

Figure 11. Locations of CRMS stations.

Table 3. Marsh type and average annual salinity for CRMS stations near the project area.

Year	CRMS 4045	CRMS 0354	CRMS 0399
2006		Intermediate	Intermediate
2007		Intermediate	Intermediate
2008	Intermediate	Intermediate	Intermediate
2009	Intermediate	Intermediate	Intermediate
2010	Intermediate	Intermediate	Intermediate
2011	Intermediate	Intermediate	Brackish
Mean Salinity	1.0 ppt	3.6 ppt	4.8 ppt

B. Fisheries

The project area supports a diverse assemblage of estuarine-dependent fishes and shellfishes, and species presence is largely dictated by salinity levels and season. During low-salinity periods, species such as blue catfish, Gulf menhaden, blue crab, white shrimp, and striped mullet are present in the project area. During high-salinity periods, more salt-tolerant species such as spotted seatrout, black drum, red drum, Atlantic croaker, sheepshead, southern flounder, and brown shrimp may move into the project area. Wetlands throughout the project area also support small resident fishes and shellfish such as least killifish, sheepshead minnow, sailfin molly, grass

shrimp and others. Those species are typically found along marsh edges or among submerged aquatic vegetation, and provide forage for a variety of fish and wildlife.

C. Essential Fish Habitat

The project is located within an area identified as Essential Fish Habitat (EFH) by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico, prepared by the Gulf of Mexico Fishery Management Council, identifies EFH in the project area to be estuarine emergent wetlands, submerged aquatic vegetation (SAV), estuarine water column, and mud substrates. Under the MSFCMA, wetlands and associated estuarine waters in the project area are identified as EFH for postlarval/juvenile and subadult brown shrimp; postlarval/juvenile and subadult white shrimp; and postlarval/juvenile and subadult red drum. Table 4 provides a more detailed description of EFH within the project area.

Table 4. EFH requirements for managed species that occur in the project area.

Species	Life Stage	Essential Fish Habitat	Occurrence in Project Area
Brown shrimp	postlarval/juvenile	marsh edge, SAV, tidal creeks, inner marsh	All habitats are found throughout the project area
	subadult	mud bottoms, marsh edge	All habitats are found throughout the project area
White shrimp	postlarval/juvenile subadult	marsh edge, SAV, marsh ponds, inner marsh, oyster reefs	All habitats are found throughout the project area (excluding oyster reefs)
Red drum	postlarval/juvenile	SAV, estuarine mud bottoms, marsh/water interface	All habitats are found throughout the project area
	subadult	mud bottoms, oyster reefs	Mud bottoms are found within open-water areas

D. Wildlife

The project area provides important habitat for several species of wildlife, including waterfowl, wading birds, shorebirds, mammals, reptiles and amphibians. The project area provides wintering habitat for migratory puddle ducks including gadwall, blue-winged teal, green-winged teal, American widgeon, and northern shoveler. Diving duck species which utilize the project area include lesser scaup and ring-necked ducks. The resident mottled duck, which nests in fresh to brackish marshes, is found throughout the year.

Common wading bird species which utilize the project area include the great blue heron, green heron, tricolored heron, great egret, snowy egret, yellow-crowned night-heron, black-crowned night-heron, and white ibis. Mudflats and shallow-water areas provide habitat for numerous species of shorebirds and seabirds. Shorebirds include the American avocet, willet, black-necked stilt, dowitchers, and various species of sandpipers. Seabirds include the white pelican, herring gull, laughing gull, and several species of terns.

Migratory and resident non-game birds, such as the boat-tailed grackle, red-winged blackbird, seaside sparrow, northern harrier, belted kingfisher, and marsh wrens, also utilize the project area. Important gamebirds found in the area include the clapper rail, sora rail, Virginia rail, American coot, common moorhen, and common snipe in addition to resident and migratory waterfowl.

Mammals found within the project area include nutria, muskrat, mink, river otter, and raccoon, all of which are commercially important furbearers. Reptiles and amphibians are fairly common in the low-salinity brackish and intermediate marshes found within the project area. Reptiles include the American alligator, western cottonmouth, water snakes, speckled kingsnake, rat snake, and eastern mud turtle. Amphibians expected to occur in the area include the bullfrog, southern leopard frog, and Gulf coast toad.

E. Threatened and Endangered Species

Federally listed as an endangered species, the West Indian manatee may occur within the project area. West Indian manatees occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). Manatee occurrences appear to be increasing, and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf coast. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Cold weather and outbreaks of red tide may also adversely affect these animals.

SECTION 3.3 CULTURAL AND RECREATIONAL RESOURCES

Various cultural resources occur throughout the Louisiana coastal zone, including both prehistoric and historic sites. The Louisiana Department of Culture, Recreation and Tourism maintains catalogues of cultural resource sites, but many areas remain unsurveyed and the significance or eligibility of some sites for inclusion in the National Register of Historic Places has not been determined. A review by the Louisiana Office of Cultural Development, Division of Archeology indicated that no archaeological sites are located within the project area. In a November 28, 2012 email, they indicated no objection to the proposed project. They did request a minor modification to one of the containment dikes on the eastern side of Lake Pagie to avoid any potential impacts to a cultural resources site located to the south along the Lake Pagie shoreline. The containment dike alignment will be adjusted accordingly.

Recreational use of the project area is oriented primarily toward hunting, fishing, and non-consumptive uses such as wildlife observation. Access to the project area is by boat only, as no roads or highways are present.

SECTION 3.4 ECONOMIC RESOURCES

Project-area wetlands provide essential nursery habitat for commercially and recreationally important fishes and shellfishes such as Gulf menhaden, red drum, spotted seatrout, southern flounder, brown shrimp, white shrimp, blue crab and others. National Marine Fisheries Service statistics for the last 20 years indicate that coastal Louisiana contributes approximately 20 percent of the nation's total commercial fisheries harvest (LCWCRTF and WCRA 1998*a*). In 2003, commercial fishery landings in coastal Louisiana exceeded 1 billion pounds with a dockside value of over $285 million with a total economic effect of more than $2.5 billion

(Southwick Associates 2005). Additionally, Louisiana's shrimp and oyster harvests comprise approximately 35 to 40 percent of the national total for those species (LCWCRTF 1993).

Louisiana's coastal wetlands also produce more wild furs and alligator skins than any other State in the nation. Nutria, muskrat, and raccoon constitute 94 percent of the value of the Louisiana fur industry, valued at approximately $1.3 million annually (Louisiana Fur and Alligator Advisory Council 1997). In 2003, the Louisiana fur harvest totaled $1.6 million (Southwick Associates 2005). The wild alligator harvest is also an important economic resource in coastal Louisiana. The wild harvest from 1972 to 1997 produced one million skins with an estimated value of $128.6 million. The annual harvest averaged 26,742 from 1992 to 1997, and the value of skins and meat was worth over $9.3 million (Louisiana Fur and Alligator Advisory Council 1997) during that period. In 2003, the wild alligator harvest totaled over $6 million in retail sales (Southwick Associates 2005).

Recreational saltwater fishing contributed over $435 million to Louisiana's economy in 2003 (Southwick Associates 2005). Coastal marshes also provide a substantial economic value associated with waterfowl hunting.

SECTION 4.0 ENVIRONMENTAL CONSEQUENCES

SECTION 4.1 ALTERNATIVE 1 - NO ACTION

A. Physical Environment

Hydrology
Under the No Action Alternative, the hydrology of the project area would likely be altered by the ongoing processes of shoreline erosion, shoreline breaching, and marsh deterioration. As marsh loss continues and additional shoreline breaching occurs, tidal connectivity with Lake Pagie, Bayou Decade, and Lost Lake could increase as more tidal channels form and tidal exchange increases.

Water Quality
Under the No Action Alternative, water quality in the project area will likely remain the same.

B. Biological Environment

Vegetation
Under the No Action Alternative, vegetation in the project area would likely remain the same as it is today with a vegetative community typical of an intermediate marsh. Marshhay cordgrass, bulltongue, cattail, and Roseau cane would likely remain as the dominant plant species.

Marsh loss from shoreline erosion, storms, and subsidence would continue. The Wetland Value Assessment (WVA) prepared by the CWPPRA Environmental Work Group projected that 218 acres of marsh would be lost under the No Action Alternative (USFWS 2012).

Fisheries
Although marsh loss would continue under the No Action Alternative, the project area would continue to support a diverse assemblage of estuarine-dependent fishery species. However, the loss of intertidal, emergent wetlands to shallow, unvegetated open water would result in decreased fishery productivity. As a marsh complex exceeds 70 percent unvegetated open water, shrimp and blue crab populations may decline (Minello and Rozas 2002).

Essential Fish Habitat Assessment
Under the No Action Alternative, estuarine marsh is the primary type of EFH impacted by continued wetland loss and deterioration. According to the WVA conducted by the CWPPRA Environmental Work Group, 218 acres of emergent marsh would be converted to shallow open water (i.e., mud bottom) over the project life. Although an increase in some types of EFH (i.e., mud bottom and estuarine water column) would occur, adverse impacts would occur to more productive types of EFH (i.e., estuarine emergent wetlands). The loss of estuarine emergent wetlands would result in negative impacts to postlarval/juvenile and subadult brown shrimp; postlarval/juvenile and subadult white shrimp; and postlarval/juvenile red drum.

Wildlife
Under the No Action Alternative, the project area would continue to provide habitat for a multitude of species including migratory waterfowl, wading birds, shorebirds, mammals, reptiles, and amphibians. However, the continued loss of emergent wetlands would negatively impact those species which utilize the project area. Intertidal marsh is utilized by those species for foraging, resting, or nesting habitat. Conversion of that habitat type to unvegetated, open-water areas would diminish habitat value for all wildlife species.

Threatened and Endangered Species
The endangered West Indian manatee is occasionally found in Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). Manatee occurrences appear to be increasing, and they have been regularly reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf coast. Although unlikely to occur in the project area, their use would continue under the No Action Alternative.

C. Cultural and Recreational Resources
No archeological sites are located within the project area; therefore, no impacts are expected under the No Action Alternative. Recreational opportunities within the project area, such as hunting and fishing, may decrease somewhat with the ongoing loss of marsh and diminished capacity of the area to support fish and wildlife populations.

D. Economic Resources
Commercial and recreational activities within the project area are important components of the local economy. Waterfowl hunting, recreational fishing, and commercial shrimping and crabbing contribute greatly toward the economies of the surrounding communities. The continued loss of emergent wetlands would decrease the project area's ability to support those activities.

SECTION 4.2 ALTERNATIVE 2 - PREFERRED ALTERNATIVE

A. Physical Environment

Hydrology

Under the Preferred Alternative, hydrologic conditions within the project area would be impacted by the creation of marsh and the replacement of fixed-crest weirs and plugs with variable-crest structures. The large, open-water areas and some of the tidal waterways through which water exchange now occurs would be filled with dredged material. However, the marsh creation features would not prevent tidal exchange in the surrounding marshes. The surrounding marshes are serviced by a number of existing channels that would not be filled so that tidal connectivity would be maintained.

Containment dikes which surround the marsh creation cells would be gapped at the end of project construction to allow the formation of tidal channels as the marsh platform settles. In addition, tidal channels are anticipated to form as differential settlement of the dredged material occurs. Existing tidal channels, boat trails, and other waterways occur throughout the project area and higher settlement of dredged material is anticipated in those areas as they are deeper than the adjacent open-water areas being filled. Those areas would be the lowest points on the marsh platform, so water exchange would naturally occur at those sites. In addition, the marsh platform is anticipated to consolidate and settle to the existing marsh elevation over the project life. As the marsh platform subsides, more tidal connections and other open-water areas would form throughout the project area.

In the areas west and north of Lost Lake, the installation of variable-crest weirs will result in greater tidal connectivity and input of fresh water. The current system of fixed-crest weirs and plugs provides for a reduced level of tidal exchange which will be improved with more open water control structures. From February through the end of October, the variable-crest structures will be set at an elevation of -2.5 feet which will considerably increase exchange within the project area. Freshwater flow into the area west of Lost Lake is estimated to increase by approximately 641 cubic feet per second (cfs) and by approximately 190 cfs north of Lost Lake.

Water Quality

Under the Preferred Alternative, dredging activities in Lost Lake, the placement of dredged material in the project area, and the construction of containment dikes and terraces would increase turbidity as bottom sediments are disturbed. However, the increased turbidity would only occur during periods of active dredging and is expected to dissipate rapidly upon completion of construction. Dewatering of the marsh creation fill sites will also result in increased turbidities in the surrounding open water areas. In addition, turbidities may increase after rainfall events as water runs off the unvegetated marsh platform, especially immediately after dredged material deposition.

B. Biological Environment

Vegetation

Under the Preferred Alternative, approximately 468 acres of marsh would be created/nourished within the marsh creation cells. In addition, 18 acres of emergent habitat would result from construction of the earthen terraces. Very little emergent vegetation would be present immediately after construction as most of the project area would be unvegetated dredged material. Those areas of marsh which are nourished would likely revegetate more rapidly than the large, open-water areas which are filled. Marsh vegetation nourished with 6 to 12 inches of material has been shown to respond favorably and revegetate quickly (Mendelssohn and Kuhn 1999). Large, open-water areas which are filled with dredged material would likely revegetate at a slower rate than nourished marsh. However, based on the performance of other marsh creation projects, revegetation could be expected within 1 to 2 years after construction. Vegetative communities would likely be very similar to those currently found within the project area.

Under the Preferred Alternative, marsh loss would continue in the project area, but at a reduced rate. The WVA prepared by the CWPPRA Environmental Work Group projected that land loss would continue at approximately one-half of the existing marsh loss rate within the marsh creation cells (USFWS 2012). Within the hydrologic restoration areas, marsh loss would be reduced by 100% west of Lost Lake and by 21% north of Lost Lake. Approximately 3,881 acres of marsh would remain at the end of the 20-year project life compared to 3,429 acres under the No Action Alternative, resulting in a net of 452 acres.

The WVA indicates that the coverage of submerged aquatic vegetation is also projected to increase under the Preferred Alternative (USFWS 2012). The smaller, shallower ponds which would form within the marsh creation areas would be more conducive for the establishment of submerged aquatic vegetation. Those smaller waterbodies would be less susceptible to increases in turbidity from wind-generated waves. In addition, the increased delivery of fresh water and nutrients resulting from the installation of the variable-crest structures would enhance the production of submerged aquatics. Furthermore, the 30,000 linear feet of terraces would reduce fetch and turbidity across 752 acres of fragmented marsh and open water providing conditions more conducive to the establishment of submerged aquatic vegetation.

Fisheries

Under the Preferred Alternative, the project area would continue to support a diverse assemblage of fishes and shellfishes. The creation and nourishment of intertidal marsh would ensure that the project area continues to provide important nursery functions well beyond the 20-year project life. Several studies indicate that vegetated habitats (i.e., emergent marsh and submerged aquatic vegetation beds) generally support higher densities of fish and crustaceans than unvegetated habitat (Castellanos and Rozas 2001, Rozas and Minello 2001, Minello and Rozas 2002). Population declines of shrimp and blue crabs may become evident when a marsh complex exceeds 70 percent unvegetated, open water (Minello and Rozas 2002). Compared to the No Action Alternative, an additional 452 acres of marsh would result from project implementation (USFWS 2012). Although the earthen terraces only result in 18 acres of emergent marsh, over 60,000 feet (i.e., over 11 miles) of edge habitat would be created. Much of that habitat would

exist within the intertidal zone and would provide foraging and nursery habitat for a number of estuarine species.

The Preferred Alternative will result in four fixed-crest weirs and one plug being replaced with variable-crest weirs. Replacement of the existing structures will result in greater cross-sectional area at each location which will improve access for estuarine organisms. The crest elevation of the fixed-crest weirs ranges from 0.0 feet to 0.5 feet. From February to November, the crest elevation of the variable-crest weirs is -2.5 feet as the structure bays will be completely open. Fisheries access will be enhanced for approximately 6,092 acres of marsh and open water habitats.

Dredging activities in Lost Lake would increase turbidity as bottom sediments are disturbed. The increased turbidity and disturbance from dredging activities could result in some fishery species being displaced. It is likely that those species would simply relocate to an area of more suitable habitat. However, the increased turbidity would only occur during periods of active dredging and is expected to dissipate rapidly once dredging activities cease.

Essential Fish Habitat Assessment

Estuarine emergent wetland is the primary type of EFH that would increase significantly under the Preferred Alternative; such habitat would be created in open-water areas and deteriorated marsh. According to the WVA, 452 additional acres of emergent marsh would exist at the end of the project life under the Preferred Alternative, compared to the No Action Alternative. Coverage of submerged aquatic vegetation is also expected to increase. Increases in those habitat types would benefit postlarval/juvenile and subadult brown shrimp; postlarval/juvenile and subadult white shrimp; and postlarval/juvenile red drum.

The creation of estuarine emergent wetlands would result in the loss of mud bottom and estuarine water column as emergent marsh would replace those habitat types. Loss of mud bottom EFH could result in negative impacts to subadult brown shrimp and postlarval/juvenile, red drum. Although adverse impacts would occur to some types of EFH, more productive types of EFH (i.e., estuarine emergent wetlands) would be created under the Preferred Alternative. In addition, open-water habitat would form within the marsh platform as ponds and other waterbodies develop as a result of natural marsh loss processes. Open-water habitats are expected to experience an increase in the percent coverage of submerged aquatic vegetation under the Preferred Alternative. Therefore, the Preferred Alternative would result in a net positive benefit to all managed species that occur in the project area.

Replacement of four fixed-crest weirs and a plug with variable-crest structures would also improve marine fishery access to semi-impounded wetlands containing several types of EFH including estuarine emergent wetlands, mud bottom, submerged aquatic vegetation, and estuarine water column. Access for estuarine organisms would improve to approximately 6,092 acres of marsh and open water habitats. That area encompasses 3,427 acres of estuarine emergent wetlands and 2,665 acres of open water. Of the open water acreage, it is estimated that 666 acres contain submerged aquatic vegetation. Improved access to those habitat types would increase habitat value for postlarval/juvenile and subadult white and brown shrimp and postlarval/juvenile and subadult red drum.

Wildlife
The Preferred Alternative would result in improved habitat conditions for several species of wildlife including migratory and resident waterfowl, shorebirds, wading birds, and furbearers. Migratory waterfowl utilizing the project area would benefit from a greater food supply resulting from the increased abundance and diversity of emergent and submerged species. Habitat for the resident mottled duck would also improve considerably as the marsh platform and terraces would provide more desirable nesting habitat.

Intertidal marsh and marsh edge would also provide increased foraging opportunities for shorebirds and wading birds. Small fishes and crustaceans are often found in greater densities along vegetated marsh edge (Castellanos and Rozas 2001, Rozas and Minello 2001), and many of those species are important prey items for wading birds such as the great blue heron, little blue heron, great egret, black-crowned night-heron, and snowy egret. Mudflats and shallow water habitat created by the deposition of dredged material would provide increased foraging opportunities for shorebirds such as least sandpipers, killdeer, and the American avocet. Those species feed on tiny invertebrates and crustaceans found on mudflats which are exposed at low tide and in shallow-water areas of the appropriate depth.

Furbearers (such as the nutria and muskrat) which feed on vegetation would benefit from the increased marsh acreage in the project area. Representative furbearers such as the mink, river otter, and raccoon have a diverse diet and feed on many different species of fishes and crustaceans. Those species often feed along vegetated shorelines which provide cover for many of their prey species.

Threatened and Endangered Species
The Service has conducted an Intra-Service Section 7 Endangered Species Act consultation of the Preferred Alternative's impacts on the West Indian Manatee. Based on that consultation, the Service has determined that the Preferred Alternative would be "not likely to adversely affect" the endangered West Indian manatee.

The West Indian manatee, although it is unlikely, may be found in the estuarine waters in or near the project area. Construction equipment (e.g., boats, barges, airboats) may encounter manatees in the waterbodies found within and around the project area. Specific language will be included within the project's plans and specifications to avoid/minimize impacts to the West Indian manatee. The following precautions will be implemented from May to October, when manatees have the greatest potential for entering the project area:

> To ensure protection of the West Indian Manatee, all personnel associated with the project will be informed of the potential presence of manatees and take actions to induce them to leave the immediate work area prior to dredging regardless of water depth or time of year. The following precautions will be implemented from May to October, when manatees have the greatest potential for entering the project area:

1) The cutterhead shall remain completely buried in the bottom material during dredging operations.

2) If pumping water through the cutterhead is necessary to dislodge material or to clean the pumps or cutterhead, etc., the pumping rate shall be reduced to the lowest rate possible until the cutterhead is at mid-depth, where the pumping rate can then be increased.
3) During dredging, the pumping rates shall be reduced to the slowest speed feasible while the cutterhead is descending to the lake bottom.
4) All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s).
5) All personnel associated with the project shall be instructed about the possible presence of manatees and the need to avoid collisions with and injury to manatees. Any sighting of, collision with, or injury to a manatee shall be immediately reported to the Engineer.

   Temporary signs should be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels should operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed. Any manatee sighting should be immediately reported to the Service's Lafayette, Louisiana Field Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821).

C. Cultural and Recreational Resources

The Louisiana Department of Culture, Recreation and Tourism has reviewed the project information to determine if any cultural resources may be impacted by project implementation. A review by the Louisiana Office of Cultural Development, Division of Archeology indicated that no archaeological sites are located within the project area. In a November 28, 2012 email, they indicated no objection to this project. They did request a minor modification to one of the containment dikes on the eastern side of Lake Pagie to avoid any potential impacts to a cultural resources site located to the south along the Lake Pagie shoreline. The containment dike alignment will be adjusted as necessary.

Recreational opportunities within the project area, such as hunting, fishing, and bird watching, may increase with the increased formation of emergent marsh and other fish and wildlife habitats. An increase in habitat value would likely result in increased fish and wildlife usage of the project area.

D. Economic Resources

By increasing emergent wetlands, and subsequently fish and wildlife resources, the Preferred Alternative would help to maintain that portion of the local economy dependent on recreational and commercial fish and wildlife resources found within the project area. Project-area waterfowl hunting and recreational fishing are important components of the local economy, and creation of

emergent marsh and other fish and wildlife habitats could increase the ability of the project area to support those activities. The increased acreage of emergent wetlands would also act as a storm buffer for flood protection levees north and east of the project area.

SECTION 5.0 RATIONALE FOR SELECTING PREFERRED ALTERNATIVE

Marsh loss in the project area has resulted in a decline in fish and wildlife habitat and the loss is expected to continue at current rates. Marsh elevations in some areas of deteriorated marsh are not conducive to the continued existence of the dominant plant species, marshhay cordgrass, which prefers higher elevations. Ponding and prolonged inundation, due to subsidence, have resulted in the deterioration of marsh and the formation of shallow, open-water habitat. Continued subsidence would result in the future deterioration of the remaining stands of healthy, unfragmented marsh. Elevation surveys conducted at three sites within the project area indicate an average marsh elevation of +1.1 feet (Pyburn and Odom, Inc. 2011). With the current design elevation of +3.5 feet, the marsh platform would support emergent vegetation throughout the 20-year project life.

Dedicated dredging to create marsh in shallow, open-water areas has been successfully used as a restoration technique across coastal Louisiana. Since CWPPRA was authorized in 1990, several marsh creation projects have been constructed and many more are authorized for engineering and design, or construction, by the LCWCRTF (Table 5). Also, several barrier island restoration projects have been constructed which utilize hydraulic dredging to create dune and marsh habitats. In addition, many other marsh creation projects have been constructed by the State of Louisiana through its Coastal Restoration Program as mitigation for wetland impacts under Section 404 of the Clean Water Act, and by the Corps of Engineers under other authorities such as Sections 204 and 1135 of the Water Resources Development Act.

Table 5. Marsh creation projects constructed/authorized under CWPPRA.

Project Name	Acres Benefited	Construction Completion Date
Bayou Labranche Wetland Creation	203	1994
Barataria Waterway Wetland Restoration	9	1996
West Belle Pass Headland Restoration	474	1998
Lake Chapeau Sediment Input and Hydrologic Restoration, Point Au Fer Island	509	1999
Sabine Refuge Marsh Creation	993	Cycles 1, 2, and 3 completed. Cycles 4 and 5 are pending.
Little Lake Shoreline Protection/Dedicated Dredging near Round Lake	713	2006
Goose Point/Point Platte Marsh Creation	436	2008
North Lake Mechant Landbridge Restoration	604	2009

Bayou Dupont Sediment Delivery System	326	2010
Dedicated Dredging on the Barataria Basin Landbridge	242	2010
West Lake Boudreaux Shoreline Protection and Marsh Creation	277	2011
East Marsh Island Marsh Creation	169	2011
South Shore of the Pen Shoreline Protection and Marsh Creation	106	2012

Scientific studies in coastal Louisiana also provide support for the use of dedicated dredging to restore coastal wetlands. Most research conducted on dedicated dredging projects in coastal Louisiana has occurred in saline marsh habitats. Although the project area supports an intermediate marsh community, the response should be somewhat similar to that observed in saline marsh. Marshes created at the correct elevation take only a few years to develop vegetative communities similar to those in natural marshes (Edwards and Proffitt 2003). Percent vegetative cover also equals that found in natural marshes, but only after several years of growth (Proffitt and Young 1999). However, soil characteristics between created and natural marshes are often very different, with created marshes being lower in organic matter and higher in bulk density (Edwards and Proffitt 2003).

Thin-layer sediment deposition to the marsh surface (i.e., marsh nourishment) has also been investigated as a restoration technique in coastal Louisiana. Mendelssohn and Kuhn (1999) studied the impacts of sediment addition to a deteriorating saline marsh dominated by smooth cordgrass. Sediment addition ranging from trace amounts to nearly 24 inches above natural marsh elevations produced increases in plant cover and plant height. Sediment addition reduced flooding, allowed for better soil aeration, and lowered concentrations of phytotoxins which provided better conditions for plant growth. Ford et al. (1999) investigated the effects of thin-layer deposition of dredged material via spray dredging in a deteriorated saline marsh. One year following the addition of approximately 9 inches of sediment, percent cover of smooth cordgrass increased three-fold over pre-project conditions with no lasting negative impacts on the native marsh plant community.

The Preferred Alternative is supported by the LCWCRTF, which approved funding for construction at their January 24, 2013, meeting. The Preferred Alternative would create emergent marsh in the project area, increase its habitat value for fish and wildlife resources, and result in a net gain of 452 acres of marsh at the end of the project life compared to the No Action Alternative. The Preferred Alternative also supports the restoration strategies recommended for this region in the Coast 2050 Plan.

SECTION 6.0 COMPATIBILITY WITH CWPPRA AND COMMUNITY OBJECTIVES

The Preferred Alternative would help to achieve CWPPRA objectives for protection and restoration of Louisiana's coastal wetlands. The cumulative impact of all CWPPRA projects approved to date would result in the protection/creation/restoration of over 113,000 acres of

coastal wetlands. Cumulative impacts of the CWPPRA Program are addressed in the Louisiana Coastal Wetlands Restoration Plan Main Report and Environmental Impact Statement (LCWCRTF 1993).

Community objectives would likely be enhanced by the proposed project. Common socioeconomic goals include the conservation of sustainable fishing, shrimping, crabbing, and hunting opportunities in the region. The general public also supports wetland restoration and preservation for fish and wildlife habitat, and for recreational, aesthetic, and other non-consumptive uses. In addition, the public is now much more aware of the surge reduction benefits provided by wetlands since the passage of Hurricanes Katrina and Rita in 2005.

SECTION 7.0 COMPLIANCE WITH LAWS, REGULATIONS AND POLICIES

This Environmental Assessment was prepared in compliance with the National Environmental Policy Act of 1969 (NEPA). It is consistent with the NEPA-compliance procedures contained in the Fish and Wildlife Service Manual (550 FW 1-3), and employs a systematic, interdisciplinary approach. The proposed action alternative involves disposal of fill material into waters or wetlands; therefore, an evaluation under Section 404(b)(1) of the Clean Water Act of 1977, as amended, is required, as well as State of Louisiana water quality certification under Section 401. A Section 404 permit (dated February 24, 2014) has been received from the U.S. Army Corps of Engineers as well as Water Quality Certification (dated April 17, 2013) from the Louisiana Department of Environmental Quality. In addition, the Louisiana Department of Natural Resources has determined that the project is consistent with the Louisiana Coastal Resources Program (dated April 17, 2013).

Under the Magnuson-Stevens Fishery Conservation and Management Act, the Service initiated consultation with the National Marine Fisheries Service upon submission of the draft Environmental Assessment in November, 2012. Project-related impacts to EFH within the project area have been evaluated. The Preferred Alternative would result in adverse impacts to some categories (i.e., mud bottom and estuarine water column) of EFH; however, more productive categories of EFH, such as estuarine emergent wetlands, would be created. Therefore, the Service finds that the Preferred Alternative would not result in net adverse impacts to habitats designated as EFH under the MSFCMA.

By correspondence dated October 16, 2012, the Service initiated consultation with the Louisiana Department of Culture, Recreation and Tourism to determine project impacts on cultural resources within the project area. A review by the Louisiana Office of Cultural Development, Division of Archeology indicated that no archaeological sites are located within the project area. In a November 28, 2012 email, they indicated no objection to this project. They did request a minor modification to one of the containment dikes on the eastern side of Lake Pagie to avoid any potential impacts to a cultural resources site located to the south along the Lake Pagie shoreline. The containment dike alignment will be adjusted as necessary.

Pursuant to Executive Order 12898 (Environmental Justice for Minority Populations), the Service has determined that the Preferred Alternative would not result in disproportionately high and adverse human health or environmental impacts on minority and low-income populations.

The proposed action has been internally reviewed by the Fish and Wildlife Service for compliance with the Endangered Species Act of 1973, as amended. In addition, the proposed action has been reviewed for compliance with the Archeological and Historic Preservation Act of 1974; Executive Order 11988 (Floodplain Management); Executive Order 11990 (Protection of Wetlands); and Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds).

SECTION 8.0 PREPARER

This Environmental Assessment was prepared by Kevin J. Roy, Senior Field Biologist with the Fish and Wildlife Service, Lafayette Field Office, Lafayette, Louisiana.

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