SOUTHWEST COASTAL LOUISIANA
FINAL INTEGRATED DRAFT FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

ENVIRONMENTAL REPORT

SOUTHWEST COASTAL LOUISIANA
FINAL INTEGRATED DRAFT FEASIBILITY REPORT
AND
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Environmental Report

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INTRODUCTION

This Appendix provides information that supplements the information provided in corresponding sections of Chapter 1 of the Main Report (i.e. subsection 1.2.4 Transportation in Appendix A supplements information in subsection 1.2.4 Transportation in Chapter 1).

1.0 Project Setting

1.1 Affected Environment

Study Area

Figure 1-1 displays land class changes within the study area between 1956 and 2000. This information, derived for the present study, was taken from a data set that does not include areas outside the Coastal Zone; hence the large areas categorized as "Out of Analysis".

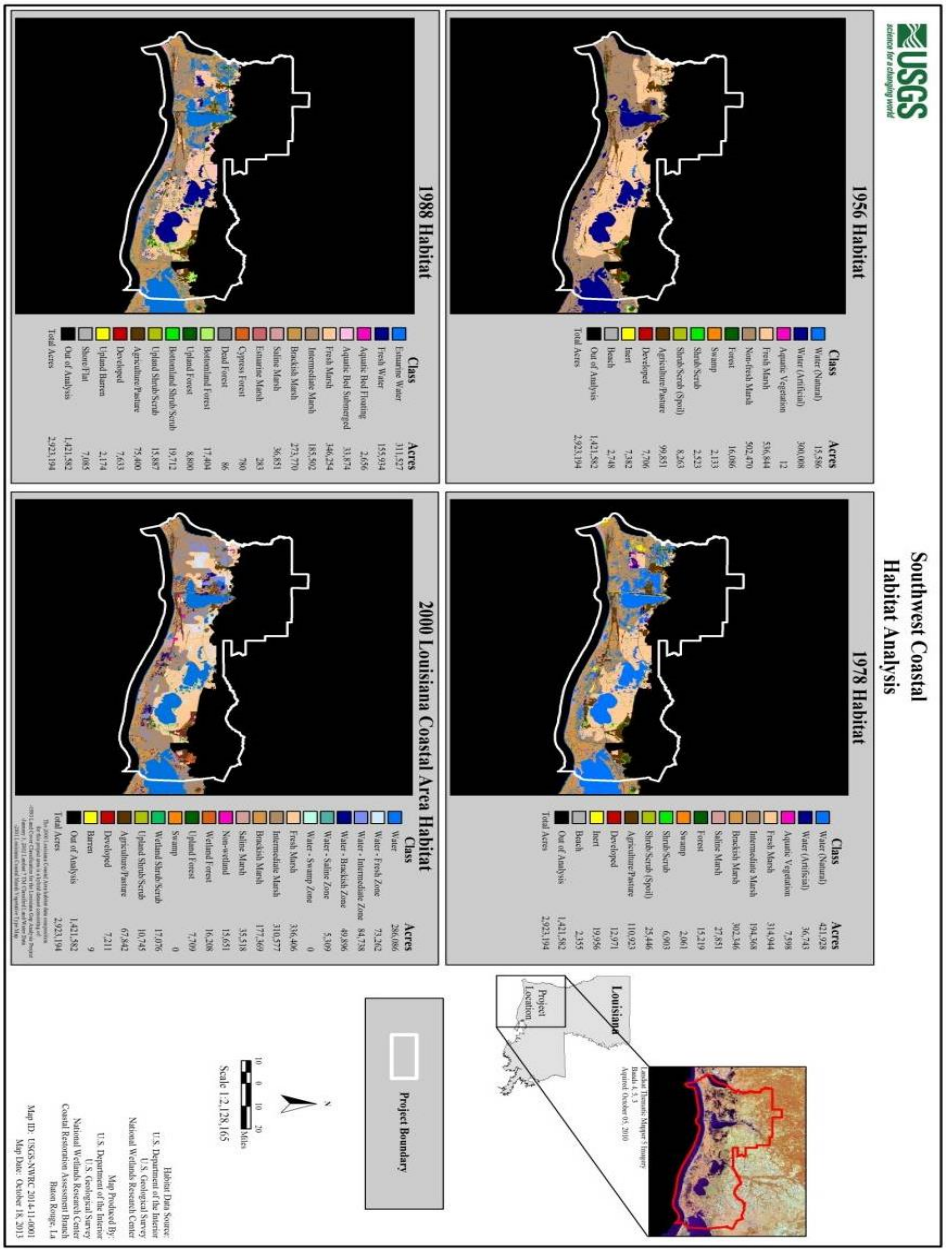

Figure 1-1: Land class (habitat) changes between 1978-2000 (source: USGS 2013).

Geomorphic and Physiographic Setting

The study area occupies a portion of the Pleistocene Prairie Terrace (or Prairie Complex) on the northern edge of Cameron, the northern half of Vermilion, as well as the majority of Calcasieu Parishes, and most of the Marginal Plain (or Chenier Plain) on the far southern portions of Calcasieu, most of Cameron and southern half of Vermilion Parishes. The main physiographic zones of the Chenier Plain include the Gulf Coast Marsh, Gulf Coast Prairies, and Forested Terraced Uplands. The Gulf Coast Marsh is at or near sea level and borders the Gulf of Mexico and most of the large lakes in the area. The Gulf Coast Prairie extends from the central part of Vermilion and Cameron Parishes into the southern part of Calcasieu Parish, while the Forested Uplands, which occur at or near 25-foot elevation, are located in the northern part of Vermilion and Calcasieu Parishes. Louisiana's coastal prairies, once encompassing an estimated 2.5 million acres in the Southwest portion of the state, now are considered critically imperiled with less than 600 acres remaining.

The study area formed over the past 7,000 years by the deltaic processes of the Mississippi River and other streams. Fine-grained sediment transported to the Chenier Plain in the mud stream from the Mississippi River was brought into coastal estuaries and marshes and deposited along the shore to form mudflats (Gagliano and van Beek, 1993). The newly formed land was then colonized by wetland vegetation, which further promoted the land-building process. Wave action and occasional storm events also deposited sand and shells onto the newly built land. As the Mississippi River changed course and active delta-building switched to the eastern Deltaic Plain, or extended to the edge of the continental shelf or beyond (current course), the mud stream ceased to carry sediment to the Chenier Plain and the Gulf shore became subject to erosion. Periods of erosion winnowed out fine-grained materials, leaving the deposits of sand and shell to form the Gulf beaches, examples of such in the area are Holly and Rutherford Beaches. Beach deposits were subsequently shaped by waves and coastal currents to form elevated ridge systems. Once the mud stream returned and land-building continued seaward, these elevated ridges or cheniers (forests atop relict beach ridges) were stranded inland where deciduous vegetative growth (e.g., live oak trees) occurred. Examples of cheniers in the area include Hackberry, Little Chenier, Grand Chenier, Pecan Island and Cheniere au Tigre ridges to name just a few. These ridges and cheniers blocked drainage and saltwater inflows from the Gulf of Mexico, resulting in the development of large freshwater basins on the landward side of the ridges. Chenier ridges run laterally to the modern shoreline and rise above the surrounding marshes by as little as a few inches or as much as 10 ft (Byrne et al. 1959). These ridges can range from 100 to 1,500 ft wide with some ridges extending along the coast for a distance of up to 30 miles. On the seaward side of the cheniers, a zone of brackish to saline marshes developed as a result of tidal influences from the Gulf (adapted from Visser et al. (2000), USACE (2004), and LADNR (2009)).

1.2 Human Environment

1.2. Employment, Business, and Industrial Activity

Table 1-1 displays the percentage breakdown of non-farm employment by industry for each parish in the study area.

Table 1-1: Non-farm employment by industry (2010)

Industry	Calcasieu	Cameron	Vermilion
Forestry, fishing, and related activities	0%	6%	3%
Mining	1%	6%	7%
Utilities	0%	X	0%
Construction	9%	7%	8%
Manufacturing	8%	10%	6%
Wholesale trade	2%	8%	3%
Retail trade	11%	X	13%
Transportation and warehousing	3%	11%	3%
Information	1%	X	1%
Finance and insurance	3%	X	4%
Real estate and rental and leasing	3%	X	4%

Professional, scientific, and technical services	5%	X	3%
Management of companies and enterprises	1%	X	0%
Administrative and waste management services	5%	3%	3%
Educational services	1%	1%	X
Health care and social assistance	12%	3%	X
Arts, entertainment, and recreation	2%	X	1%
Accommodation and food services	10%	X	5%
Other services, except public administration	6%	4%	9%
Federal, civilian	1%	1%	1%
Military	1%	1%	1%
State government	3%	2%	1%
Local government	10%	19%	14%

Source: Bureau of Economic Analysis (BEA)
An "X" denotes that data is not available for an entry.

Approximately 32% of the land area is used for agriculture. The major crops grown in the area are rice, soybeans, sugarcane, and sorghum. Pecans are also a major crop in Cameron Parish. According to the 2007 Census of Agriculture, the total stock of crops in the area is valued at over $62 million, with Vermillion Parish accounting for 80% of the total crop value.

1.2.4 Transportation

Navigation Projects

Navigational channels in the chenier plain influence hydrology, primarily by increasing marine influences (saltwater intrusion, wave energies) into freshwater and other interior marshes (LCA 2004). The following navigation waterways are in the vicinity of the Southwest Coastal Louisiana feasibility study area:

- GIWW
- Sabine-Neches Waterway
- Calcasieu River and Pass
- Mermentau River
- Freshwater Bayou
- Bayou Teche and Vermilion River

Gulf Intracoastal Waterway

The GIWW traces the U.S. coast along the Gulf of Mexico from Apalachee Bay near St. Marks, FL to Brownsville, TX, near the Mexico border. It intersects the Mississippi River and extends eastward for approximately 376 miles and west-southwestward for approximately 690 miles. In the study area, the approximate distances between major crossings are as follows:

- Atchafalaya River to Vermilion River, 64 miles;
- Vermilion River to Mermentau River, 43 miles;
- Mermentau River to Calcasieu River, 37 miles;
- Calcasieu River to Sabine River, 27 miles.

In addition to its main stem, the GIWW (Figure 1-2) includes a major alternative route (64 miles) which connects Morgan City, LA to Port Allen, LA. Project dimensions for the main stem channel and the alternative route are 12 ft deep and 125 ft wide, except for the reach between the Mississippi River and Mobile Bay, which is 150 ft wide. Today, parts of the GIWW are deeper and wider than the original construction dimensions.

Figure 1-2 Gulf Intracoastal Waterway Mainstem and Alternate Route

The GIWW was first authorized and construction began in the 1920s. The project was authorized by the River and Harbor Act of July 24, 1946, Senate Document 242, 79th Congress, 2nd Session, and prior River and Harbor Acts. The primary purpose of the inland navigation channel is transportation of goods by barge. Numerous side channels and tributaries intersect both the eastern and western main stem channel, providing access to inland areas, coastal harbors, and the Gulf of Mexico. The USACE operates the Leland Bowman Lock located on the GIWW. The lock helps to regulate the flow of water in the Mermentau Basin and keeps salt water out of the fresh water supply that serves the farming communities further north, while allowing barge transportation.

Sabine-Neches Waterway and Sabine Pass Ship Channel

The Sabine-Neches Waterway is an approximately 64-mile federally authorized and maintained waterway located in Jefferson and Orange Counties in southeast Texas and Cameron Parish, Louisiana. The Sabine Pass, Sabine Lake, and Sabine River together form part of the boundary between the states of Texas and Louisiana. The Sabine-Neches main channel dimensions are currently 40 ft deep and 400 ft wide. The existing waterway consists of a jettied entrance channel, 42 ft deep and 500 to 800 ft wide, from the Gulf of Mexico; a channel 40 ft deep and 400 ft wide to Beaumont via the Neches River; and a channel 30 ft deep and 200 ft wide to Orange via the Sabine River.

The Sabine-Neches Project was authorized by the River and Harbor Act of 1962, House Document No. 553, 87th Congress, 2nd Session. The Sabine-Neches Waterway and the Sabine Pass Ship Channel serve the ports of Port Arthur, Beaumont, and Orange, Texas in the movement of commodities, particularly crude petroleum.

The USACE Galveston District is currently investigating navigation improvements on the Sabine-Neches Waterway. A draft report has been circulated for public review which tentatively recommends a channel modification to a depth of 48 ft. The project modification process is described in more detail in the chapter on Existing and Future Without Project Conditions.

Calcasieu River and Pass

The Calcasieu River is a 68-mile, deep-draft navigation channel. The northern boundary of the ship channel is located at Mile 36.0, just south of Interstate 10 in Lake Charles, LA. The southern boundary extends to Mile 32.0 in the Gulf of Mexico. The project was authorized under the River & Harbor Act of July 14, 1960 House Document 436, 86th Congress, 2nd Session (USACE). The purpose of this project is to provide deep-draft access to the Port of Lake Charles, the 12th largest port in the U.S. based on tonnage. The project also provides for a Saltwater Barrier Structure located north of Lake Charles, approximately 3 miles north of the northern boundary of the deep-draft ship channel.

Mermentau River

The Mermentau River navigation channel is a 4.6-mile channel beginning at the point of entry of the Mermentau River into Lower Mud Lake and extends in a southerly direction to the Gulf of Mexico.

The project includes two salinity control structures: the Catfish Point Control Structure located at Mile 24 of the Mermentau River, and the Schooner Bayou Control Structure located in the enlarged White Bay to Vermilion Bay channel, approximately 5 miles southwest of Intracoastal City. The Catfish Point and Schooner Bayou Control Structures reduce saltwater intrusion into the Mermentau Basin, which consists of hundreds of thousands of acres of rice and crawfish farms that are dependent on freshwater.

The project is authorized by the Flood Control Act of August 18, 1941, as modified by the River and Harbor Act of July 24, 1946. The Act provides for enlargement of the lower Mermentau River below Grand Lake to a minimum cross-sectional area of 3,000 sq ft below Mean Low Gulf (MLG) for discharge of flows. It also provides for channel enlargement and realignment of the Inland Waterway from Vermilion Bay to Grand Lake to provide a minimum cross-sectional area of 3,000 sq ft below MLG for discharge of flood flows and interflow between lakes.

This project also provides for the enlargement of the North Prong of Schooner Bayou and Schooner Bayou Cutoff to a channel -6 ft MLG by 60 ft. It also provides for a sector gated control structure at Catfish Point, Mile 24 of the Mermentau River, and Schooner Bayou Lock on Schooner Bayou. The Act further provides for incorporation of the existing projects: "Waterway from White Lake to Pecan Island, LA" and the portion of "Inland Waterway from Franklin, LA to the Mermentau River" west of Vermilion Bay. The waterway from "Inland Waterway from White Lake to Pecan Island, LA" consists of a channel -5 ft MLG by 40 ft.

Freshwater Bayou and Freshwater Bayou Lock

Freshwater Bayou is a 23.1-mile navigation channel that serves as the hydrologic boundary between the Mermentau Basin to the west and the Teche-Vermilion Basin to the east. The canal extends from the northern boundary at Mile 161.2 of the GIWW, at Intracoastal City west of the Harvey Lock, to the 12-ft depth contour in the Gulf of Mexico. A lock is located at the Gulf of Mexico to aid in reducing saltwater intrusion into interior wetlands along the canal. Between 1979 and 1986, approximately 300,000 tons of cargo was transported along Freshwater Bayou Canal, mostly in oil and gas service and supply vessels and commercial fishing boats (USACE, 1989). The project was authorized under the River and Harbor Act of July 14, 1960 (USACE Project Fact Sheet) and constructed between 1965 and 1967. The purpose of this project is to provide deep-draft vessels access between the Gulf of Mexico and Intracoastal City, Abbeville Harbor and Terminal District, and the GIWW.

Bayou Teche and Vermilion River, LA

The Vermilion River is a 131.8-mile navigable channel that flows from the 8-foot contour in Vermilion Bay to the head of navigation at Mile 52 at Lafayette, LA. There is a flood control project from Lafayette to Port Barre, LA, as well as in Bayou Teche from 2 miles below Arnaudville to Port Barre (USACE Project Fact Sheet).

The project was authorized by the Flood Control Act of August 18, 1941 (USACE Project Fact Sheet). The purpose of this project is to provide a shallow-draft navigation channel to Lafayette and improve flood control from Port Barre to the Vermilion River via Bayou Teche, Bayou Fusilier, and the Vermilion River.

Operations and Maintenance Dredging of Navigation Channels

Calcasieu River and Pass, Louisiana, published as House Document Number 436, 86th Congress, resulted in authorization by the River and Harbor Act of July 14, 1960 (Public Law 86-646) of the following measures: a 42- by 800-foot approach channel from the 42-foot depth in the Gulf of Mexico to the jettied channel; a channel between the jetties varying in depth from 42 ft at the seaward end to 40 ft at the shoreline over a bottom width of 400 ft; a 40- by 400-foot channel from the shoreline (mile 0) to the wharves of the Port of Lake Charles (mile 34.1); enlargement of the existing turning basin at mile 29.6 to a depth of 40 ft; a mooring basin at about mile 3 having dimensions of 40 by 350 by 2,000 ft; extension of the existing channel at a depth of 35 ft over a bottom width of 250 ft from the Port of Lake Charles at mile 34.1 to the vicinity of the bridge on U.S. Highway 90 at mile 36.0, with a 35- by 750- by 1,000-foot turning basin at its upper end; and maintenance of the existing 12- by 200-foot channel from the ship channel to Cameron, Louisiana, via the old channel of the Calcasieu River. The project maintenance is focused in 3 primary reaches. The most gulfward reach from mile 0-5 is maintained with agitation dredging. Two Calcasieu Lake reaches, mile 5-17 and mile 17-22 are typically maintained on an alternating year cycle. The typical quantity removed and disposed for each reach is 2.5 million cubic yards.

The Calcasieu River and Pass Dredged Material Management Plan (DMMP) was approved in December 2010. Existing disposal areas for the continued maintenance of the navigation channels cannot accommodate the volume of material, which would be dredged for channel maintenance. Alternative plans addressed in the DMMP include modification of existing disposal areas, development of new disposal areas, and measures to reduce channel maintenance requirements.

Operations and maintenance (O&M) dredging of navigation channels can provide a source of materials for ecosystem restoration projects. For example, the Calcasieu Dredge Material Management Plan estimates that over 6,000 acres could be created over the next 20 years from the Calcasieu River.

In general, O&M dredge material management plans must be "environmentally acceptable;" however, that does not necessarily mean that the material will be used beneficially. The authorized and funded Louisiana Coastal Area (LCA) Beneficial Use of Dredged Material (BUDMAT) Program also could provide a potential source of funding for beneficial use of dredged material throughout the Louisiana coastal area. Of the nine authorized Federal navigation channels that represent the most significant opportunities for additional beneficial use of dredged material in coastal Louisiana, three are located in the Southwest Coastal area: Calcasieu River and Pass, Mermentau River, and Freshwater Bayou. See Table 1-2 for information on dredging quantities and amounts for beneficial use by channel.

Table 1-2: Marsh restoration dredging locations and quantities

Channel / Reach	Average Quantity/ Event (cubic yard)	Average Annual Quantity (cubic yard)	Frequency Of Dredging	Federal Standard (% Used Beneficially)
Freshwater Bayou - Lock to Gulf	1,057,000	352,333	2 to 4 yrs	100
Freshwater Bayou - inland	2,000,000	133,333	every 15 yrs	n/a
Total	3,057,000	485,666		
Mermentau River – bar & inland*	1,264,000	632,000	1 to 3 yrs	100
Total*	1,264,000	632,000		
Calcasieu – Mile 5 to 14	3,615,000	1,446,000	2 to 3 yrs	0
Calcasieu – Mile 14 to 24.5	5,250,000	2,100,000	2 to 3 yrs	0
Calcasieu – Mile 28 to 36	1,334,000	242,545	3 to 8 yrs	0
Calcasieu - bar	7,547,000	7,547,000	annually	10
Total	17,746,000	11,335,545		
Grand Total	22,067,000	12,453,211		

Note: Based on New Orleans District data from years 1996 through 2007. Extracted from BUDMAT Table 2-6. New Orleans District (CEMVN) Primary Navigation Channels

* The Mermentau River project includes dredging of the Mermentau River from Highway 82 out to the Gulf of Mexico (and also includes Schooner Bayou and Catfish Point Control Structures). The USACE typically dredges Mermentau from LA-82 to the Gulf (approx 6 mile reach) every 2 to 4 years. Most recent dredging took place after Gustav/Ike. However, in light of O&M funding being decreased and low use waterways being funded 50% of their average annual funding, USACE may not dredge the Mermentau again anytime soon. Mermentau falls under the classification of a "low use" waterway (communication with Tracy Falk, USACE Operations Manager for Mermentau).

1.4.5 Rare, Unique, and Imperiled Vegetative Communities

The following rare, unique, and imperiled communities, documented by the Louisiana Natural Heritage Program, are important in that they contribute to the diversity and stability of the coastal ecosystem. In the future without action, these rare, unique, and imperiled vegetative communities are expected to continue disappearing. For example, without action, saltwater intrusion and drainage problems would continue, resulting in the conversion of freshwater marsh to intermediate and brackish marsh.

Coastal Live Oak-Hackberry Forest (chenier maritime forest): Also known as chenier maritime forest, this natural community formed on abandoned beach ridges primarily in southwest Louisiana. Composed primarily of fine sandy loams interbedded with sand and shell debris, these ridges range in height from 4 to 5 ft above sea level. Live oak and hackberry are the dominant canopy species. Other common species include red maple, sweet gum, water oak, green ash, and American elm.

Chenier forests have historically been subject to human disturbance. It is the only high ground in the landscape and therefore is used for development, highways, access roads, infrastructures, oil and gas production, and agriculture. In a study conducted by Providence Engineering and funded by the LDNR on the cheniers and natural ridges, approximately 11 percent of the cheniers studied were undeveloped (Cheniers and Natural Ridges Report, 2009). Of the original 100,000 to 500,000 acres in Louisiana, only 2,000 to 10,000 acres remain.

Coastal Dune Grassland: Coastal dune grasslands occur on beach dunes and elevated backshore areas above intertidal beaches. Louisiana's coastal dunes are poorly developed because of the high frequency of overwash

associated with hurricanes and storms, and a limited amount of eolian-transported sand. Vegetative cover ranges from sparse to fairly dense and is dominated by salt spray tolerant grasses. Coastal dune grasslands are estimated to have occupied less than 2,000 acres in pre-settlement times, and 50 to 75 percent was thought to remain prior to the 2005 hurricanes. Some of the most extensive examples of coastal dune grasslands in Louisiana occur in the Chenier Plain.

Coastal Prairie: The Coastal Prairie can be divided into two main types, upland dry to mesic prairies at the northern end of its range, and marsh fringing prairies on "islands" or "ridges" in the marsh at the southern end of its range. The soil conditions and frequent burning from lightning strikes prevented invasion by woody trees and shrubs and maintained the prairie vegetation. Coastal prairie vegetation is extremely diverse and dominated by grasses. Remnant Louisiana coastal prairies, once covering an estimated 2.5 million acres, have been reduced to less than 1 percent of the original extent. Some of the larger prairie remnants are marsh fringing, wet prairies found in Vermilion and Cameron Parishes.

Freshwater Marsh: Freshwater marsh is generally located adjacent to intermediate marsh along the northern extent of the coastal marshes. Salinities are usually less than 2 parts per thousand (ppt) and normally average about 0.5-1 ppt. Freshwater marsh has the greatest plant diversity of any of the marsh types. Although the freshwater marshes, as previously described, compose a large amount of the entire coastal marsh acreage, the Louisiana Natural Heritage Program ranks this community as imperiled because it has undergone the largest reduction in acreage of any of the marsh types over the past 20 years due to saltwater intrusion. Some of the largest contiguous tracts of freshwater marsh in Louisiana occur in Vermilion and Cameron Parishes.

1.4.7 Aquatic and Fisheries Resources

Benthic Resources

Estuarine benthic organisms include: macrobenthic (e.g., molluscs, worms, large crustaceans); microbenthic (e.g., protozoa); and meiobenthic (e.g., microscopic worms and crustaceans) groups (Day et al. 1989). Primary consumer groups of the benthic habitat include: bacteria and fungi, microalgae, meiofauna, and microfauna (Mitsch and Gosselink 2000). A major link in the aquatic food web between plants and predators is formed by the conversion of plant material (formed in primary production) by benthic detritivores and herbivores to animal tissue (Cole 1975). The salt marsh is a major producer of detritus for both the salt marsh system and the adjacent estuary (Mitsch and Gosselink 2000).

Fisheries Resources

The area contains a variety of aquatic habitats, including rivers, bayous, canals, lakes, ponds, shallow open water areas, the Gulf of Mexico, and estuarine marsh and embayments. Salinity and habitat structure (SAV, marsh, tidal creeks, deep water, oyster reefs, and benthic substrate) are the primary drivers that affect the distribution of fish and macrocrustaceans throughout the area with three general types: freshwater resident, estuarine resident, and transient marine species. Freshwater species, some of which may tolerate low salinities, generally live in the freshwater portions of the more interior and northern-most regions of the area. Resident species are generally smaller and do not commonly migrate very far. Marine transient species spend a portion of their life cycle in the estuary, generally spawning offshore or in high-salinity bays, and use coastal marshes as nursery areas (Herke 1971, 1995). Species typically found in freshwater areas include: spotted gar, bowfin, largemouth bass, channel catfish, crappie, and gizzard shad. Estuarine-dependent species typically include red and black drum, spotted seatrout, Gulf menhaden, and southern flounder. Typical marine species include king and Spanish mackerel, and cobia.

1.4.8 Essential Fish Habitat (EFH)

Figures 1-3, 1-4, 1-5 and 1-6 display EFH for coastal migratory pelagics (king mackerel, Spanish mackerel and cobia); shrimp (brown, white and pink shrimp); red drum; and stone crab, respectively within the area (source: http://www.habitat.noaa.gov/protection/efh/newInv/index.html; accessed December 15, 2015).

Figure 1-3: Coastal migratory pelagic EFH (source: http://www.habitat.noaa.gov/protection/efh/newInv/index.html; accessed December 15, 2015)

Figure 1-4: Shrimp EFH (source: http://www.habitat.noaa.gov/protection/efh/newInv/index.html; accessed December 15, 2015)

Figure 1-5: Red drum EFH (source: http://www.habitat.noaa.gov/protection/efh/newInv/index.html; accessed December 15, 2015).

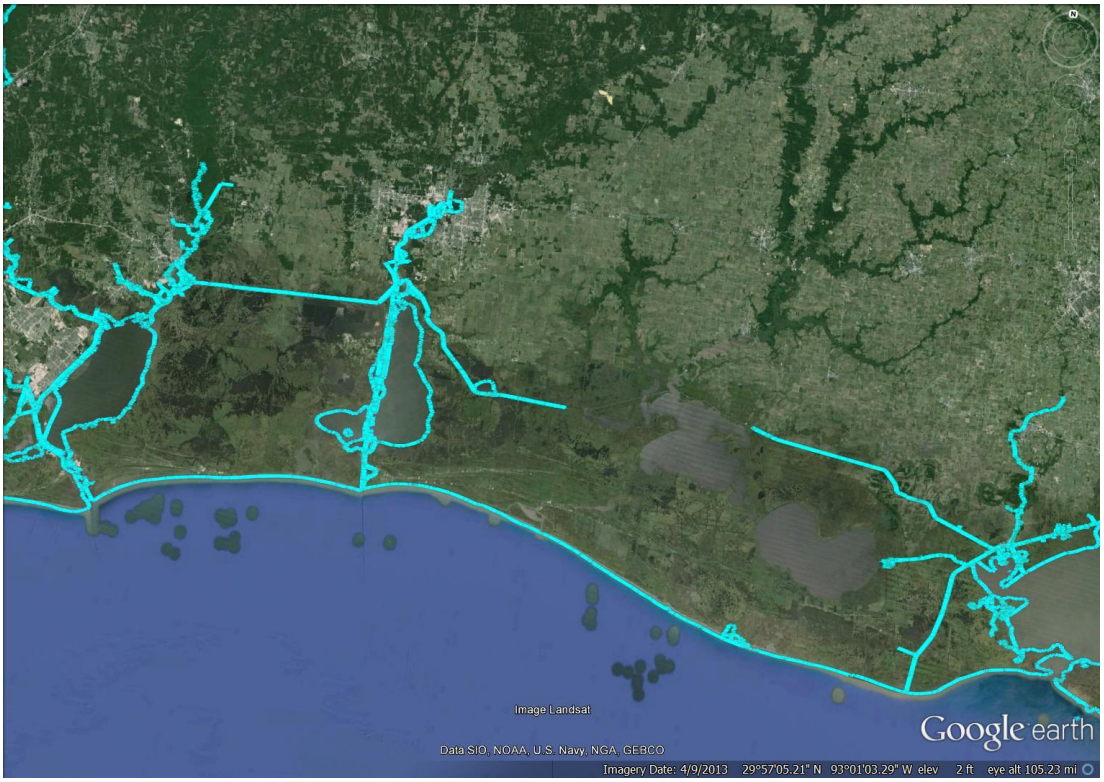

Figure 1-6: Stone crab EFH (source: http://www.habitat.noaa.gov/protection/efh/newInv/index.html; accessed December 15, 2015)

1.4.9 Threatened and Endangered Species

Piping plovers winter in Louisiana but do not nest on Louisiana's coast. Critical wintering habitat encompasses 24,950 acres along 342.5 miles of shoreline, which is most of the coast of Louisiana. Critical habitat is presented in Figure 1-7. Piping plovers arrive from their northern breeding grounds as early as late July and may be present in designated critical wintering habitat for 8 to 10 months of the year.

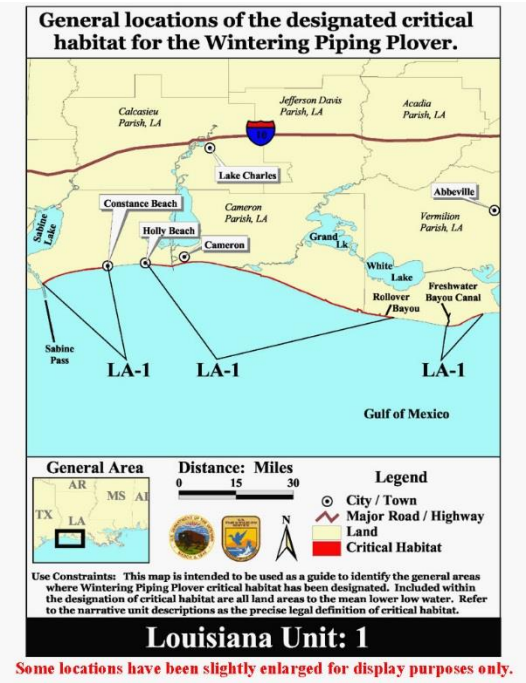

Figure 1-7: Designated critical habitat for wintering piping plover (Source: http://www.fws.gov/plover/finalchmaps/Plover_LA_1.jpg; accessed December 15, 2015)

Loggerhead Critical Habitat (*Sargassum* habitat) exists in the southernmost (offshore) portion of the study area (Figure 1-8). This critical habitat expands the entire length of the project (west to east) with the closest points ranging from approximately four miles to nine miles offshore. For additional detail concerning threatened and endangered species see Annex K.

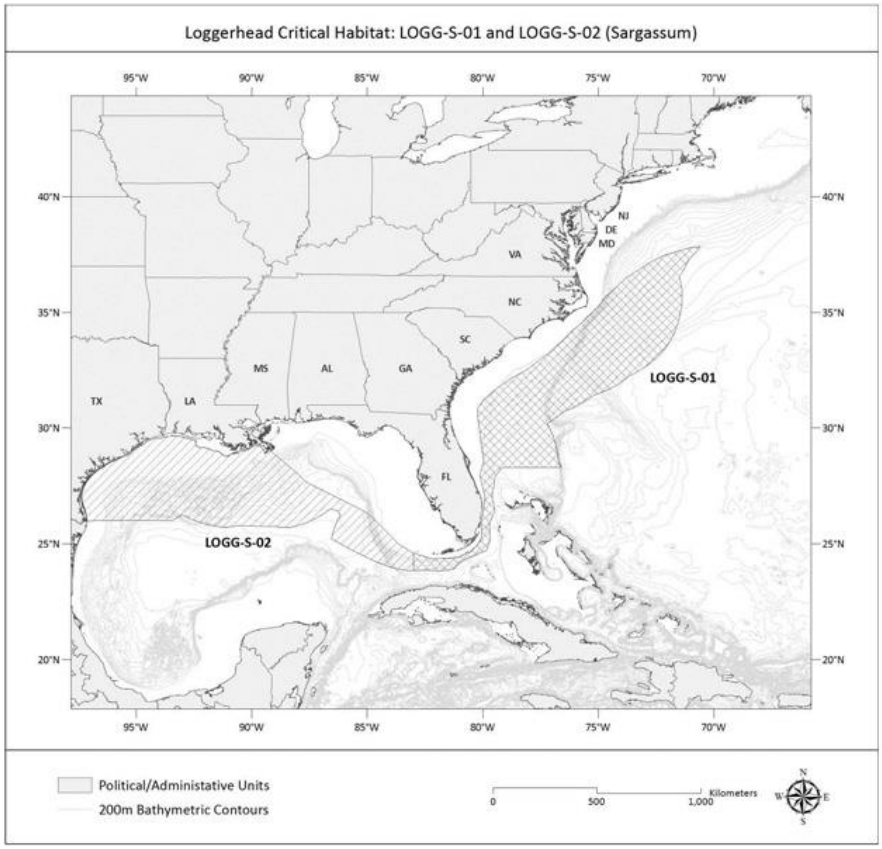

Figure 1-8 Loggerhead Critical Habitat

1.4.11 Aesthetics and Visual Resources

Other major water resources include the Gulf of Mexico, Sabine Lake, Calcasieu Lake, Grand Lake, White Lake and Vermillion Bay as large bodies of water. Within the coastal parishes there is an abundance of varying water bodies both salt and fresh water mixed with marsh, swamp and wetland. Numerous canals, streams and creeks crisscross the native habitat south of I-10 and the more developed areas along that corridor.

There are a variety of eco-regions within the area. Cameron Parish is primarily made up of Texas – Louisiana Coastal Marshes. Vermilion Parish is made up of Northern Humid Gulf Coastal Prairies in the northwest, Lafayette Loess Plains in the northeast, and Texas – Louisiana Coastal Marshes in the south. Calcasieu Parish is made up of Northern Humid Gulf Coastal Prairies in the southern parish of the parish, Flatwoods in the northern portion of the parish, and small pockets of Texas – Louisiana Coastal Marshes along the Calcasieu River corridor (according to the State of Louisiana Eco-Region Map, ref. "Louisiana Speaks").

The Northern Humid Gulf Coast Prairies originally contained tallgrass grasslands with gallery forests along streams paired with gently sloping coastal plain. In modern times, almost all of the coastal prairies have been converted to croplands, pasture, aquaculture or urban land uses. Texas – Louisiana Coastal Marshes is an area characterized by extensive freshwater and saltwater coastal marshes, few bays, and lack of barrier islands. There are many rivers, lakes, bayous, tidal channels, and canals. Chenier plains occupy about three percent of the region and are typically treeless. Lafayette Loess plains originally were home to a variety of plant species that included trees and grasses. In modern times native species have been replaced with crops of rice, soybeans, cotton, sugarcane, sweet potatoes, wheat, and aquaculture. Urban expansion into this eco-region has been substantial. Flatwoods generally occurs on mostly flat to gently sloping sediments. This eco-region was once dominated by longleaf pine flatwoods and savannas, pimple mounds, and small hillocks. While reduction of these characteristics has taken place, these features still dominate the area, especially in the case of the longleaf pine.

Other entities with institutional and public significance include the Sabine National Wildlife Refuge, Cameron Prairie National Wildlife Refuge, and Lacassine National Wildlife Refuge, all of which are located in Cameron Parish, and, finally, Sam Houston Jones State Park, which is located in Calcasieu Parish. These state and federally protected areas offer a refuge for the landscape and wildlife of southeast Louisiana and important recreational opportunities.

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APPENDIX A
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Clean Water Act Section 401 Water Quality Certification
Clean Water Act Section 404(b)(1) Evaluation

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT *(33 CFR 325)*	*OMB APPROVAL NO. 0710-003* *Expires October 1996*

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged of fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application or a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	*2. FIELD OFFICE CODE*	*3. DATE RECEIVED*	*4. DATE APPLICATION COMPLETED*

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME US Army Corps of Engineers, New Orleans District	*8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)* Same as Applicant
6. APPLICANT'S ADDRESS Planning , Programs and Programs and Project Management Division CEMVN-PDN-CEP P.O. Box 60267 New Orleans, LA 70160-0267 ATTN: William P. Klein, Jr.	*9. AGENT'S ADDRESS*
7. APPLICANT'S PHONE NOS. W/AREA CODE	*10. AGENT'S PHONE NOS. W/AREA CODE*
a. Residence *b. Business* (504) 862-2540	*a. Residence* *b. Business*

11. STATEMENT OF AUTHORIZATION

STILES.SANDRA.ELAINE.1230921748 January 5, 2016

APPLICANT'S SIGNATURE *DATE*

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Southwest Coastal Louisiana
Revised Draft Integrated Feasibility Report and Environmental Impact Statement

13. NAME OF WATERBODY, IF KNOWN (if applicable) All of Calcasieu, Cameron and Vermilion Parishes	*14. PROJECT STREET ADDRESS (if applicable)* All of Calcasieu, Cameron and Vermilion Parishes
15. LOCATION OF PROJECT Calcasieu, Cameron and Vermilion Parishes *COUNTY* Louisiana *STATE*	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN, (see instructions)

17. DIRECTIONS TO THE SITE

All of Calcasieu, Cameron and Vermilion Parishes

18. Nature of Activity (Description of project, include all features.)
Through separate reciprocal authorizations, Congress authorized the investigation of alternatives to: (1) provide hurricane protection and storm damage reduction, and (2) significantly restore environmental conditions that existed prior to the large scale alteration of the natural ecosystem including the Chenier Plain in Calcasieu, Cameron, and Vermilion parishes in Louisiana. The intent is to develop potential solutions to these water resource problems. The impacts described for the National Economic Development (NED) hurricane and storm damage risk reduction objective are programmatic in nature and therefore additional National Environmental Policy Act (NEPA) documents will be prepared at a later date to further analyze in detail site specific project(s) impacts prior to implementation of the NER component of the Project. Hence this Water Quality Certification application is not directed to the programmatic NED Plan. A Water Quality Certification application will be provided following more detailed, feasibility-level analysis for construction.

This Water Quality Certification application is directed to the National Ecosystem Restoration (NER) features that have been developed to a feasibility level of design and are recommended as fully constructible. The NER Tentatively Selected Plan (TSP) includes:
** 9 marsh restoration and nourishment features restoration locations include: (a) three areas on the south side of LA-82 approximately 4.5 miles west of Grand Chenier; (b) Pecan Island west of the Freshwater Bayou Canal approximately 5 miles north of the Freshwater Bayou locks; (c) Christian Marsh located east of Freshwater Bayou Canal and approximately 5 miles north of Freshwater Bayou locks; (d) southern shoreline of GIWW west of the CSC near Black Lake; (e) eastern rim of Calcasieu Lake within the Cameron-Creole Watershed; (f) east of Mud Lake and north of Highway 82; (g) Mud Lake west of Calcasieu Ship Channel adjacent to southern rim of West Cove.*
** 5 Gulf shoreline protection / stabilization features spanning 252,000 linear feet to reduce erosion of canal banks and shorelines at multiple locations of Gulf of Mexico shoreline from the Calcasieu River to Freshwater Bayou consisting of reef breakwaters located approximately 150' offshore; in addition, approximately 13.4 miles of rock revetment placed at three locations to fortify spoil banks of the GIWW and Freshwater Bayou; rock and breakwaters would also be placed at Holly Beach.*
**Hydrologic and salinity control feature is the Cameron-Creole Spillway structure south of Lambert Bayout would serve as a drainage manifold and the outfall channel into Calcasieu Lake would be rock-lined for scour protection and built to +2 ft.*
**Chenier reforestation consists of replanting of 435 seedlings per acre at 10' x 10' spacing, in 35 Chenier locations on 1,400 acres in Cameron and Vermilion parishes.*
**The CSC Salinity Barrier Navigation Study is recommended as an additional long-range study feature to adequately account for potential environmental benefits, navigation impacts, and engineering. This feature would not be constructed by the proposed action but is recommended for additional study.*

19. Project Purpose (Describe the reason or purpose of the project, (see instruction.)
NED Objective 1. Reduce the risk of damages and losses from hurricane and storm surge flooding.
NER Objective 2. Manage tidal flows to improve drainage, and prevent salinity from exceeding 2 parts per thousand (ppt) for fresh marsh and 6 ppt for intermediate marsh.
NER Objective 3. Increase wetland productivity in fresh and intermediate marshes to maintain function by reducing the time water levels exceed marsh surfaces.
NER Objective 4. Reduce shoreline erosion and stabilize canal banks to protect adjacent wetlands.
NER Objective 5. Restore landscapes, including marsh, shoreline, and cheniers to maintain their function as wildlife habitat and improve their ability to serve as protective barriers.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge
**Marsh Restoration: Nine marsh restoration and nourishment features consist of delivering sediments to former marsh areas and eroding marsh areas (minimum of 100 acres efficiency criteria) that have water levels of less than two feet and that have been optimized to preserve or restore critical geomorphologic features to restore vegetated wetlands. This involves excavation of significant quantities and delivery of borrow material to restoration sites through designated corridors. Some restoration sites may require containment to hold sediments in place.*
**Shoreline Protection: The five Gulf shoreline protection/stabilization features would be used to reduce erosion of canal banks and shorelines in critical areas in order to protect adjacent wetlands and critical geomorphic features.*
**Hydrologic and salinity control structure is the Cameron-Creole Spillway structure south of Lambert Bayou would serve as a drainage manifold and the outfall channel into Calcasieu Lake would regulate the flow of water in certain areas and inhibit salinity intrusion above a certain threshold.*
**Chenier reforestation would not involve the discharge of dredged or fill material; rather Chenier restoration consists of replanting seedlings in 35 Chenier locations on 1,400 acres in Cameron and Vermilion parishes.*

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Years.
See tables 2-18a-d

Table 1a: Details of the marsh restoration features of the NER Recommended Plan.

Measure Number	Measure Name	Basin	Marsh Type	Acres Restored	Acres Nourished	Total Acres	Net Benefits (acres)	Average Annual Habitat Units (AAHU)	Borrow Volume (cy)	Borrow Area (acres)	Renourishment Volume (cy)	Initial Construction Costs (US $)	TY 30 Renourishment (US $)
3a1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	Calcasieu	Brackish	599	-	599	454	191	5,339,286	139	1,000,000	$66,593,748	$17,759,470
3c1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	Calcasieu	Brackish	1,347	734	2,081	1,324	607	9,458,313	314	3,651,841	$168,194,346	$70,984,253
47a1	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	Brackish	933	88	1,021	895	272	3,022,782	1,716	1,500,000	$105,234,982	$21,239,680
47a2	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	Brackish	1,297	126	1,423	1,218	381	8,831,084	1,716	1,500,000	$97,348,440	$17,585,890
47c1	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	Brackish	1,304	4	1,308	1,135	353	8,557,120	1,716	1,800,000	$95,372,834	$14,981,607
124c	Marsh Creation at Mud Lake	Calcasieu	Saline	1,077	708	1,837	1,228	500	10,369,956	531	2,001,611	$112,219,520	$24,680,885
124d	Marsh Creation at Mud Lake	Calcasieu	Brackish	159	448	607	168	4	1,420,943	378	1,200,000	$28,882,160	$17,636,205
127c3	Marsh Restoration at Pecan Island	Mermentau	Brackish	832	62	894	735	241	7,301,057	3,950	781,000	$61,662,041	$15,683,451
306a1	Rainey Marsh Restoration Southwest Portion (Christian Marsh)	Mermentau	Brackish	627	1,269	1,896	743	151	8,128,181	3,950	3,500,000	$75,885,692	$37,551,555
	Totals			8,175	3,439	11,666	7,900	2,700	62,428,722	14,410	16,934,452	$811,393,763	$238,102,996

Table 1a: continued.

Measure Number	Measure Name	State Water Bottoms permanent (acres)	Floatation Footprint (acres)	Disposal Footprint (acres)	Dike Footprint (feet)	Dike Footprint (acres)	State Water Bottoms (temporary)	Dredge Pipeline Route (feet)	Dredge Pipeline Route (acres)	Piping Plover Critical Habitat (acres)	Construction Period
3a1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	139	132	-	44,700	30.8	-	43,942	30	-	16 months
3c1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	314	182	-	97,250	51.4	-	61,497	42	-	33 months
47a1	Marsh Restoration Using Dredged Material South of Highway 82	1,716	47	-	68,300	47.0	-	35,519	24	0.14	23 months
47a2	Marsh Restoration Using Dredged Material South of Highway 82	1,716	47	-	41,000	28.2	-	30,898	21	0.14	24 months
47c1	Marsh Restoration Using Dredged Material South of Highway 82	1,716	47	-	35,200	24.2	-	29,858	21	0.14	23 months
124c	Marsh Creation at Mud Lake	531	28	-	78,100	31.5	-	9,485	7	1.8	27 months
124d	Marsh Creation at Mud Lake	314	182	-	32,500	22.4	-	21,452	15	-	9 months
127c3	Marsh Restoration at Pecan Island	3,950	110	-	46,000	31.7	-	37,074	26	-	12 months
306a1	Rainey Marsh Restoration Southwest Portion (Christian Marsh)	3,950	178	-	108,000	74.4	-	59,731	41	-	17 months
	Totals	14,347	953	-	551,300	341.6	-	329,4567	227	2.2	184 months

Table 1b: Details of the shoreline protection features of the NER Recommended Plan.

Measure Number	Measure Name	Basin	Marsh Type	Net Benefits (acres)	Average annual habitat units (AAHU)	Shoreline Feature Length (ft)	Rock (tons)	Grade Rock (lbs)	Geotextile Fabric (sq yds)	Lightweight Aggregate (tons)	1st Maintenance Lift (tons)	2nd Maintenance Lift (tons)	Initial Construction Costs (US $)	TY15 Maintenance (US $)
5a	Holly Beach Shoreline Stabilization – Breakwaters	Calcasieu	Saline	26	56	46,014	860,540	250	386,460	0	129,081	86,054	$144,044,021	$16,786,222
6b1	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	Brackish	2,140	625	58,293	968,400	250	447,830	479,150	86,848	0	$198,400,921	NA
6b2	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	Brackish	1,583	466	42,883	687,140	250	363,270	357,010	68,714	0	$145,876,561	NA
6b3	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	Brackish	1,098	312	33,355	561,530	250	244,205	279,030	56,153	0	$115,270,890	NA
16b	Fortify Spoil Banks of the GIWW and Freshwater Bayou	Mermentau	Brackish	1,288	279	70,983	617,640	250	516,860	0	92,646	61,764	$36,018,600	$5,695,468
	Totals			6,135	1,736	251,528	3,595,330		1,958,625	1,115,190	433,442	147,818	$639,690,993	$22,481,690

Table 1b: continued.

Measure Number	Measure Name	TY 25 Maintenance (US $)	State Water Bottoms (permanent)	Breakwater Footprint (feet)	Floatation Footprint (acres)	Disposal Footprint (acres)	State Water Bottoms (Temporary)	Critical Habitat (acres)	Staging Area (acres)	Crown Elevation (feet NAVD88)	Crown Width (feet)	Slopes	Aprons (feet)	Construction Period
5a	Holly Beach Shoreline Stabilization – Breakwaters	$11,247,740	57.4	57.4	479	462	941	-	-	3.50	24	2:1	10-ft front & 6-ft back	19 months
6b1	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	$15,389,345	65.9	65.9	725	711	1436	-	21	3.25	18	2:1	10-ft front & 6-ft back	31 months
6b2	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	$11,343,672	40.2	40.2	507	497	1004	-	21	3.25	18	2:1	10-ft front & 6-ft back	23 months
6b3	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	$9,041,421	37.8	37.8	372	289	661	-	21	3.25	18	2:1	10-ft front & 6-ft back	18 months
16b	Fortify Spoil Banks of the GIWW and Freshwater Bayou	$3,966,404	77.1	77.1	358	-	-	-	-	3.00	4	4:1	none	13 months
	Totals	$50,988,582	278.4	278.4	2441	1959	4042	-	63	-	-	-	-	104 months

Table 1b: continued.

Linear Feet for Access and Temporary Disposal						
Measure	5a1	6b1	6b2	6b3	Total Feet	Miles
Disposal	159,741	239,001	168,533	98,683	665,958	126.1
Equipment Access	161,957	244,857	173,050	126,542	706,406	133.8

Table 1c: Details of the chenier reforestation features of the NER Recommended Plan.

Measure Number	Measure Name	Net Benefits (acres)	Average Annual Habitat Units (AAHUs)	Species	Total Fence Length (feet)	Fence Height (feet)	Planting Density (#/acre)	Spacing (feet)	Initial Construction Costs (US $)	OMRR&R Costs (US $)
CR (total)	Chenier Reforestation	1,413	538	Live Oak; Hackberry	150,000	7.5	435	10 x 10	4,138,249	None Planned

Table 1c: continued.

Measure Number	Measure Name	Survival (percent)	Equipment Access Corridor (feet)	Equipment Access Corridor (acres)	State Water Bottoms (Permanent)	State Water Bottoms (Temporary)	Critical Habitat (acres)	Staging Area (acres)	Construction period
CR (total)	Chenier Reforestation	57%	13,867	10	0	0	0	0	95 months

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)
See tables 2-18a-d

23. Is Any Portion of the Work Already Complete? Yes ____ No __X__ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list.

25. List of Other Certifications or Approvals/Denials Received from other Federal, State or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL	IDENTIFICATION NO.	DATE APPLIED	DATE APPROVED	DATE DENIED

To the best of my knowledge the proposed activity described in my permit application complies with and will be conducted in a manner that is consistent with the LA Coastal Management Program.
*Would include but is not restricted to zoning, building and flood plain permits.

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

STILES.SANDRA.ELAINE.1230921748 January 5, 2016

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

*U.S. :1994-520-478/82018

BOBBY JINDAL
GOVERNOR

PEGGY M. HATCH
SECRETARY

State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

July 6, 2015

Mr. William P. Klein, Jr.
U.S. Army Corps of Engineers, New Orleans District
CEMVN-PDN-CEP
Post Office Box 60267
New Orleans, Louisiana 60267

AI No.: 101235
Activity No.: CER20150002

RE: Southwest Coastal Louisiana
Water Quality Certification WQC 150706-01
Calcasieu, Cameron, and Vermilion Parishes

Dear Mr. Klein:

The Louisiana Department of Environmental Quality, Water Permits Division (LDEQ), has reviewed the application to discharge fill to conduct marsh restoration and shoreline protection/stabilization projects in Calcasieu, Cameron, and Vermilion Parishes.

The information provided in the application and the Revised Integrated Draft Feasibility Report and Environmental Impact Statement received March 20, 2015, has been reviewed in terms of compliance with State Water Quality Standards, the approved Water Quality Management Plan and applicable state water laws, rules and regulations. LDEQ determined that the requirements for a Water Quality Certification have been met. LDEQ concludes the discharge of fill material will not violate water quality standards as provided for in LAC 33:IX.Chapter 11. Therefore, LDEQ hereby issues U.S. Army corps of Engineers, New Orleans District – Southwest Coastal Louisiana Water Quality Certification, WQC 150706-01.

Should you have any questions concerning any part of this certification, please contact Elizabeth Hill at (225) 219-3225 or by email at elizabeth.hill@la.gov. To ensure all correspondence regarding this certification is properly filed into the Department's Electronic Document Management System, please reference Agency Interest (AI) number 101235 on all future correspondence to this Department.

Sincerely,

Scott Guilliams
Administrator
Water Permits Division

c: IO-W
Corps of Engineers – New Orleans District

Post Office Box 4313 • Baton Rouge, Louisiana 70821-4313 • Phone 225-219-3181 • Fax 225-219-3309
www.deq.louisiana.gov

SECTION 404(b)(1) EVALUATION
Southwest Coastal Louisiana Study
Calcasieu, Cameron, and Vermilion Parishes, Louisiana

I. Project Description

a. Location.

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN) has prepared an Integrated Final Feasibility Report and Environmental Impact Statement (Integrated Final Report) to evaluate the impacts associated with the Southwest Coastal Louisiana Study. The study area is located in southwest Louisiana and includes all of Calcasieu, Cameron, and Vermilion Parishes, Louisiana. Cameron Parish is located in the southwest corner of Louisiana. The southern boundary of the parish is the Gulf of Mexico. Eighty-two percent of Cameron Parish is coastal marshes. Geographically, it is one of the largest parishes in Louisiana. The parish is chiefly rural and the largest communities are Cameron and Hackberry. Cameron is located along LA-82, while Hackberry is located along LA-27. Other smaller communities include Creole, Johnsons Bayou, and Holly Beach. Calcasieu Parish is located due north of Cameron Parish. The town of Lake Charles is the parish seat, which is the largest urban area in the study area. Only a small portion of the parish is located in the coastal zone. Vermilion Parish is located to the east of Cameron Parish. The southern boundary of the parish is the Gulf of Mexico. Large expanses of Vermilion Parish are open water (lakes, bays, and streams). Approximately 50 percent of the land is coastal marshes. The parish is chiefly rural and the town of Abbeville is the parish seat as well as the largest urban area in the parish. Other communities include Delcambre, Kaplan, and Gueydan, which are all located along LA Hwy 14 in the northern part of the study area. Pecan Island and Forked Island are smaller communities located along LA Hwy 82 in lower Vermilion Parish. Located along LA Hwy 333, Intracoastal City is the nearest access to Vermilion Bay and the Gulf of Mexico in this region and supports the area's oil and shrimp industries.

b. General Description.

The Southwest Coastal Louisiana Study is comprised of two components consisting of a nonstructural National Economic Development (NED) plan and a National Ecosystem Restoration (NER) plan. The NED Recommended Plan (RP) would not impact waters of the United States and is therefore not subject to this evaluation. The NER RP is the Small Integrated Restoration Alternative, a comprehensive ecosystem restoration plan addressing land loss and ecosystem degradation. The NER RP is cost effective, and is the least-cost comprehensive best buy plan. The NER RP would minimize land loss; enhance plant productivity by reducing major stressors; and reinforce and protect critical landscape features. Table 1 provides a brief description of the NER RP measures. **Tables 2a, 2b**, and **2c** provide the NER RP measure details, description of construction equipment, and quantities and types of fill to be placed in wetlands. **Figures 1, 2** and **3** display locations of the NER RP measures**.**

There are a total of 49 ecosystem restoration features or measures:

- 9 Marsh Restoration measures
- 35 Chenier Reforestation measures; construction of these measures would not impact waters of the United States and are therefore not part of this 404(b)(1) evaluation
- 5 Shoreline Protection measures
- The Calcasieu Ship Channel Salinity Barrier measure is being recommended for long-term study.
- The Cameron-Creole Spillway Salinity Control Structure measure is being recommended for long-term study.
- Two marsh restoration measures would be located partially on U.S. Fish and Wildlife Service (USFWS) lands. Measure 124d Marsh Restoration at Mud Lake would be located on Sabine National Wildlife Refuge (NWR). Measure 3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel would be located on the Cameron Prairie NWR (**Figure 4**). While USACE believes that these features are worthy of recommendation, USACE has determined that these features would more properly be

implemented by USFWS. Therefore, USACE will not seek authorization and funding of these features. Rather USACE will recommend to USFWS that it consider seeking independent Congressional authorization and funding for implementation of these features by USFWS.

Table 1. NER RP Feature Construction Benefits

	Category	ID	Description	Net Acres	Net AAHUs
Mermantau/Teche-Vermilion (Plan M-4)	Marsh Restoration[1]	47a1	Marsh restoration using dredged material south of LA-82, about 4.5 miles west of Grand Chenier. 933 marsh acres would be restored and 88 acres would be nourished from 3M cubic yards of dredged material with one renourishment cycle.	895	272
		47a2	Marsh restoration using dredged material south of LA-82, approximately 4.5 miles west of Grand Chenier. 1,297 marsh acres would be restored and 126 acres would be nourished from 8.8M cubic yards of dredged material with one renourishment cycle.	1,218	381
		47c1	Marsh restoration using dredged material south of LA-82, approximately 4.5 miles west of Grand Chenier. 1,304 marsh acres would be restored and 4 acres would be nourished from 8.6M cubic yards of dredged material with one renourishment cycle.	1,135	353
		127c3	Marsh restoration at Pecan Island, west of the Freshwater Bayou Canal and approximately 5 miles north of the Freshwater Bayou locks. 832 marsh acres would be restored and 62 acres would be nourished from 7.3M cubic yards of dredged material with one renourishment cycle.	735	241
		306a1	Rainey marsh restoration at Christian Marsh, east of the Freshwater Bayou Canal and approximately 5 miles north of the Freshwater Bayou locks. 627 marsh acres would be restored and 1,269 acres would be nourished from 8.1M cubic yards of dredged material with one renourishment cycle.	743	151
	Shoreline Protection/ Stabilization[1]	6b1	Gulf shore protection/stabilization from Calcasieu River to Freshwater Bayou. 11.0 miles of Gulf shore protection consisting of a reef breakwater with a lightweight aggregate core. Located ~150 ft offshore consisting of geotextile fabric and stone built to an 18 ft crest width.	2,140	625
		6b2	Gulf shore protection/stabilization from Calcasieu River to Freshwater Bayou. 8.1 miles of Gulf shoreline protection consisting of a reef breakwater with a lightweight aggregate core. Located ~150 ft offshore using geotextile fabric and stone built to an 18 ft crest width.	1,583	466
		6b3	Gulf shore protection/stabilization from Calcasieu River to Freshwater Bayou. 6.3 miles of Gulf shoreline protection consisting of a reef breakwater with a lightweight aggregate core. Located ~150 ft offshore using geotextile fabric and stone built to an 18 ft crest width.	1,098	312
		16b	Fortify spoil banks of Freshwater Bayou. Approximately 13.4 miles of rock revetment at three critical locations to prevent shoreline breaching. Rock revetment would be built to +4 ft with a 4 ft crown. Two maintenance lifts would be required.	1,288	279
	Chenier Re-forestation	CR	13 separate chenier locations would be replanted. Approximately 435 seedlings per acre, at 10 ft x 10 ft spacing, with invasive species control incorporated[3].	281	96

Calcasieu/ Sabine (CM-4) (Includes all measures in this table)	Marsh Restoration[1]	3a1	Beneficial use of dredged material from the Calcasieu Ship Channel. Located adjacent to the south shore of the GIWW west of the Calcasieu Ship Channel near Black Lake. Restore 599 marsh acres with 5.3M cubic yards of dredged material with one renourishment cycle.	454	191
		3c1[2]	Beneficial use of dredged material from the Calcasieu Ship Channel. Located adjacent to the eastern rim of Calcasieu Lake and situated within the Cameron-Creole Watershed area. 1,347 marsh acres would be restored and 734 acres would be nourished from 9.4M cubic yards of dredged material with one renourishment cycle.	1,324	607
		124c	Marsh restoration at Mud Lake. Located adjacent and north of Highway 82 and east of Mud Lake. 1,077 marsh acres would be restored and 708 acres would be nourished from 10.4M cubic yards of dredged material with one renourishment cycle.	1,228	500
		124d[2]	Marsh restoration at Mud Lake. Located west of the Calcasieu Ship Channel and adjacent to the south rim of West Cove. 159 marsh acres would be restored and 448 acres would be nourished from 1.4M cubic yards of dredged material with one renourishment cycle.	168	4
	Shoreline Protection/ Stabilization[1]	5a	Holly Beach Shoreline Stabilization Breakwaters. Construction of 8.7 miles of rock and low action breakwaters and is a continuation of existing breakwaters. Crown elevation of +3.5 ft with a crown width of 24 ft. Two maintenance lifts would be required.	26	56
	Chenier Re-forestation	CR	22 separate chenier locations would be replanted. Approximately 435 seedlings per acre, at 10 ft x 10 ft spacing, with invasive species control incorporated3.	1,132	442
	TOTALS			15,448	4,976

1- Renourishment and maintenance lifts are considered an OMRR&R cost and are a 100% NFS responsibility. Renourishment material would come from the site of the initial dredging effort.

2- Features 3c1 and 124d are partially located on USFWS property. While USACE believes that these features are worthy of recommendation, USACE has determined that these features would more properly be implemented by USFWS.

3- Costs to ensure the minimum survival percent are considered 'construction' and will be cost-shared accordingly.

Table 2a: Details of the marsh restoration measures of the NER Recommended Plan.

Measure Number	Measure Name	Basin	Marsh Type	Acres Restored	Acres Nourished	Total Acres	Net Benefits (acres)	Average Annual Habitat Units (AAHU)	Borrow Volume (cy)	Borrow Area (acres)	Renourishment Volume (cy)	Initial Construction Costs (US $)	TY 30 Renourishment (US $)
3a1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	Calcasieu	Brackish	599	-	599	454	191	5,339,286	139	1,000,000	$66,593,748	$17,759,470
3c1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	Calcasieu	Brackish	1,347	734	2,081	1,324	607	9,458,313	314	3,651,841	$168,194,346	$70,984,253
47a1	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	Brackish	933	88	1,021	895	272	3,022,782	1,716[1]	1,500,000	$105,234,982	$21,239,680
47a2	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	Brackish	1,297	126	1,423	1,218	381	8,831,084	1,716[1]	1,500,000	$97,348,440	$17,585,890
47c1	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	Brackish	1,304	4	1,308	1,135	353	8,557,120	1,716[1]	1,800,000	$95,372,834	$14,981,607
124c	Marsh Restoration at Mud Lake	Calcasieu	Saline	1,077	708	1,837	1,228	500	10,369,956	531	2,001,611	$112,219,520	$24,680,885
124d	Marsh Restoration at Mud Lake	Calcasieu	Brackish	159	448	607	168	4	1,420,943	378	1,200,000	$28,882,160	$17,636,205
127c3	Marsh Restoration at Pecan Island	Mermentau	Brackish	832	62	894	735	241	7,301,057	3,950[2]	781,000	$61,662,041	$15,683,451
306a1	Rainey Marsh Restoration Southwest Portion (Christian Marsh)	Mermentau	Brackish	627	1,269	1,896	743	151	8,128,181	3,950[2]	3,500,000	$75,885,692	$37,551,555
	Totals			8,175	3,439	11,666	7,900	2,700	62,428,722	7,028	16,934,452	$811,393,763	$238,102,996

1- This borrow source provides the sediment for all three restoration features but the full amount of available material will not be dredged each cycle. Therefore this total acreage is only counted once in the column total.

2- This borrow source provides the sediment for both restoration features but the full amount of available material will not be dredged each cycle. Therefore this total acreage is only counted once in the column total.

Table 2a: continued.

Measure Number	Measure Name	Impact to State Water Bottoms permanent (acres)	Floatation Footprint (acres)	Disposal Footprint (acres)	Dike Footprint (feet)	Dike Footprint (acres)	Impact to State Water Bottoms (temporary)	Dredge Pipeline Route (feet)	Dredge Pipeline Route (acres)	Piping Plover Critical Habitat (temporary impact acres)	Construction Period
3a1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	139	132	-	44,700	30.8	-	43,942	30	-	16 months
3c1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	314	182	-	97,250	51.4	-	61,497	42	-	33 months
47a1	Marsh Restoration Using Dredged Material South of Highway 82	1,716	47	-	68,300	47.0	-	35,519	24	0.14	23 months
47a2	Marsh Restoration Using Dredged Material South of Highway 82	1,716	47	-	41,000	28.2	-	30,898	21	0.14	24 months
47c1	Marsh Restoration Using Dredged Material South of Highway 82	1,716	47	-	35,200	24.2	-	29,858	21	0.14	23 months
124c	Marsh Restoration at Mud Lake	531	28	-	78,100	31.5	-	9,485	7	1.8	27 months
124d	Marsh Restoration at Mud Lake	314	182	-	32,500	22.4	-	21,452	15	-	9 months
127c3	Marsh Restoration at Pecan Island	3,950	110	-	46,000	31.7	-	37,074	26	-	12 months
306a1	Rainey Marsh Restoration Southwest Portion (Christian Marsh)	3,950	178	-	108,000	74.4	-	59,731	41	-	17 months
	Totals	14,347	953		551,50	341.6		329,456	227	2.2	---

Table 2b: Details of the shoreline protection measures of the NER Recommended Plan.

Measure Number	Measure Name	Basin	Marsh Type	Net Benefits (acres)	Average annual habitat units (AAHU)	Shoreline Feature Length (ft)	Rock (tons)	Grade Rock (lbs)	Geotextile Fabric (sq yds)	Lightweight Aggregate (tons)	1st Maintenance Lift (tons)	2nd Maintenance Lift (tons)	Initial Construction Costs (US $)	TY15 Maintenance (US $)
5a	Holly Beach Shoreline Stabilization – Breakwaters	Calcasieu	Saline	26	56	46,014	860,540	250	386,460	0	129,081	86,054	$144,044,021	$16,786,222
6b1	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	Brackish	2,140	625	58,293	868,480	250	447,830	479,150	86,848	0	$198,480,921	NA
6b2	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	Brackish	1,583	466	42,883	687,140	250	363,270	357,010	68,714	0	$145,876,561	NA
6b3	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	Brackish	1,098	312	33,355	561,530	250	244,205	279,030	56,153	0	$115,270,890	NA
16b	Fortify Spoil Banks of the GIWW and Freshwater Bayou	Mermentau	Brackish	1,288	279	70,983	617,640	250	516,860	0	92,646	61,764	$36,018,600	$5,695,468
	Totals			6,135	1,738	251,528	3,595,330		1,958,625	1,115,190	433,442	147,818	$639,690,993	$22,481,690

Table 2b: continued.

Measure Number	Measure Name	TY 25 Maintenance (US $)	Impacts to State Water Bottoms (permanent)	Breakwater Footprint (feet)	Flotation Footprint* (acres)	Temporary Disposal Footprint* (acres)	Impact to State Water Bottoms (temporary acres)	Critical Habitat (acres)	Temporary Staging Area (acres)	Crown Elevation (feet NAVD88)	Crown Width (feet)	Slopes	Aprons (feet)	Construction Period
5a	Holly Beach Shoreline Stabilization – Breakwaters	$11,247,740	57.4	57.4	479	462	941	-	-	3.50	24	2:1	10-ft front & 6-ft back	19 months
6b1	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	$15,389,345	65.9	65.9	725	711	1436	-	21	3.25	18	2:1	10-ft front & 6-ft back	31 months
6b2	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	$11,343,672	40.2	40.2	507	497	1004	-	21	3.25	18	2:1	10-ft front & 6-ft back	23 months
6b3	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	$9,041,421	37.8	37.8	372	289	661	-	21	3.25	18	2:1	10-ft front & 6-ft back	18 months
16b	Fortify Spoil Banks of the GIWW and Freshwater Bayou	$3,966,404	77.1	77.1	358	-	-	-	-	3.00	4	4:1	none	13 months
	Totals	$50,988,582	278.4	278.4	2,441	1,959	4,042	-	63	-	-	-	-	---

**- Access for heavy equipment to construct shoreline stabilization features consists of dredging a channel in open water to allow construction equipment to reach shoreline areas and placing the dredged material alongside the channel so the necessary channel depth is maintained. This material stored adjacent to the channel will be returned to the access channel after construction. These impacts are temporary and will naturally revert to existing conditions over time.*

Table 2b: continued.

Linear Feet for Access and Temporary Disposal							
Measure	**5a**	**6b1**	**6b2**	**6b3**	**16b***	**Total Feet**	**Miles**
Disposal	159,741	239,001	168,533	98,683	0	665,958	126.1
Equipment Access	161,957	244,857	173,050	126,542	0	706,406	133.8

**- No dredging or temporary disposal is anticipated for Feature 16b since Freshwater Bayou has adequate water depths to allow the necessary construction equipment access.*

Table 2c: Details of the chenier reforestation measures of the NER Recommended Plan.

Measure Name	Net Benefits (acres)	Benefits (AAHU)	Species	Total Fence Length (feet)	Fence Height (feet)	Planting Density (#/acre)	Spacing (feet)	Min. Survival % at Year 4*	Equip-ment Access Corridor (feet)	Equip-ment Access Corridor (acres)	State Water Bottoms (permanent)	State Water Bottoms (tempor-ary)	Critical Habitat (acres)	Staging Area (acres)
Chenier Reforestation (CR)	1,413	538	Live Oak; Hackberry	150,000	7.5	435	10 x 10	57%	13,867	10	0	0	0	0

**- For a given planting, a minimum of 250 seedlings/saplings per acre must be present (with a 60 to 40 hard mast to soft mast ratio) at the end of the fourth year (i.e., Year 5) following successful attainment of the one-year survivorship criteria. Costs to ensure the minimum survival percent are considered 'construction' and will be cost-shared accordingly.*

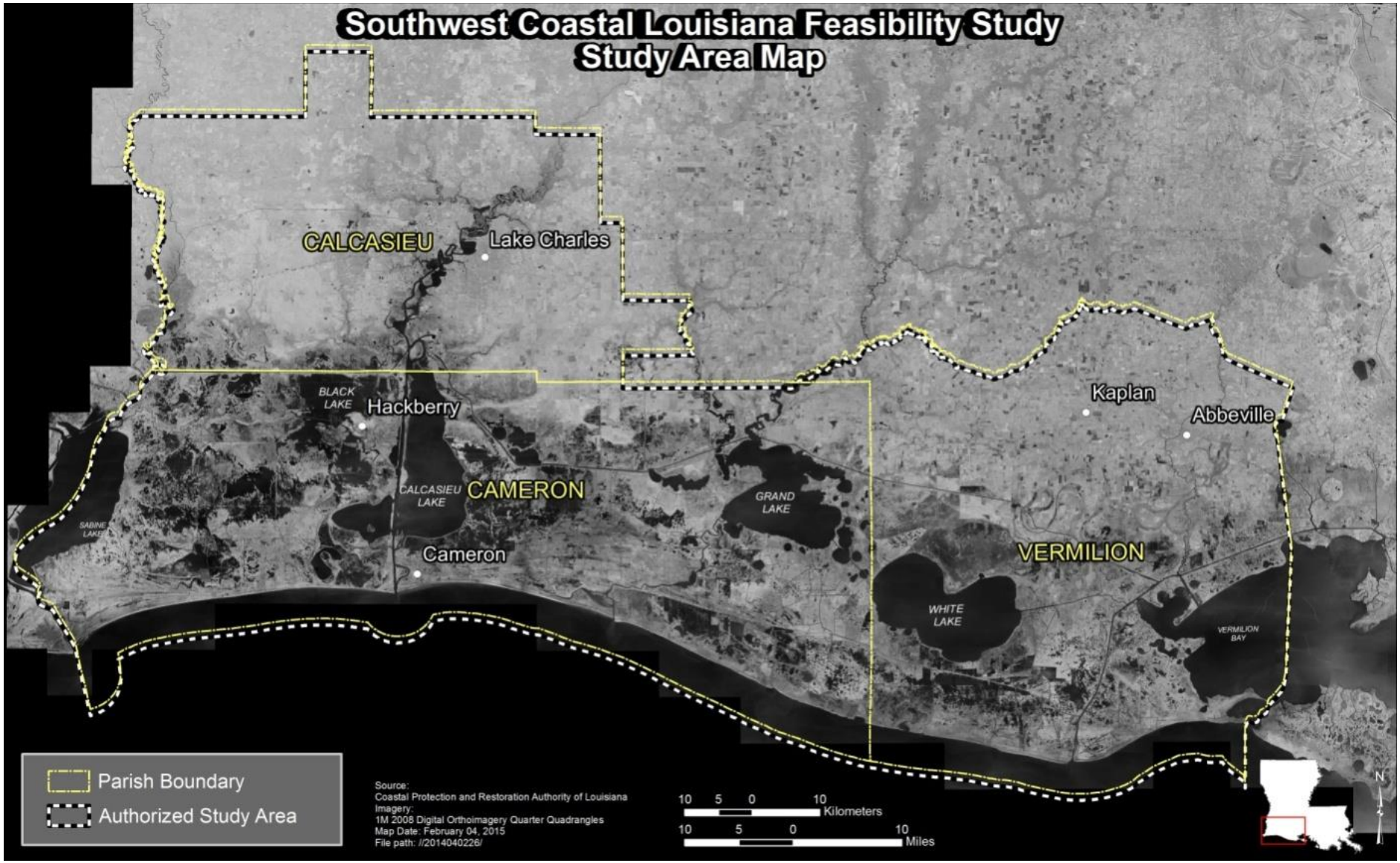

Figure 1. Southwest Coastal Louisiana Project Area

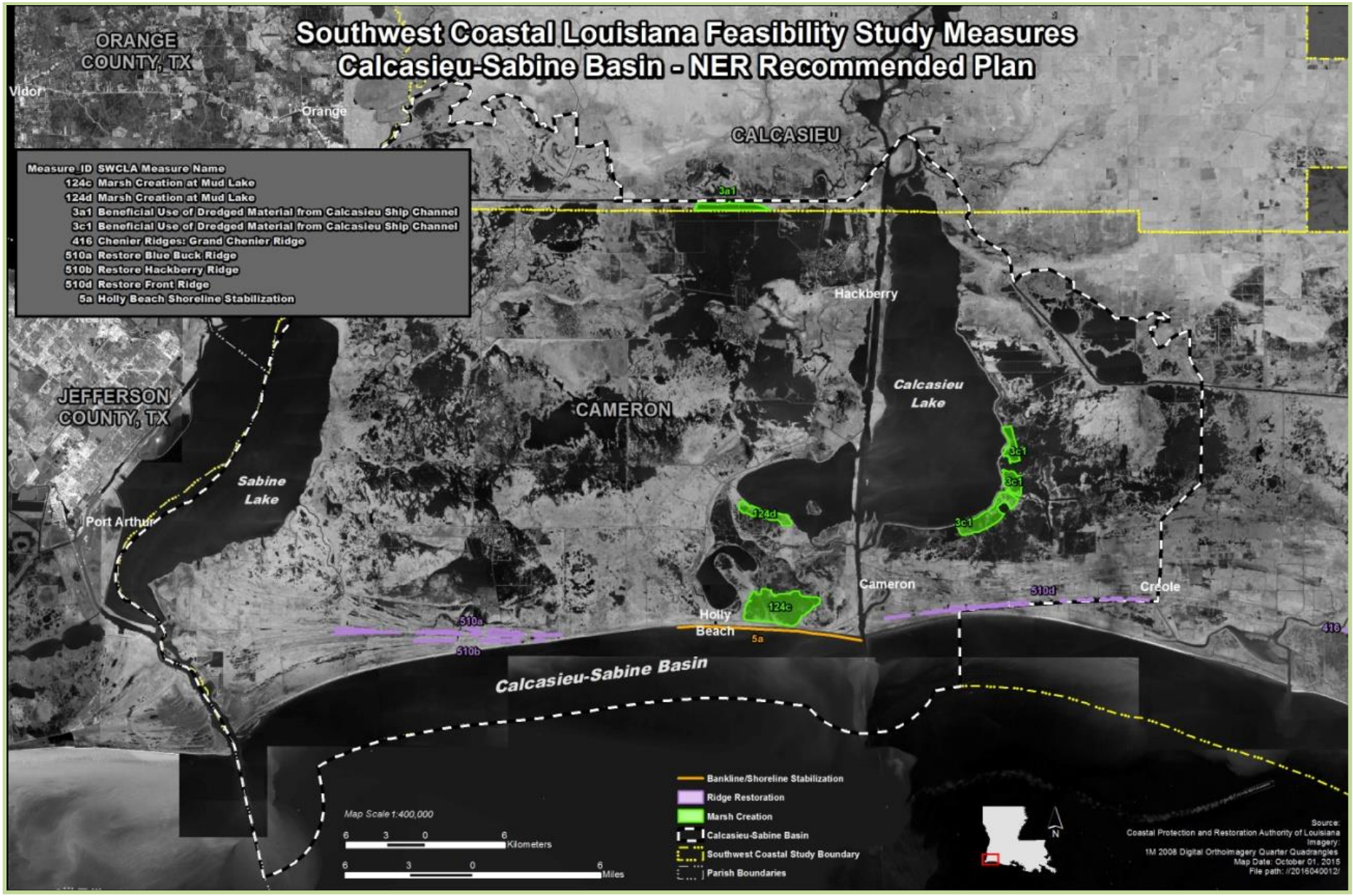

Figure 2. NER RP Measures in the Western Portion of the Study Area.

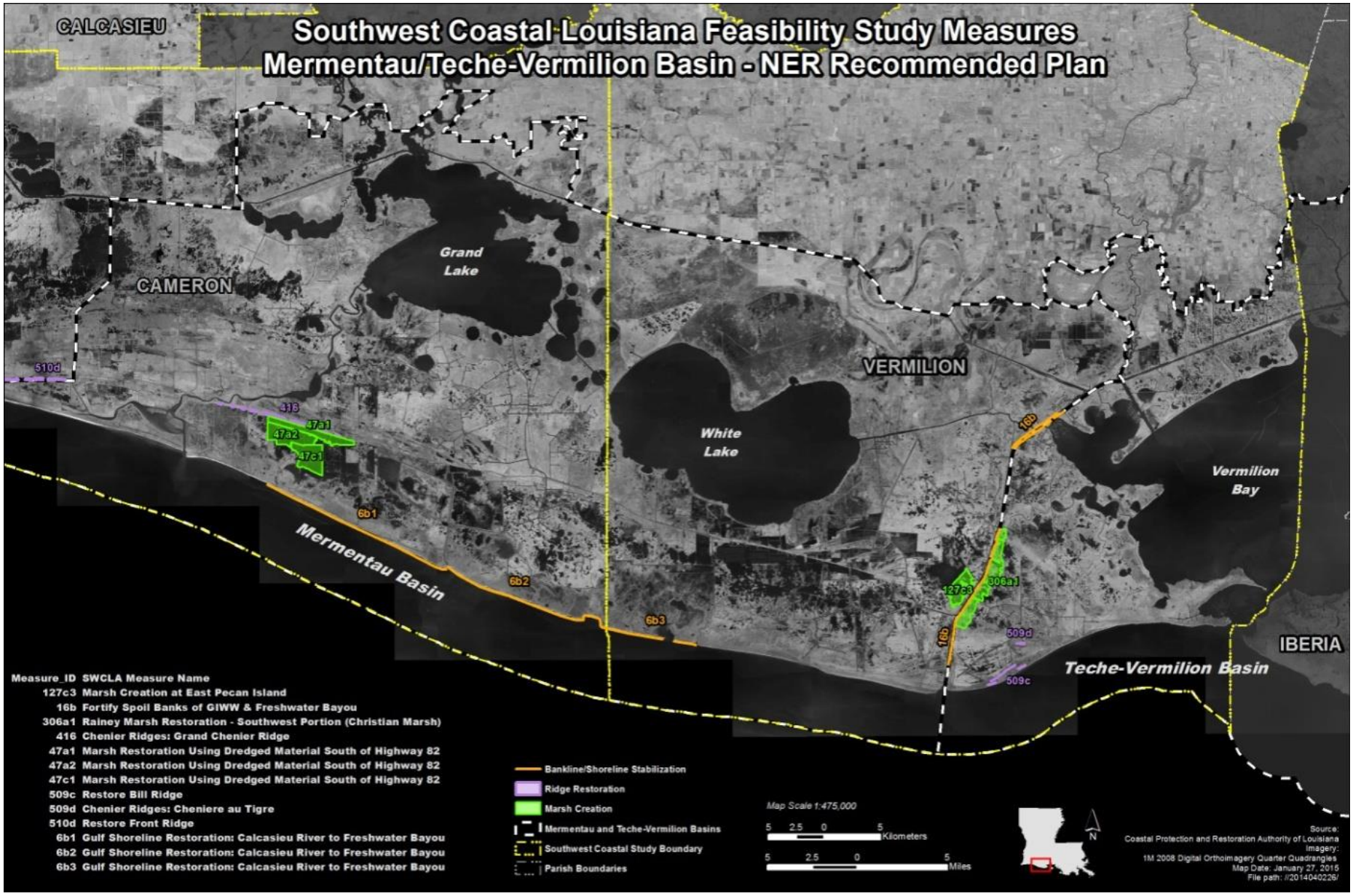

Figure 3. NER RP Measures in the Eastern Portion of the Study Area.

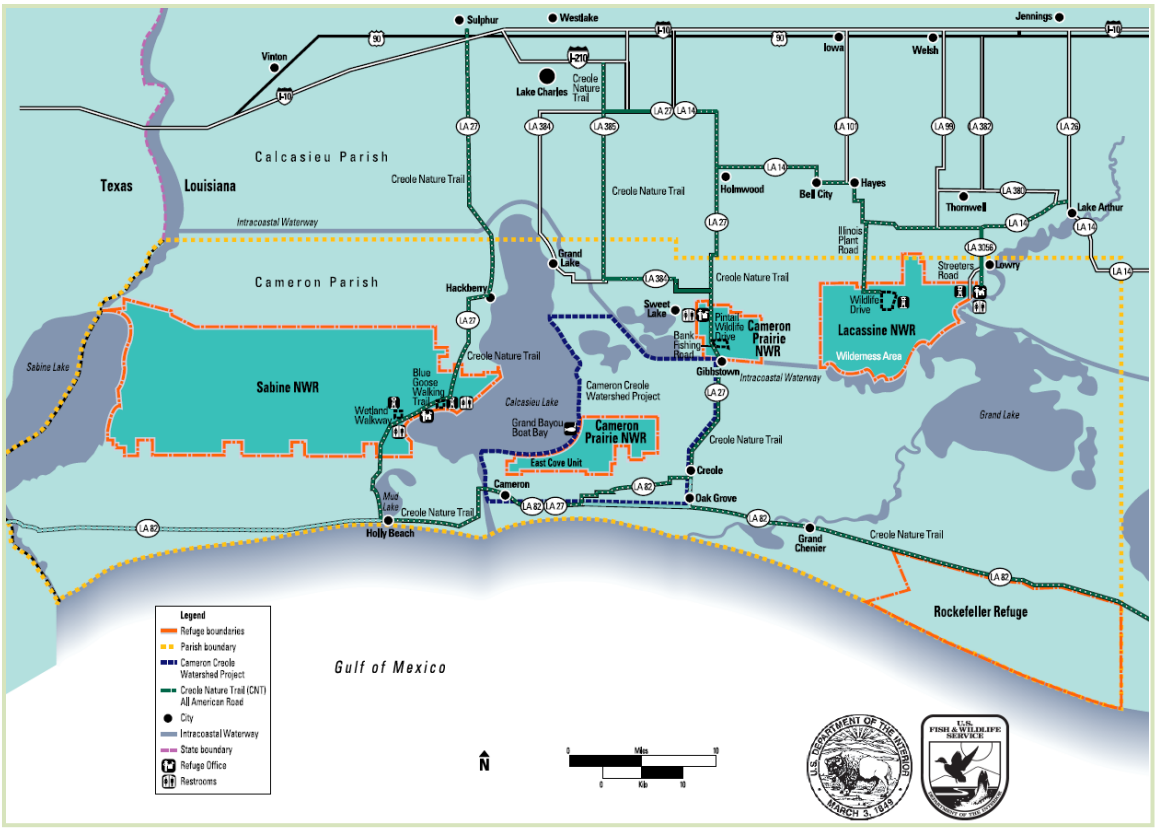

Figure 4. Sabine and Cameron Prairie Nation Wildlife Refuges.

Coastal Restoration Projects Impacted by NER RP Measures: Many of the NER RP measures would be constructed in the immediate vicinity of other coastal restoration projects, such as the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) projects (**Figure 5**). **Table 3** lists the names of other coastal restoration projects within the Southwest Coastal Louisiana project area corresponding to **Figure 5**. The following projects would be impacted by the implementation of the NER RP.

- Shoreline protection Measure 5a (Holly Beach Shoreline Stabilization-Breakwaters) would be located immediately offshore of the projects CS-31 (Holly Beach Sand Management) and CS 33 (Cameron Parish Shoreline).
- Project CS-59 (Oyster Bayou Marsh Creation and Terracing) would be directly impacted by construction of the NER RP marsh restoration measure 124c (**Figure 6**). Project CS-054 (Cameron-Creole Watershed Grand Bayou Marsh Creation) would be directly impacted by construction of the NER RP marsh restoration measure 3c1 (**Figure 7**). Due to the close proximity, the proposed NER RP measures would be constructed to avoid existing coastal restoration project by construction of temporary containment/exclusion dikes that would contain dredged borrow sediments used for construction of the NER RP measure and also prevent dredged effluents from entering the existing coastal restoration project sites. Temporary containment/exclusion dikes would be allowed to degrade naturally to restore connectivity with surrounding areas or they would be degraded by the NFS the third year following completion of construction, whichever occurs first.

Mitigation Projects Directly Impacted by the NER RP Measures: In addition to above cited coastal restoration projects, existing mitigation projects, identified by Mitigation Manger Kelley Templet with the LADNR, Office of Coastal Management, were constructed by various companies (e.g., oil and gas, Union Pacific, and others) and are designed and constructed to offset unavoidable anticipated losses to wetlands from permitted activities.

Figure 8 and **Table 4** contain information about mitigation projects that occur within the project area. In most instances, these mitigation projects were developed to provide a sustainable buffer from wave action and storm surge generated by tropical storms and hurricanes. Where overlap occurs, proposed NER RP measures would not be constructed until the mitigation projects satisfy their permit obligations.

Fact Sheets located in Appendix K of the Integrated Final Report and EIS contain additional NER RP measure details, description of construction equipment, and quantities and types of fill to be placed in wetlands. *The proposed action itself consists of measures to minimize the adverse effects of storm water erosion and thus requires no separate measures or controls for compliance with CWA Section 402(p) and LAC 33:IX.2341.B.14.j.*

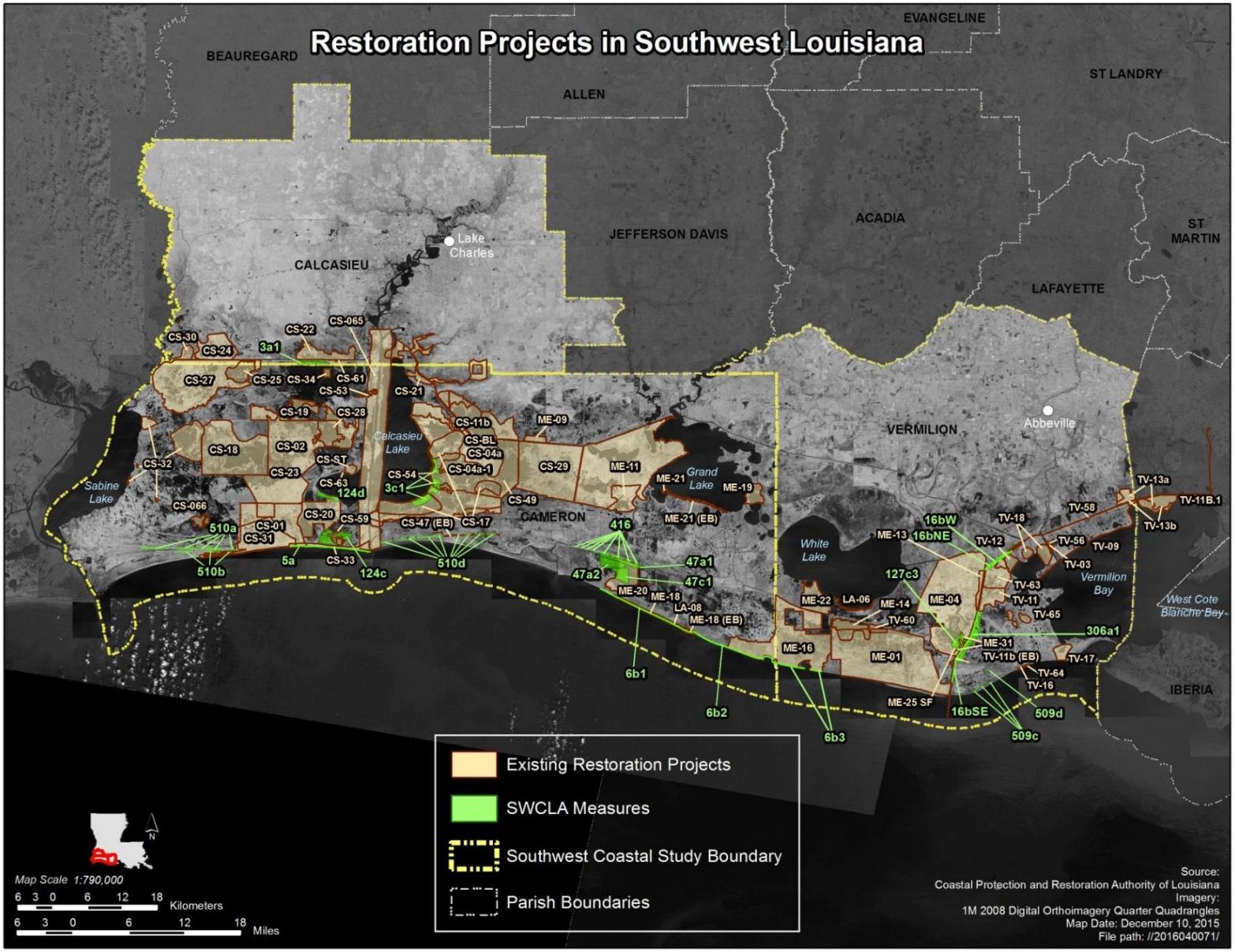

Figure 5. Ecosystem Restoration Activities and proposed NER RP Projects in Southwest Coastal Louisiana Project Area.

Table 3. List of Ecosystem Projects Displayed in Figure 3-1. (*projects would be impacted/benefitted by the NER RP measures)

CS-01 Holly Beach Breakwaters Project
CS-02 Rycade Canal Marsh Management
CS-04a Cameron-Creole Maintenance
CS-04a-1 Cameron-Creole Structure Automation
CS-11b Sweet Lake/Willow Lake Hydrologic Restoration
CS-17 Cameron Creole Plugs
CS-18 Sabine National Wildlife Refuge Erosion Protection
CS-19 West Hackberry Vegetative Planting Demo
CS-20 East Mud Lake Marsh Management
CS-21 Highway 384 Hydrologic Restoration
CS-22 Clear Marais Bank Protection
CS-23 Replace Sabine Refuge Water Control Structures
CS-24 Perry Ridge Shore Protection
CS-25 Plowed Terraces Demonstration
CS-27 Black Bayou Hydrologic Restoration
CS-28-1 Sabine Refuge Marsh Creation, Cycle 1
CS-28-2 Sabine Refuge Marsh Creation, Cycle 2
CS-28-3 Sabine Refuge Marsh Creation, Cycle 3
CS-28-4-5 Sabine Refuge Marsh Creation, Cycles 4-5
CS-29 Black Bayou Culverts Hydrologic Restoration
CS-30 GIWW - Perry Ridge West Bank Stabilization
*CS-31 Holly Beach Sand Management (impacted by NER RP Measure 5a)
CS-32 East Sabine Lake Hydrologic Restoration
*CS-33 Cameron Parish Shoreline Restoration (impacted by NER RP Measure 5a)
CS-34 Marcantel Supplemental Beneficial Use Disposal Area
CS-47 Trosclair Road Repairs
CS-49 Cameron-Creole Freshwater Introduction
CS-53 Kelso Bayou Marsh Creation

CS-53 Kelso Bayou Marsh Creation
*CS-54 Cameron-Creole Watershed Grand Bayou Marsh Creation (impacted by NER RP Measure 3c1)
*CS-59 Oyster Bayou Marsh Creation and Terracing (impacted by NER RP Measure 124c)
CS-61 Brannon Ditch
CS-63 Sabine Shellbank Stabilization
CS-65 Calcasieu Ship Channel Salinity Controls
CS-66 Cameron Meadows Marsh Creation and Nourishment
CS-BL Blind Lake
CS-ST Sabine Terraces

LA-06 SP Foundation Improvements Demo
LA-08 Bio-Engineered Oyster Reef Demo

ME-01 Pecan Island Freshwater Introduction
ME-04 Freshwater Bayou Wetland Protection
ME-09 Cameron Prairie National Wildlife Refuge Shoreline Protection
ME-11 Humble Canal Hydrologic Restoration
ME-13 Freshwater Bayou Bank Stabilization
ME-14 Pecan Island Terracing
ME-16 Freshwater Introduction South of Highway 82
ME-18 Rockefeller Refuge Gulf Shoreline Stabilization
ME-19 Grand-White Lakes Landbridge Protection
ME-20 South Grand Chenier Marsh Creation
ME-21 Grand Lake Shoreline Protection
ME-22 South White Lake Shoreline Protection
ME-25 Marsh Creation Near Freshwater Bayou
ME-31 Freshwater Bayou Marsh Creation

TV-03 Vermilion River Cutoff Bank Protection
TV-09 Boston Canal/Vermilion Bay Bank Protection
TV-11 Freshwater Bayou Bank Protection
TV-11b Freshwater Bayou Bank Stabilization
TV-11b.1 Acadiana Gulf of Mexico Access Channel
TV-12 Little Vermilion Bay Sediment Trapping
TV-13a Oaks/Avery Canal Hydrologic Restoration, Increment 1
TV-13b Oaks/Avery Structures
TV-16 Cheniere Au Tigre Sediment Trapping Demonstration
TV-17 Lake Portage Land Bridge
TV-18 Four Mile Canal Terracing and Sediment Trapping
TV-56 Four-Mile Canal Storm Surge Reduction Construction
TV-58 Boston Canal
TV-60 Front Ridge Chenier Terracing/Protection
TV-63 Cole's Bayou Restoration
TV-64 Cheniere au Tigre
TV-65 Rainey Audubon Wildlife Sanctuary Earthen Terraces

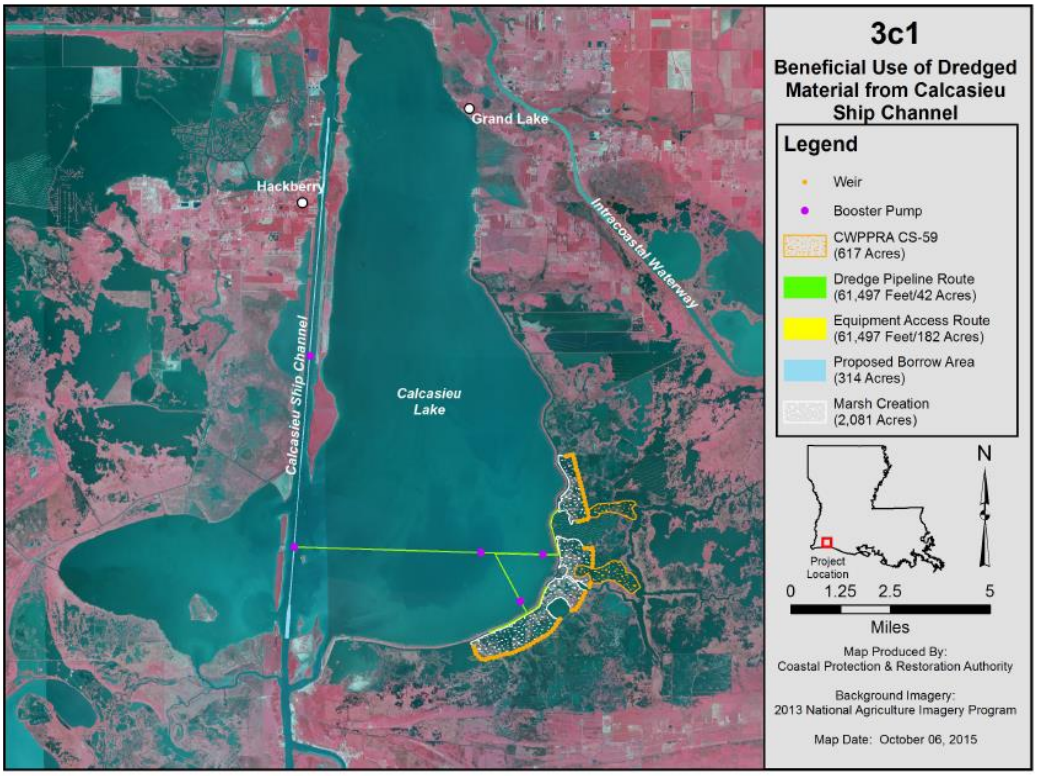

Figure 6. NER RP Measure 3c1 Adjacent to CWPPRA Project CS-54 Cameron Creole Watershed

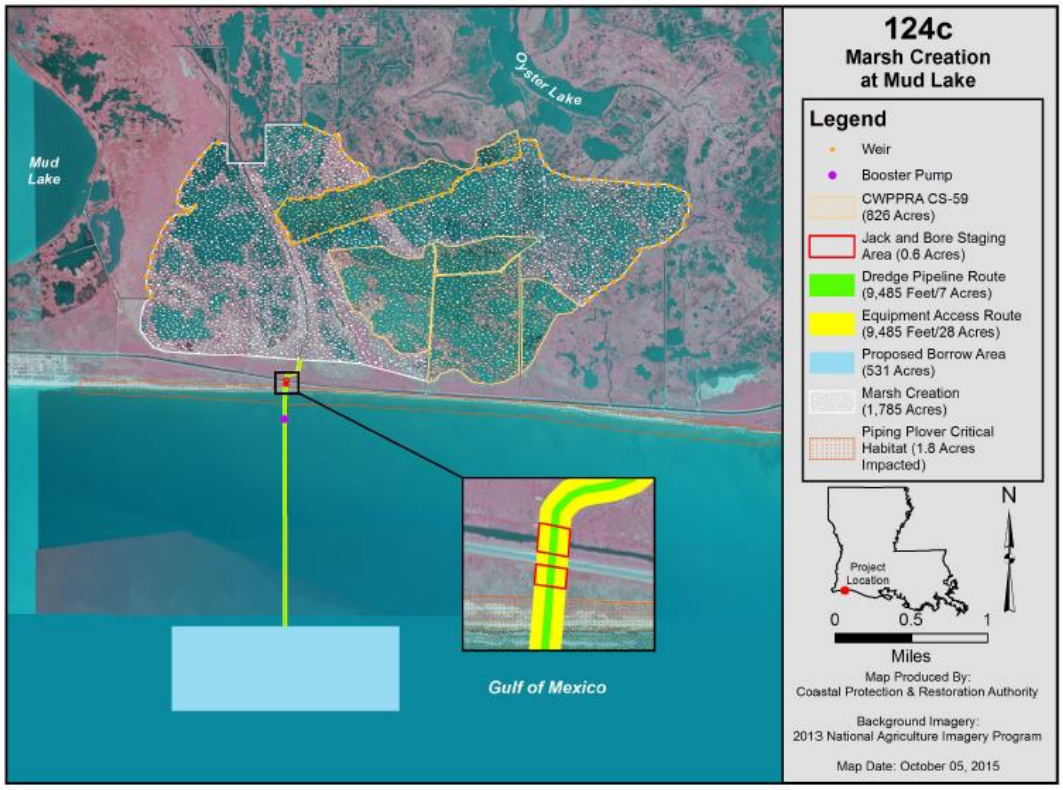

Figure 7 NER RP Measure 124c Adjacent to CWPPA CS-59 Oyster Bayou Restoration

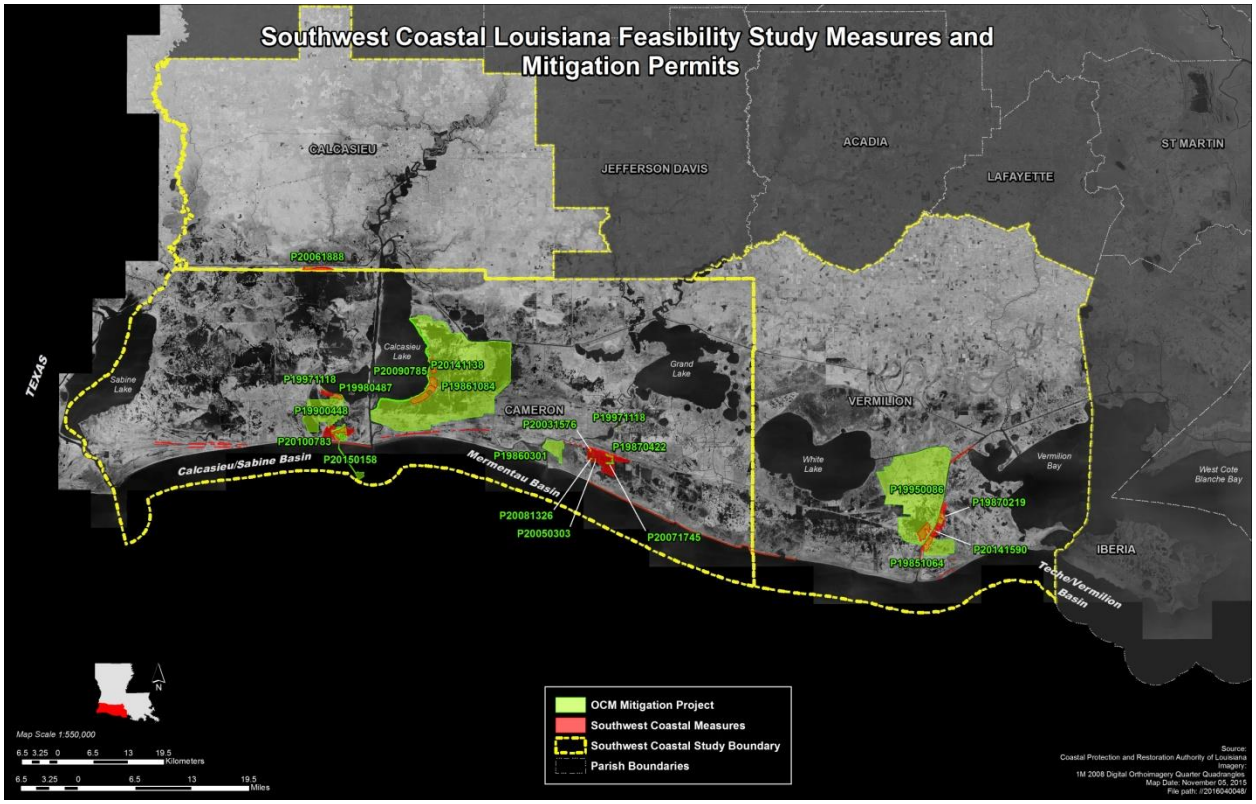

Figure 8. Permitted Mitigation Projects and Southwest Coastal Louisiana Study Measures.

Table 4: Mitigation Projects that Overlap with NER RP Features.

Permit #	Description	NER RP Feature	Permittee or Owner	Expiration Date (permit completion date + 20 years)	Mitigation Project Description
Tier I Features					
P20061888	Terraces at GIWW N of Black Lake	3a1	Gulfport Energy Corporation	11/30/2032	Proposed construction of 5,358 linear ft of terraces south of the GIWW and north of Black Lake.
P19900448	Marsh Management Plan area	124d	Apache Louisiana Minerals	11/13/2016	Install and maintain water control structures for CTU 1 and 2. In CTU 1, 64,000 linear ft of smooth cordgrass plantings. In CTU 2, 32,470 linear ft of boundary levee are to be repaired. Various water control structures are to be repaired or replaced.
P19971118	West Cove Planting Project	124d	Union Pacific Resources	7/28/2022	West Cove Planting Project; 5,000 ft of plantings of *Spartina alterniflora*.
P19950086	Marsh Management Plan area	127c3	Vermilion Corporation	4/1/2021	Eight water control structures will be installed; a riprap levee will be constructed; five double flapgated culverts and one earthen plug will be installed; two earthen plugs will be constructed.
Tier II Features					

P20141590	Spoil Placement	306a1	Hilcorp Energy Company	4/8/2040	Dredging of 15,430 cubic yards of native material to construct slip for the purpose of installing a drill rig, well protector and pilings. The dredged material will be pumped into a shallow pond adjacent to the proposed drill site using a temporary discharge pipe. An additional 301 cubic yards of material will be displaced to construct containment berms.
Tier III Features					
P20090785	Spoil disposal/levee restoration	3c1	Cameron Parish Drainage District #3	8/13/2034	Consists of five water control structures and 17.1 miles of earthen levee (CWPPRA Project CS-04A-L Phase II).
P20141138	Rip-rap Grand Bayou	3c1	CPRA	1/29/2040	Installation of 21,000 tons of riprap along the Calcasieu Lake Shoreline near the Peconi, Mangrove and Grand Bayou water control structures.
P19870422	Marsh Management Plan area	47a2	T. Bonsall	2/3/2023	Construction of a levee and multiple water control structures (South of Upper Mud Lake).
P20031576	Mitigation for P20031304	47a2	Kash Oil & Gas, Inc.	3/31/2029	Constructed 4,803 linear feet of terraces and planted with *Spartina alterniflora.*
P20081326	Mitigation for P20080132	47a2	PetroQuest Energy, L.L.C.	11/25/2033	Construct and plant 2,897 linear ft of wave dampening terraces that will capture re-suspended sediments and protect fragile shorelines by planting plugs of smooth cordgrass on both sides of constructed terraces.
P20071745	Mitigation for 20070883	47c1	Manti Operating Company	3/5/2025*	Construction of ten 500-foot terraces, eight 300-foot terraces, two 200-foot terraces and eight 400-foot terraces (6.1 acres). Plantings of *Spartina alterniflora* rows on each side of the terraces.

c. Authority and Purpose.

Study Authority
An investigation for additional hurricane storm damage risk reduction and related purposes was authorized by a Resolution of the Committee on Transportation and Infrastructure, U.S. House of Representatives, Docket 2747, on December 7, 2005, which included consideration of a plan for an armored 12-foot levee along the Gulf Intracoastal Waterway (GIWW) across Calcasieu, Cameron, and Vermilion Parishes.

CEMVN initiated the Section 905(b) reconnaissance study in April 2006. NED alternatives to mitigate for hurricane-induced damages within Calcasieu, Cameron, and Vermilion Parishes were formulated through a series of planning meetings with the State of Louisiana, local parishes, and other stakeholders. Structural, nonstructural, and coastal restoration measures were considered; however, the economic analysis focused on NED benefits only. The 905(b) reconnaissance study found sufficient Federal interest to conduct a feasibility study and was approved to advance to the feasibility phase in 2007.

The investigation of large scale ecosystem restoration concepts, including the Chenier Plain Freshwater Management and Allocation Reassessment Study (Chenier Plain Study), was recommended in the January 31, 2005 Chief's Report for the LCA, Ecosystem Restoration program. The Chenier Plain Study was one of six large-scale restoration concepts that were purported to have the ability to "significantly restore environmental

conditions that existed prior to large-scale alteration of the natural ecosystem" upon construction. The LCA program was authorized in Title VII of WRDA 2007. Guidance provided by the Director of Civil Works on December 19, 2008 states that "*the coastal restoration components proposed as part of the LCA Chenier Plain study will be evaluated as part of the Southwest Coastal Louisiana feasibility study".* A Feasibility Cost Share Agreement between USACE and the Louisiana Coastal Protection and Restoration Authority Board (CPRAB) as the non-Federal Sponsor was executed on January 14, 2009 for the study and analysis of the NED and NER study alternatives.

Study Purpose
The study purpose is to evaluate coastal storm flood damages and coastal ecosystem degradation in Cameron, Calcasieu, and Vermilion parishes in Louisiana. The intent is to develop potential solutions to these water resource problems.

d. General Description of Dredged or Fill Material

(1) General Characteristics of Material. (grain size, soil type)
The borrow material to be dredged for the nine marsh restoration measures is characterized primarily as silt and clay, with varying amounts of organic material and sands. For shoreline protection measures, the fill material would be rock (200-pound gradation) and geotextile fabric.

(2) Quantity of Material. (cubic yards)
See **Tables 2a, 2b,** and **2c,** attached Fact Sheets describing NER measures and Appendix K for project measure details. **Table 5** presents the borrow site dimensions.

Table 5. Southwest Coastal Louisiana Study Borrow Site Dimensions

Marsh Restoration Measures	Length by Width (ft)[1]	Borrow Area (acres)	Borrow Area Cut depth (ft)	Access Route Length by Width (ft)	Access Route Area (acres)	Access Route Cut Elevation (ft)[2]
3a1	USACE authorized channel dimensions			No dredging required for access		
3c1	USACE authorized channel dimensions			3,500 x 96	7.7	-8
47a1, 47a2, 47c1[3]	4,922 x 14,855	1,679	-15	10,000 x 96	22	-8
124c	2,937x7,880	531	-15	4,000 x 96	8.8	-8
124d	USACE authorized channel dimensions	USACE authorized channel dimensions		21,453 x 96	47.3	-8
127c3[4]	11,516 x 18,655	4,932	-15	1,400 x 96	2.2	-8
306a1[4]	11,516 x 18,655	4,932	-15	No dredging required for access		

[1]- Impacts to the shoreline due to the off shore borrow areas would be modeled in the PED Phase. Presently all off shore borrow areas were delineated, based on previous engineering experience, to have no significant impacts to the existing shoreline.
[2]-All excavated access routes would be backfilled upon construction completion.
[3]- These restoration features will utilize the same borrow source for construction but at different times.
[4]- These restoration features will utilize the same borrow source for construction but at different times.

(3) Source of Material.
Marsh restoration borrow material would be dredged from a number of off-shore borrow areas and from the Calcasieu Ship Channel (**Figures 9** and **10**). See Fact Sheets in Appendix K for additional measure and borrow area details. Rock material for the shoreline protection measures would be imported from outside the study area and transported via barges from an inland commercial quarry.

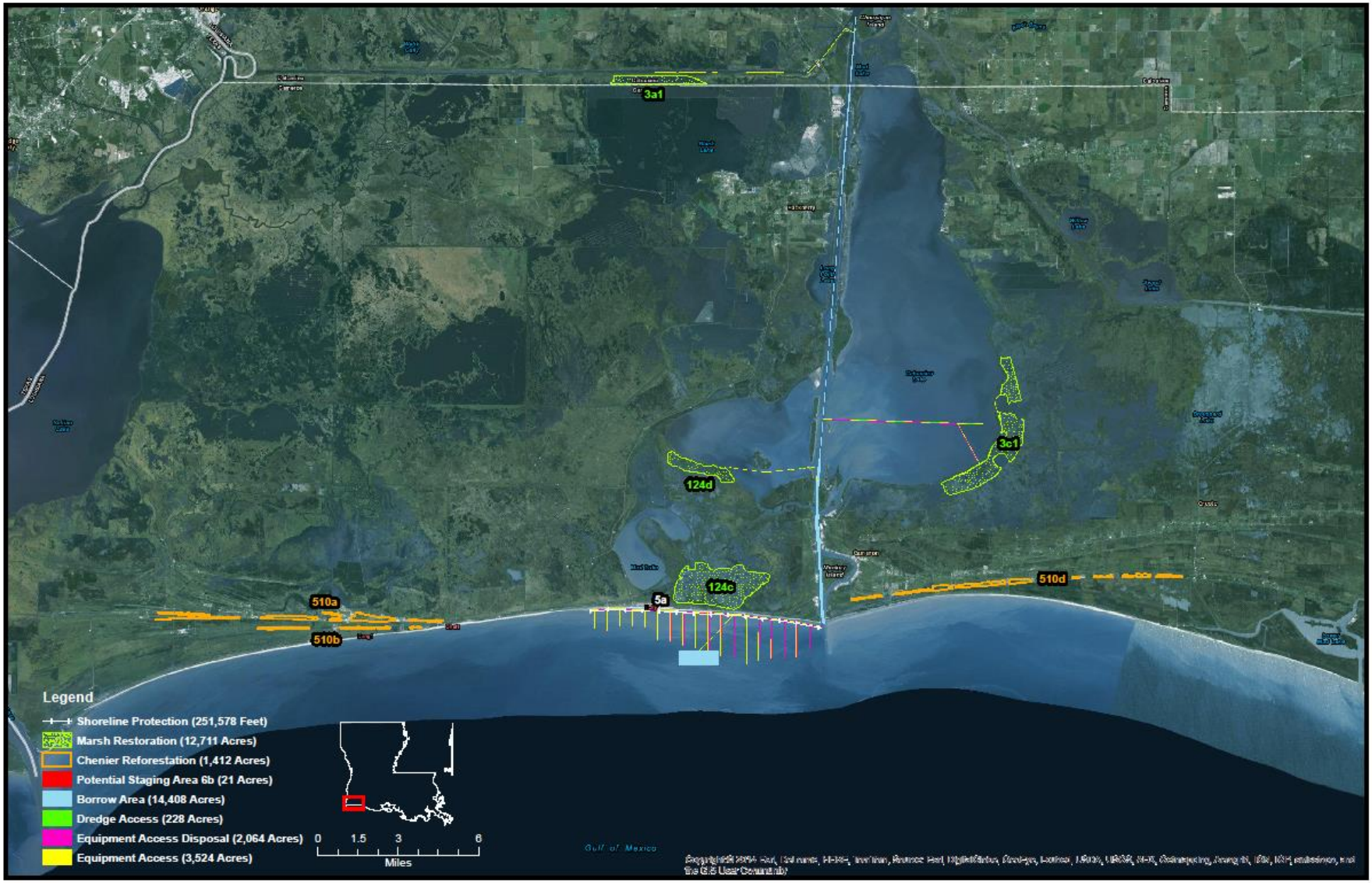

Figure 9. NER RP measures, including borrow and access routes in western portion of study area.

Figure 10. NER RP measures including borrow and access routes in eastern portion of study area.

e. Description of the Proposed Discharge Site(s)

Proposed marsh restoration measures are located in interior fragmented marshlands throughout the entire study area (**Figures 9** and **10**). Shoreline protection measures are located along the Gulf of Mexico and Freshwater Bayou shorelines (**Figures 9** and **10**). Measure 5a (Holly Beach Shoreline Stabilization-Breakwaters) would be located immediately offshore of the projects CS-31 (Holly Beach Sand Management) and State project CS 33 (Cameron Parish Shoreline). The remaining shoreline protection measures would be located offshore of brackish and saline marsh-dominated shorelines. If no action is taken, the beach and marsh habitats would continue to be subjected to the prevailing erosional processes that would eventually result in a direct loss and conversion of the existing marsh to open water. This marsh loss would reduce available marsh habitat and result in the loss of critical habitat for threatened and endangered species, essential fish habitat, and marsh and barrier beach habitats used by species of special interest. This habitat loss would adversely impact Federally-managed fisheries, other aquatic resources, and diminish the storm-surge protection benefits of the barrier beach and marsh systems.

Material dredged via mechanical dredge for access corridors for construction of the five shoreline protection measures would be temporarily side-cast onto water bottoms immediately adjacent to the temporary access corridor. Following construction, the side-cast material would be returned to the temporary access corridor.

Both the Calcasieu Ship Channel Salinity Barrier measure and the Cameron-Creole Spillway Salinity Control Structure measure are being recommended for additional long term study. Additional modeling and NEPA analysis would be required before implementation of these measures.

(1) Location. (map)

See **Figures 1, 2** and **3** for NER RP measure locations; **Figures 9** and **10** display NER RP measures, borrow sites and access corridors.

(2) Size. (acres)

The size of each NER RP measure is listed in **Tables 2a, 2b,** and **2c**.

(3) Type of Site. (confined, unconfined, open water)

Disposal sites for the marsh restoration are comprised of shallow open-water and fragmented marsh (**Figures 2** and **3**). See also Fact Sheets and Appendix K of the Main Report for measure details of construction.

Disposal sites for the breakwater measures include shallow open water immediately offshore of the Gulf Shoreline (**Figures 2** and **3**). The shoreline protection measures would be placed on existing marsh shorelines (**Figures 2** and **3**).

(4) Type(s) of Habitat.

The nine marsh restoration measures are characterized by shallow open-water, fragmented and degraded emergent marsh which provides low quality wetland habitat. Breakwaters would be located immediately offshore in the Gulf of Mexico waters. The remaining shoreline protection measures would be located offshore of brackish and saline marsh-dominated shorelines. Salinity within the disposal areas is variable due to tidal fluctuation; a variety of marine and freshwater fauna utilize the area. These wetland habitats also function as critical nursery areas for various species of finfish and shellfish. Interior marsh is necessary for the successful completion of the life cycles of several species, and provides detritus that forms the basis of the food chain for organisms utilizing the area.

(5) Timing and Duration of Discharge.

NER RP measures were categorized in to three tiers whereby Tier I measures would be constructed before Tier II, and Tier II measures constructed before Tier III. Tier I measures may be constructed simultaneously because they would not affect the construction of any nearby Tier I project measure. Shoreline protection measures

would be constructed prior to marsh restoration measures in order to provide immediate protection of the storm-vulnerable marsh restoration measures. This approach contributes to the sustainability of the marsh restoration measures. Tier II project measures were so categorized because they utilize the same borrow or staging area, and/or construction of these measures would potentially interfere with construction of a Tier I project measure. Tier II project measures would be constructed contemporaneously as the construction of any one of these project measures would not affect any other project measure within this grouping. Tier III project measures were so categorized because they would utilize the same borrow or staging area, and/or interfered with construction of a Tier II project, and/or interfered with an existing mitigation project. Tier III project measures would be constructed contemporaneously if they would not affect construction of the other project measures within this grouping. In categorizing project measures, it was assumed that all construction funds would be available, multiple construction contracts could be let at one time, and an adequate supply of all materials to facilitate construction. More detailed design and analysis would be conducted during the Preconstruction Engineering and Design (PED) Phase. The construction schedule for completing all project measures is expected to last a total of about 60 months. Dredge spoil retention measures would be constructed prior to discharge of dredged material at marsh restoration sites. Duration of construction for each measure is provided in **Tables 2a, 2b,** and **2c**.

Tier I Projects:

- Holly Beach Shoreline Stabilization – Breakwaters (5a)
- Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou (6b1)
- Fortify Spoil Banks of the GIWW and Freshwater Bayou (16bSE)
- Fortify Spoil Banks of the GIWW and Freshwater Bayou (16bNE)
- Fortify Spoil Banks of the GIWW and Freshwater Bayou (16bW)
- Beneficial Use of Dredged Material from the Calcasieu Ship Channel (3a1)
- Marsh Restoration at Mud Lake (124d)[1]
- Marsh Restoration at Pecan Island (127c3)
- Chenier Ridges: Grand Chenier Ridge (416)[2]
- Restore Bill Ridge (509c)[2]
- Chenier Ridges: Cheniere au Tigre (509d)[2]
- Restore Blue Buck Ridge (510a)[2]
- Restore Hackberry Ridge (510b)[2]
- Restore Front Ridge (510d)[2]

Tier II Projects:

- Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou (6b2)
- Marsh Restoration at Mud Lake (124c)
- Rainey Marsh Restoration Southwest Portion (Christian Marsh) (306a1)

Tier III Projects:

- Beneficial Use of Dredged Material from the Calcasieu Ship Channel (3c1)[1]
- Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou (6b3)
- Marsh Restoration Using Dredged Material South of Highway 82 (47a1)
- Marsh Restoration Using Dredged Material South of Highway 82 (47a2)
- Marsh Restoration Using Dredged Material South of Highway 82 (47c1)

Recommended for Further Study:

- Calcasieu Ship Channel Salinity Control Structure
- Cameron-Creole Spillway Structure

[1]- Recommended for USFWS independent Congressional authorization and appropriation for construction by USFWS
[2]- Individual features that comprise the chenier reforestation measure

f. Description of Disposal Method. (hydraulic, drag line, etc.)

Sediments for the nine marsh restoration measures would be dredged from a number of off-shore borrow areas (see **Figures 9** and **10** and Fact Sheets located in Appendix K of the Integrated Final Report for individual project measure descriptions) and from the Calcasieu Ship Channel (via USACE maintenance dredging). The contractor would use a hydraulic dredge to excavate fill from the available borrow areas or to convey material from Calcasieu Ship Channel that was dredged during CEMVN maintenance dredging events. The fill would then be pumped through a series of booster pumps to the disposal (marsh restoration) areas via submerged sediment pipeline.

II. Factual Determinations

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope.

Dredged borrow sediments used for the nine marsh restoration measures would be placed to achieve a post-construction marsh target elevation of +1.5 feet North American Vertical Datum of 1988 (NAVD88) following dewatering and consolidation. Earthen containment dikes would be constructed of *in situ* material obtained from within the marsh restoration cells with side slopes of no more than 4H:1V with a crown width of approximately 5 feet. The five shoreline protection measures would have varying elevations and slopes ranging from +3.5 feet NAVD88 with 2:1 side slopes to +3.0 feet NAVD88 with 4:1 side slopes. Water bottom substrates dredged for temporary access corridors to the five shoreline protection sites would be temporarily side-cast. Following completion of construction activities, this side-cast material would be returned to the dredged temporary access corridor. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts to the physical substrate.

(2) Sediment Type

Dredged borrow sediments, taken from a number of off-shore borrow areas and the Calcasieu Ship Channel (see **Figures 9** and **10** and Fact Sheets located in Appendix K of the Integrated Final Report), are composed primarily of silt, with varying amounts of organic material and sand. Detailed grain-size analysis would be performed prior to construction as part of the Preconstruction Engineering and Design (PED) phase. Sediments in the project area are similar to sediments discharged by the Atchafalaya River. Sediment travels westward from Atchafalaya Bay and the GIWW. A large percentage of Atchafalaya River sediments are deposited along the Gulf shoreline in the vicinity of Freshwater Bayou while coarser sediments continue westward along the shoreline. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts.

(3) Dredged/Fill Material Movement.

Little or no movement of dredged or fill material is anticipated to occur following dewatering and consolidation of sediments used for the nine marsh restoration measures, because of the typically low velocities of water flow across the nine marsh restoration measures, construction of earthen containment dikes within the marsh restoration/nourishment areas, construction of temporary containment/exclusion dikes surrounding existing coastal restoration projects, and the use of best available practical techniques and BMPs during construction.

Rock placed for the five shoreline protection measures is expected to settle initially following construction due to the overburden pressure that the rock would create on underlying unconsolidated substrate. However, placement of geotextile fabric between rock and substrate would help to prevent the complete sinking of the rock over time. Additional placement of rocks during Operations and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) is anticipated (on the existing footprint) but rocks are not expected to move laterally

following placement. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts and dredged/fill movement.

(4) Physical Effects on Benthos. (burial, changes in sediment types, etc.)

Dredging and construction activities would have localized effects on benthos. The factors primarily responsible could include increased turbidity and total suspended sediments, organic enrichment, chemical leaching, reduced dissolved oxygen, and elevated carbon dioxide levels, among others. Dredging for borrow sediments and temporary access corridors, discharge of dredged borrow sediments and construction of containment/exclusion dikes for the nine marsh restoration measures and to prevent dredged effluent from entering existing coastal restoration projects would smother and destroy immobile benthic organisms and force mobile benthos to move from the borrow and discharge areas. It is expected, however, that benthic organisms would re-colonize the borrow sites and the discharge sites within 1-3 years due to its similarity with the existing substrate in the disposal areas (Wilber et al 2008). The conversion of shallow open-water and fragmented marsh to restored contiguous marsh would temporarily preclude larger aquatic organisms from initially re-entering the disposal area. Smaller organisms would, however, be able to access the newly restored marsh during high tides. Temporary containment/exclusion dikes would naturally degrade or would be breached in multiple places at three years following construction, if necessary, to restore aquatic organism and fish access if natural degradation is not sufficient. Breach locations would correspond to weir locations. Following dredging and construction, dredged sediments would consolidate and differentially settle to different elevations thereby resulting in development of lower-lying areas that would develop into small ponds and streams further enabling aquatic organism access from surrounding waters. Wetlands throughout coastal Louisiana and the study area have been fragmenting, degrading and being loss at significant rates. Therefore, restoring marsh is considered to have a higher ecological value than shallow open-water because of its benefits to terrestrial and aquatic organisms in an area with decreasing wetland habitats.

Dredging temporary access corridors, the placement of geotextile fabric and rock for shoreline protection would smother sessile and slow moving benthic organisms and force mobile organisms to move from the disposal areas. The rock and geotextile fabric, by design, covers benthic subtidal sediments; hence, infauna would likely be absent. However, rock would provide substrate for epifaunal colonization (Bilkovic and Mitchell 2013). The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts and dredged/fill movement.

(5) Other Effects.

No other physical substrate determinations.

(6) Actions Taken to Minimize Impacts.

Dredged sediments would be placed at the nine marsh restoration sites to achieve a post-construction marsh target elevation to achieve of +1.5 feet NAVD88, following dewatering and consolidation. During construction of the nine marsh restoration sites, effluent from dewatering would be discharged into adjacent wetlands via spill box weirs. Earthen containment/exclusions dikes would be constructed from *in-situ* material located within the marsh restoration/nourishment area using a mechanical (clamshell or bucket) dredge. Access for the mechanical dredge would be via the designated pipeline corridors. Borrow areas used for construction of earthen containment/exclusion dikes would be refilled during the placement of dredged material for marsh restoration. One foot of freeboard for containment/exclusion dikes would be maintained at all times during dredge discharge operations. Containment/exclusion dikes would be breached in multiple places three years following construction, if necessary, to restore fish access if natural degradation is not sufficient. Breach locations would correspond to weir locations or most appropriate.

Construction of the five shoreline protection measures and placement of rock and geotextile fabric would utilize the best available practical techniques and BMPs to avoid and minimize potential adverse impacts to surrounding aquatic and terrestrial environment. Geotextile fabric would be placed to reduce subsidence of placed rock, and rock would be placed with a barge-mounted crane to increase precision of placement.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water

(a) Salinity

The Louisiana coastal area is horizontally stratified with water salinities decreasing gradually from the coast inland (Gosselink 1984). Dredging borrow sites, construction of temporary access corridors, the nine marsh restoration measures and the five shoreline protection measures would have little, if any, effects on local or basin-wide salinity. The proposed action would not significantly alter existing waterways or other water movement patterns. Sediments and dredge effluent taken from off-shore borrow areas (see Fact Sheets) and placed at interior disposal marsh restoration areas may have higher salinities compared to the saline marsh restoration sites. However, any differences would likely be minimal and the dredged effluent and higher saline borrow sediments would rapidly desalinate to those ambient salinity conditions following dewatering and consolidation of sediments. Borrow areas would be configured so that stratification would be minimized by orienting the long axis of each borrow area parallel to the Gulf shoreline and with side slopes no steeper than 4(H):1(V).

Construction of shoreline protection measures would not result in localized changes to salinities for the areas immediately behind the shoreline protection measure because these areas would retain connectivity to protected waters through the placement of gaps in the shoreline protection structures to allow hydrologic connectivity. Shoreline protection structures would not provide a hydraulic barrier to the exchange of waters; rather, these structures would reduce wave erosion. Any potential adverse impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to salinity.

(b) Water Chemistry. (pH, etc.)

Construction activities, hydraulic dredging and placement of sediments and other fill materials can result in a localized and temporary reduction in the pH of receiving area waters toward more acidic conditions. The factors responsible include increased turbidity, organic enrichment, chemical leaching, reduced dissolved oxygen, and elevated carbon dioxide levels, among others. Tidal currents present in the project measure areas would serve to disperse and thereby dilute localized changes to pH. Following construction, pH levels in the area would return to those observed prior to measure construction. Any such impacts would be minimized and controlled by utilizing the use of the best available practical techniques and BMPs. The proposed action would have no significant long-term adverse impacts to water chemistry. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to water chemistry.

(c) Clarity

Dredging, placement of dredged sediments, and construction activities in the nine marsh restoration measures would temporarily reduce water clarity due to increased turbidity and suspended sediments. Containment of the dredged material and management of the effluent would minimize impacts to water clarity outside of the disposal areas. The placement of rock for the five shoreline protection measures is expected to result in the disturbance of water bottom, causing a minor, temporary, and localized increase in turbidity levels and decrease in water clarity. Following construction activities, turbidity levels and water clarity in the vicinity of measures would return to those which existed prior to construction activities. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to clarity.

(d) Color.

Construction activities, dredging and placement of dredged sediments in the nine marsh restoration measures, and placement of geotextile fabric and rock for the five shoreline protection measures may temporarily change water color. Turbidity levels and suspended sediment levels are expected to temporarily increase at the

construction site until construction is completed. Following completion of construction activities, affected waters would clarify and the water color would return to conditions observed prior to construction.

The disturbance of water bottom substrate during placement of rock and geotextile fabric for the five shoreline protection measures may result in temporary and localized changes to water color. In addition, because shoreline protection would serve to reduce wave erosion, some minor changes to water color in areas protected by the rock breakwaters are expected, as the rock would serve to significantly reduce the wave energy-driven resuspension of water bottom substrate for those areas. Any such impacts would be minimized by the use of the best available practical techniques and BMPs. Following completion of construction activities color conditions would return to those observed prior to construction. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to color.

(e) Odor.

Construction and dredging activities of reduced sulfur-bearing sediments, typical of estuarine marshes, can result in the emission of reduced sulfur compounds including hydrogen sulfide, often characterized as an objectionable rotten-egg smell. However, these emissions would likely occur infrequently, at low levels and are not expected to be significant or detectable by any sensitive human occupied areas. There would be no expected odors detectible outside of the dredged borrow sites, temporary access corridors, nine marsh restoration measures and five shoreline protection measures construction areas. Following completion of construction activities, odors in the vicinity of project measures would return to those which existed prior to construction activities. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to odor.

(f) Taste.

During construction and dredging activities there could be a release of sulfur compounds from sediments; increased turbidity, total suspended sediments, and water temperatures; and decreased oxygen which could likely cause changes to water taste within and immediately adjacent to construction sites. However, there are no human water intakes or other human consumption of waters activities located within or adjacent to any of the project measures. Any change in taste is not expected to be detectable to any nearby human inhabitants. Following construction activities, water taste in the vicinity of measures would return to that which existed prior to construction activities. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to taste.

(g) Dissolved Gas Levels.

The biological and chemical content of suspended materials released during dredging, discharge and other construction activities may react with the dissolved oxygen in the water, which can result in temporary and localized, but minor oxygen depletions and a release of ammonia. The introduction of organic material to the water column as a result of discharge can lead to temporary and localized, but minor, high biochemical oxygen demand (BOD) which in turn can lead to temporary and localized, but minor, reduced dissolved oxygen thereby potentially affecting the survival of many aquatic organisms. Decomposition of organic material within the nine marsh restoration measures following discharges of dredged sediments may result in temporary and localized, but minor, reduction in dissolved oxygen and a release of ammonia. Following completion of construction activities, dissolved gas levels in the vicinity of these measures would return to that which existed prior to construction activities.

Placement of rock and geotextile fabric for the five shoreline protection measures may result in disturbances of water bottom substrate along the footprint of the measures. Because of organic material contained within the bottom substrate, this disturbance may result in minor, localized, and short-term reductions in dissolved oxygen levels and ammonia. Tidal currents are expected to quickly disperse waters affected by construction of these measures, such that no significant impacts to dissolved oxygen levels are anticipated. Following completion of construction activities, dissolved gas levels in the vicinity of these measures would return to that

which existed prior to construction activities. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to dissolved gas levels.

(h) Nutrients.

Dredged sediments excavated from the borrow sites would contain low but variable concentrations of organic material adsorbed or complex plant nutrient compounds which, if available for biological uptake and use, can lead to eutrophication. However, nutrients released from sediments resuspended during dredging operation have given mixed results as to their ability to stimulate algal growth. However, as these releases are expected to be minor, and because there is expected to be adequate flows and sufficient dissolved oxygen levels in the water column for converting ammonia into non-toxic nitrate, any effects associated with dredging and construction activities associated with these measures are expected to be minor and temporary and nutrients within the water column would rapidly cease following construction. Following completion of construction activities, nutrients within the water column in the vicinity of these measures would return to that which existed prior to construction activities.

Construction activities involving placement of rock and geotextile fabric for the five shoreline protection measures can result in the disturbance of water bottom substrate, which may expose variable levels of organic material to resuspension in the water column, and also resulting in the release of nutrient compounds However, as these releases are expected to be minor, and because there is expected to be sufficient dissolved oxygen levels in the adjacent waters for converting ammonia into non-toxic nitrate, any effects associated with construction activities associated with these measures are expected to be localized and short-lived and would return to nutrient levels that which existed prior to construction activities. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to nutrients.

(i) Eutrophication.

Dredged sediments could contain low but variable concentrations of organic material, and sufficient quantities of ammonia, nitrogen and phosphorous compounds which, if released in available forms during dredging and construction operations, could stimulate the growth of algae and other aquatic plants. Decomposition of organic material within the nine marsh restoration measures following discharges of dredged material may result in a release of ammonia. While ammonia and nitrate may stimulate phytoplankton production, adverse or persistent algal blooms are not expected during construction. Following completion of construction activities, potential for eutrophication in the vicinity of these measures would return to that which existed prior to construction activities.

Placement of rock and geotextile fabric for the five shoreline protection measures could result in the disturbance of water bottom substrate, which may expose variable levels of organic matter, nitrogen and phosphorus to the water column, resulting in the release of minor amounts of these compounds into the water column. While ammonia and nitrate may stimulate phytoplankton production, adverse or persistent algal blooms are not expected during construction. Following completion of construction activities, nutrients within the water column in the vicinity of these measures would return to that which existed prior to construction activities. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts of eutrophication.

(j) Others as Appropriate.

No other water circulation, fluctuation, or salinity determinations.

(2) Current Patterns and Circulation

(a) Current Patterns and Flow.

Dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures can significantly change local current patterns and local water circulation. The higher substrate elevations resulting from marsh restoration of shallow open water and fragmented marsh areas may

slightly reduce and modify local throughput (current patterns and flow) of water over the footprint of each of these measures. However, overall basin current patterns and flows would be similar to that which existed prior to the widespread coastal marsh fragmentation, degradation, and loss we are currently experiencing.
The five shoreline protection measures are designed to reduce wave erosion of shorelines and back marsh areas. In addition shoreline protection measures would include fish dips which would allow water flows to proceed unimpeded by these measures. Shoreline protection measures would also reduce shoreline erosion by moderating the wave erosion caused by wind, tidal, and other current patterns, water circulation and flows. These impacts are considered positive and would provide protection of back marsh lands in an otherwise degrading marsh area. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to current patterns and flows.

(b) Velocity.

Dredging and construction of access corridors, the nine marsh restoration measures and the five shoreline protection measures could significantly reduce localized water velocities in the immediate vicinity of the these measures and to a lesser extent on adjacent marsh and shorelines.

Elevations of the nine marsh restoration measures, about +1.5 feet NAVD 88, would reduce water velocities compared to velocities found in adjacent existing shallow open water and fragmented marsh area. The five shoreline protection measures, by design, would reduce water velocities and protect back marsh areas from wave induced erosion. However, the shoreline protection would be segmented with lower elevated fish dips that would provide access for fish and other aquatic organisms as well as for waters to infiltrate to interior portions of the created marshlands. The positive impacts of the shoreline protection measures is to reduce the waves and velocities from eroding and further degrading shorelines and back marsh areas and are therefore considered positive in an overall degrading coastal marsh system. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts of water velocities.

(c) Stratification.

The Louisiana coastal area is horizontally stratified with sediment and water salinities decreasing gradually from the coast inland (Gosselink 1984). The larger tidal passes at the Gulf of Mexico typically display salinity stratification in these deeper waterways. However, within the numerous shallow waterbodies and marsh areas throughout the Chenier Plain, there is little salinity stratification (Miller and Meselhe 2007). Dredging and disposal, and other construction activities associated with the access corridors, the nine marsh restoration measures and the five shoreline protection measures would not cause stratification of waters or any associated adverse impacts of hypoxia in the vicinity of the project measures. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to stratification.

(d) Hydrologic Regime.

Hydrologic regimes are dependent on climatic, wind, terrain, vegetation, and other hydrologic conditions. Dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures would not significantly alter the existing hydrologic regime.

Construction of the NER RP measures would be localized and would displace existing shallow open water and fragmented marsh areas by restoring and nourishing marsh and providing shoreline protection. NER RP measures would act primarily as a roughness factor on local flows and waves but would otherwise have no significant effects on the hydrologic regime of the area. Acting as a roughness factor, the higher substrate elevations resulting from restoration and nourishment of the nine marsh restoration measures in shallow open water and fragmented marsh areas may slightly reduce throughput of water over the footprint of these measures. By design, the five shoreline protection measures would reduce wave erosion. However, the localized changes to water flows and reduction of erosive wave impacts in a degrading coastal marsh ecosystem are considered positive effects in an otherwise degrading coastal marsh ecosystem. The NER RP would utilize the

best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts.

(3) Normal Water Level Fluctuations.

Dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures would not significantly change normal water level fluctuations in the project area. The higher substrate elevations resulting from restoration of marsh land in shallow open water and fragmented marsh areas may slightly reduce throughput (normal water level fluctuations) of water over the footprint of these measures. However, these impacts are considered positive by restoring marsh in a degrading coastal marsh ecosystem.

By design, the five shoreline protection measures would be constructed to reduce the erosive forces of wave action and flows. However, normal water level fluctuations, such as tidal flows, would remain unimpeded by these measures. Hence, these impacts are considered positive due to the protection of shoreline and back marsh lands in an overall degrading coastal marsh ecosystem. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts normal water fluctuations.

(4) Salinity Gradients.

The Louisiana coastal area is horizontally stratified with water salinities decreasing gradually from the coast inland (Gosselink 1984). Dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures would not significantly affect salinity gradients.

For the nine marsh restoration measures, the higher substrate elevations resulting from restoration of marsh land in shallow open water and fragmented marsh areas may slightly reduce throughput of waters over the footprint of these measures. However, any such impacts would not change salinity gradients. The positive effects of marsh restoration and nourishment would help to offset the degrading, fragmenting and systemic marsh loss throughout the project area.

The five shoreline protection measures, by design, would be constructed to reduce the erosive forces of wave action and flows. However, normal water level fluctuations and salinity gradients would remain unimpeded by these measures. Hence, these impacts are considered positive due to the protection of shoreline and back marsh lands in an overall degrading coastal marsh ecosystem. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to salinity gradients.

(5) Actions That Would Be Taken to Minimize Impacts.

Storm Water Pollution Prevention Plans (SWPPPs) shall be prepared in accordance with good engineering practices emphasizing storm water best available practical techniques and BMPs and complying with Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT). The SWPPP shall identify potential sources of pollution, which may reasonably be expected to affect storm water discharges associated with the construction activity. In addition, the SWPPP shall describe and ensure the implementation of practices which are to be used to reduce pollutants in storm water discharges associated with the construction activity and to assure compliance with the terms and conditions of this permit.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site.

Dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures would result in localized and temporary increases in total suspended particulates and turbidity in the vicinity of the dredge borrow, access corridors, marsh restoration/nourishment and shoreline protection sites. These temporary impacts would be localized and occur primarily due to disturbance of water

bottoms during dredging and construction activities (temporary access corridors, dredging and placement operations for marsh restoration, and placement of rock and geotextile fabric for shoreline protection measures). However, these temporary and localized impacts would be minimized by utilizing the best available practical techniques and BMPs during construction. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. The placement of rock for the shoreline protection measures is expected to result in the disturbance of water bottom, causing a minor, temporary, and localized increase in suspended particulate/turbidity levels. Following dredging and construction activities, suspended particulates and turbidity levels in the vicinity of NER RP measures would return to those which existed prior to construction activities. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to suspended particulates and turbidity levels.

(2) Effects on Chemical and Physical Properties of the Water Column.

(a) Light penetration.

Water column effects, including light penetration, associated with construction activities would be localized and temporary, occurring only during dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures. These temporary and localized impacts would include reduction of light penetration due to the increased turbidity and total suspended sediments levees associated with dredging and construction operations. However, these temporary and localized effects would be minimized by utilizing the best available practical techniques and BMPs during construction. During marsh restoration and nourishment, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following dredging and construction, turbidity and total suspended sediment levels would rapidly return to those conditions observed prior to construction thereby resulting in light penetration returning to pre-construction conditions. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts of light penetration.

(b) Dissolved oxygen

Water column effects, including lower dissolved oxygen levels, associated with dredging and construction activities would be localized and temporary, occurring only during dredging, construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures. Decomposition of organic material within the nine marsh restoration measures following placement of dredged material may result in a temporary and localized reduction of dissolved oxygen.

Placement of rock for the five shoreline protection measures may result in disturbances of water bottom substrate along the footprint and in the immediate area of the measures during construction. Because of organic material contained within the substrate, this disturbance may result in minor, localized, and short-term reductions in dissolved oxygen levels. Once construction is complete, tidal currents are expected to quickly disperse waters affected by these measures, such that no significant impacts to dissolved oxygen levels are anticipated.

These temporary and localized impacts of decreased dissolved oxygen would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During marsh restoration and nourishment, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction dissolved oxygen conditions would return to those observed prior to construction. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to dissolved oxygen.

(c) Toxic metals and organics.

A Phase I environmental site assessment of the NER RP project area was conducted in accordance with applicable sections of the American Society for Testing and Materials (ASTM) Standard E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process; ASTM Standard E2247-08, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment

Process for Forestland or Rural Property; the U.S. Environmental Protection Agency (USEPA) 40 CFR Part 312 Standards and Practices for All Appropriate Inquiry, Final Rule; and BEM's scope of work dated December 16, 2014 to assess for the presence of Hazardous, Toxic, and Radioactive Wastes (HTRW) within the ASTM E1527-13 recommended approximate minimum search distance of 1 mile from the NER RP restoration measures. The majority of the recognized environmental conditions and areas of environmental concern within the project area are located: 1) adjacent to Highway 82 on the east side of Grand Chenier and from the right descending bank of the Calcasieu Ship Channel east to Highway 27 and in the northern vicinity of Hackberry adjacent to Highway 27; 2) along Freshwater Bayou. However, records indicate that the majority of these sites have been cleaned, remediated, and closed. Based on the Phase I environmental site assessment, the proposed restoration activities within the NER RP project area would likely result in the "capping" of any potentially impacted areas through the placement of overlying materials that may include dredged sand and sediment, rocks, and placement of reinforced structures. This action would potentially minimize future recognized environmental conditions and environmental concerns from existing petroleum or metal-impacted sediment through the placement of the overlying dredged materials.

Water column effects, including toxic metals and organics, associated with dredging and construction activities could be temporary, localized and occur only during dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures. Decomposition of organic material within the disposal areas following placement of dredged material may result in a temporary and localized release of ammonia. These temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction, toxic metals and organics conditions would return to those observed prior to construction. Material to be used for marsh restoration and material to be excavated for temporary access corridors for the shoreline protection measures is being obtained from offshore water bottoms and the Calcasieu Ship Channel. Some temporary access corridor dredging may be required in Calcasieu Lake, which would be along existing authorized access channels. Initial evaluation of Environmental Database Reviews for the project area indicate no recognized environmental conditions (e.g., unmitigated oil spills or other activities), in the borrow areas, temporary access corridors, or placement areas that would preclude project implementation. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts of toxic metals and organics.

(d) Pathogens.

Water column effects, including release of pathogens associated with dredging and construction activities could be temporary, localized and occur only during dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures. These temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction, any pathogens released would return to those observed prior to construction. No significant short or long term effects on water column pathogens are anticipated from the dredged/fill material disposal activities. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts of pathogens.

(e) Aesthetics.

Water column effects, including aesthetics, associated with construction activities could be temporary, localized and occur only during dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures. The primary aesthetic effects would be primarily associated with dredging construction activities resulting in temporary and localized turbid waters and emission of reduced sulfur compounds including hydrogen sulfide, often characterized as an objectionable rotten-egg smell. However, these emissions would likely occur infrequently, at low levels and are not expected to be significant or detectable by any sensitive human occupied areas. There would be no expected odors detectible outside of the dredged borrow sites, temporary access corridors, nine marsh restoration measures and five shoreline

protection measures construction areas. Following completion of construction activities, odors in the vicinity of project measures would return to those which existed prior to construction activities. Any such impacts would be minimized and controlled by utilizing the use of the best available practical techniques and BMPs. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction, aesthetics conditions would return to those observed prior to construction. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to aesthetics.

(f) Others as Appropriate.

Water column effects, including particulate matter, associated with dredging and construction activities would be significant but temporary and localized in nature and occur only during dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures. These temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction other effect conditions, including particulate matter, would return to those observed prior to construction. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impact.

(3) Effects on Biota.

(a) Primary production, photosynthesis.

Potential adverse effects on biota, including primary production photosynthesis, could be primarily associated with increased turbidity and total suspended sediments, increased water temperature and lower dissolved oxygen during dredging and construction activities of the access canals, the borrow sites, the nine mash restoration measures and the five shoreline protection measures. Any such adverse effects would generally be temporary and localized. Increased turbidity and total suspended sediments, increased water temperature and lower dissolved oxygen could result in temporary and localized reduction of photosynthesis due to blocking of sunlight into the waters. However, these temporary and localized effects would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following dredging and construction, turbidity levels, total suspended sediments, water temperatures, and dissolved oxygen levels would return to that observed prior to construction. Consequently, primary production and photosynthesis conditions would return to that observed prior to construction. It is anticipated that primary production and photosynthesis would show localized increases at the nine marsh restoration sites. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to biota.

(b) Suspension/filter feeders.

Potential adverse effects on biota, including suspension and filter feeders, could be primarily associated with increased turbidity and total suspended sediments, increased water temperature and lower dissolved oxygen during dredging and construction activities of the access corridors, the borrow sites, the nine marsh restoration measures and the five shoreline protection measures. Any such effects would generally be temporary and localized. During dredging and construction activities, dredging temporary access corridors, dredging and placement of dredged sediments for the nine marsh restoration measures and placement of geotextile fabric and rock for the five shoreline protection measures would smother sessile and immobile suspension/filter feeders and force more mobile organisms to move from the disposal/construction areas. However, it is expected that benthic suspension/filter feeders would re-colonize the newly deposited dredged material at marsh restoration sites within 1-3 years due to its similarity with the existing substrate in the disposal areas. The conversion of shallow open-water to marsh habitat would prevent some larger aquatic suspension/filter feeders from immediately re-entering the disposal area (marsh restoration/nourishment sites). However, following dredging and construction activities, suspension and filter feeder organisms would gain access to the newly formed marsh and tidal pools and permeable rocked shoreline protection during normal water flows and tides.

Marsh is considered to have a higher ecological value than shallow open-water in this coastal ecosystem that is presently experiencing widespread coastal land loss.

Dredging and construction could also have additional effects associated with increases in turbidity levels and suspended sediments. This could clog the gills and feeding mechanisms of sessile suspension/filter-feeding organisms and temporarily displace mobile suspension/filter-feeding organisms. These temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction, suspension/filter feeders conditions would return to those observed prior to construction. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to suspension and filter feeders.

(c) Sight feeders.

Adverse effects on biota, including sight feeders, would generally be temporary, localized and occur only during dredging and construction activities of the access corridors, the nine marsh restoration measures and the five shoreline protection measures. These impacts would include temporary and localized increased turbidity and total suspended sediments, increased water temperature and lower dissolved oxygen. The conversion of shallow open-water to marsh and the displacement of shallow open water and fragmented marsh to geotextile and rock shoreline protection would displace sight feeders. However, following settlement and consolidation of dredged sediments into marsh and following construction of shoreline protection measures, smaller organisms would have access to the newly formed marsh during normal and high tidal fluctuations. These temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction sight feeders conditions would return to those observed prior to construction. Other effects on biota, including sight feeders, associated with construction activities would be temporary, localized and occur only during construction of the nine marsh restoration measures and five shoreline protection measures. This could include temporary and localized increases in turbidity levels and total suspended sediments from placement of dredged material and geotextile fabric and rock, which could impede the foraging success of sight-feeding organisms. These temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction sight feeders conditions would return to those observed prior to construction. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to sight feeders.

(4) Actions Taken To Minimize Impacts.

For the nine marsh restoration measures, dredged sediments would be placed to achieve a post-construction target elevation suitable for the establishment of marsh vegetation following dewatering. During construction, effluent from dewatering would be discharged into adjacent wetlands via spill box weirs. Earthen containment/exclusion dikes would be constructed from in-situ material located within the marsh restoration/nourishment area using a mechanical (clamshell or bucket) dredge. Temporary access for the mechanical dredge would be via the pipeline corridor. The borrow area used for construction of the earthen containment/exclusion dike would be within the footprint of the marsh restoration site and would be refilled during the placement of dredged sediments for marsh restoration. One (1) foot of freeboard would be maintained at all times during dredge discharge operations. Containment/exclusion dikes would be breached in multiple places at three years following construction, if necessary, to restore fish access if natural degradation is not sufficient. Breach locations would correspond to weir locations. Construction of marsh restoration measures would utilize the best available practical techniques and BMPs to avoid and minimize potential adverse impacts to surrounding aquatic and terrestrial environment.

Construction of the five shoreline protection measures would utilize the best available practical techniques and BMPs to avoid and minimize potential adverse impacts to surrounding aquatic and terrestrial environment.

d. Contaminant Determinations.

An evaluation of the Environmental Data Resources report, performed during the Southwest Coastal Louisiana Phase I Environmental Site Assessment, indicates there appear to be no recognized environmental conditions within the study area. Further research is being conducted concerning potential sediment contaminants in the Calcasieu Ship Channel and the GIWW (i.e., the reaches within the Calcasieu restoration area as outlined in the Phase I maps). If contaminant levels are discovered to be significant, the reach in the Calcasieu Ship Channel may be avoided and material obtained from adjacent, less-contaminated reaches.

Water and sediment from 32 stations within the ship channel were collected in December 2006. Samples were analyzed in accordance with the protocols described in *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. - Testing Manual* (ITM) (USEPA/USACE, 1998) and *Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities - Testing Manual* (UTM) (USACE, 2003). Only the stations relevant to the Southwest Coastal Louisiana Study are discussion below.

Physical and chemical analyses were performed on sediment from each in-channel station. Dredged Material Management Unit (DMMU) 4 consisted of in-channel stations D4-06-1 through D4-06-5 (approximate channel mile 24 to channel mile 21 and Devil's Elbow). DMMU 5 consisted of in-channel stations D5-06-1 through D5-06-5 (approximate channel mile 21 to channel mile 16); and DMMU 6 consisted of in-channel stations D6-06-1 through D6-06-6 (approximate channel mile 16 to channel mile 5.

Results from chemical analyses of sediment from the three DMMUs within the Calcasieu River and Pass, revealed the presence of 12 metals, nine PAHs, four pesticides, three petroleum hydrocarbons, three PCBs, and ammonia.

Concentrations of most metals detected in river sediments were similar and within the same order of magnitude for the three DMMUs. Metal detected included antimony (0.101 to 0.111 ppb), arsenic (2.26 to 2.70 ppb), barium (68.6 to 116 ppb), beryllium (0.396 to 0.564 ppb), chromium (6.90 to 8.58 ppb), copper (5.00 to 6.90 ppb), hexavalent chromium (0.0957 to 0.152 ppb), lead (7.60 to 8.42 ppb), mercury (0.0335 to 0.0501 ppb), nickel (6.92 to 8.54 ppb), selenium (0.253 to 0.502 ppb), and zinc (24.4 to 26.4 ppb). Antimony and hexavalent chromium were not detected at DMMU 5.

Polycyclic aromatic hydrocarbons (PAHs) were detected in DMMUs 4 and 5, but not in DMMU 6. While PAHs were most prevalent in DMMU 4, the sum of all detected PAHs was relatively low with a total of 158 ppb. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, and phenanthrene were detected at DMMU 4. Fluoranthene was the only PAH analyte detected at DMMU 6 (14.0 ppb).

Pesticides were detected in two DMMUs, and were most prevalent in DMMU 4. Concentration of 4,4'-DDT were detected in DMMUs 4 and 6 (2.08 ppb and 1.85 ppb). Other pesticides were detected in river sediments only: endosulfan II in DMMUs 4 and 6 (2.05 ppb and 2.11 ppb), heptachlor in DMMU 4 (0.574 ppb), and gamma-BHC in DMMU 4 (0.618 ppb).

Diesel range organics (DRO) and ammonia were common to river sediments. DRO ranged from 18,157 to 43,600 ppb and ammonia ranged from 24,714 to 27,000 ppb, and tended to decrease from upper (DMMU 4) to lower reaches (DMMU 6) of the river. Gasoline range organics (GRO) and motor oil range organics (MRO) were detected only in DMMU 4 (172 ppb and 50,500 ppb, respectively) above Calcasieu Lake. PCB 1016 was detected in DMMUs 4 and 6 (2.0 ppb and 0.7 ppb), while PCB 1254 and PCB 1260 only occurred in DMMU 4 (1.2 ppb and 0.9 ppb). A single volatile organic compound (tetrachloroethylene at 1.3 ppb) was detected at DMMU 6.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton.

Temporary and localized adverse effects on aquatic ecosystems and organisms, including plankton, would be primarily associated with construction activities and would include increased turbidity and total suspended solids, increased water temperatures and lower dissolved oxygen. These temporary and localized effects would occur only during dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures. These temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During marsh restoration, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction plankton conditions would return to those observed prior to construction. The restored and protected marsh would provide increased estuarine habitat suitable for re-colonization. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to plankton.

(2) Effects on Benthos.

Localized adverse effects on aquatic ecosystems and organisms, including benthos, would primarily be associated with dredging and construction activities and could include smothering and permanent loss of sessile and slower moving benthic organisms during dredging and placement of borrow sediments for marsh restoration as well as during placement of geotextile fabric and rock for shoreline protection. More mobile benthic organisms could move out of the immediate construction areas. Following construction activities, marsh bottoms would be rapidly recolonized by benthic organisms within 1-3 years (Wilber et al. 2008). Rocks for shoreline protection measures would provide substrate and micro habitats suitable for some smaller organisms and benthos. Other impacts would include temporary and localized increases in turbidity and total suspended solids, increased water temperatures and decreased dissolved oxygen that would occur only during construction of the nine marsh restoration measures and five shoreline protection measures. These temporary and localized impacts can inhibit photosynthesis and affect respiration of benthic organisms by silt deposition on respiratory structures. However, these temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During construction of marsh restoration measures, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to benthos.

(3) Effects on Nekton.

Localized sessile and slow-moving nekton would be smothered and permanently lost by dredging and placement of borrow sediments during marsh restoration as well as during placement of geotextile fabric and rock for shoreline protection. However, most nekton are mobile and would be displaced from nine marsh restoration measures and five shoreline protection measures. Much of the marsh restoration sites would be temporarily unavailable for nekton or other aquatic organisms during construction and until containment/exclusion dikes degrade naturally or as part of project construction at three years following construction, after which nekton would have access to the newly restored marsh. The open water areas where shoreline protection sites would be constructed would be permanently unavailable for use by nekton. However, gaps in the shoreline protection would allow aquatic organism access to back marsh areas. Construction activities would be temporary and localized increases in turbidity and total suspended solids, increased water temperatures and decreased dissolved oxygen that would occur only during construction of the nine marsh restoration measures and five shoreline protection measures. These temporary and localized impacts can inhibit predator-prey interactions and affect respiration of nekton by silt deposition on respiratory structures. However these temporary impacts would not likely impact most nekton, which are generally mobile enough to avoid areas during construction. In addition, these temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During construction of marsh restoration measures, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment.

Sediments in marsh restoration areas would differentially settle following construction into higher and lower lying lands enabling reestablishment of natural water connections for access of aquatic organisms from nearby and adjacent waters. Marsh restoration measures would also provide essential fish habitat for Federally-managed species. Rock placed for shoreline protection would provide a variety of micro-habitats and substrates for various prey species that could be utilized by nekton. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to nekton.

(4) Effects on the Aquatic Food Web.

Effects on the aquatic food web would be temporary and localized increases in turbidity and total suspended solids, increased water temperatures and decreased dissolved oxygen that would occur only during construction of the nine marsh restoration measures and five shoreline protection measures. Although these temporary and localized impacts can disrupt and inhibit predator-prey interactions, they would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During construction of marsh restoration measures, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. The aquatic food web would benefit from both short and long term changes to the marsh restoration disposal areas, including additions in energy to basal elements of the food web, habitat preservation, and increased habitat complexity. Nutrients and detritus released during the discharge of dredged sediments into marsh restoration areas would be added to the existing food web. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to the aquatic food web.

(5) Effects on Special Aquatic Sites.

(a) Sanctuaries and Refuges.

Existing Coastal Restoration Projects: Marsh restoration measures 124c and 3c1 would be constructed on portions of projects CS-59 Oyster Bayou Marsh Creation and Terracing (**Figure 5**) and CS-54 Cameron-Creole Watershed Grand Bayou Marsh Creation (**Figure 6**), respectively. The proposed marsh restoration measures would be constructed to avoid the existing coastal restoration projects that they may overlap. This would generally include construction of temporary containment/exclusion dikes to prevent dredged sediments used for construction of proposed NER RP marsh restoration measures from entering existing coastal restoration project sites. Temporary containment/exclusion dikes would degrade naturally to restore connectivity with surrounding areas or would be degraded at three years after construction has been completed.

National Wildlife Refuges: Portions of NER RP measure 124d would be constructed on the Sabine National Wildlife Refuge (NWR) and portions of NER RP measure 3c1 would be constructed on the Cameron Prairie NWR (**Figure 4**). The effect of marsh restoration these refuges would be significantly positive and long term, if not permanent, and primarily associated with restoration and protection of wetlands on these NWRs and adjacent lands. These measures would restore and protect important and essential habitats utilized by terrestrial and aquatic organisms as well as provide essential fish habitat (EFH) utilized by Federally managed fisheries. No other proposed actions would impact any other sanctuaries or refuges in the study area.

State Wildlife Refuges: The implementation of three of the five shoreline protection measures (6b1, 6b2, and 6b3) would have a significant and long-term positive effect on wetlands in the Rockefeller State Wildlife Refuge and Game Preserve (Rockefeller Refuge). The installation of a field of light-weight aggregate core rock breakwaters offshore of the Gulf of Mexico shoreline of the Rockefeller Refuge would decrease the wave energy reaching the shoreline, which would reduce background erosion rates, protecting existing saline wetlands.

Mitigation Projects: **Table 3** indicates the Office of Coastal Management (OCM) permitted mitigation projects that proposed NER RP marsh restoration measures would be constructed upon. However, construction of the NER RP marsh restoration measures would not be initiated until each mitigation project has completed its permit completion/expiration date.

The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to sanctuaries and refuges.

(b) Wetlands.

Implementation of the proposed action would significantly and positively effect and increase the area of estuarine wetlands in the study area and, in turn, provide and protect important, essential and in some instances critical habitats used by various terrestrial and aquatic organisms for shelter, nesting, feeding, roosting, cover, nursery, EFH and other life requirements; as well as increase productivity. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to wetlands.

(c) Mud Flats.

Some existing mud flats would be significantly and permanently impacted by marsh restoration and nourishment of nine marsh restoration measures and five shoreline protection measures that would be constructed near Calcasieu Lake. The placement of fill material for marsh restoration and rock for shoreline protection measures would cover any existing mud flats, converting them to other habitats (intertidal marsh and rock, respectively). Since intertidal marsh is degrading throughout the study area, the conversion of shallow open water and some mud flats to marsh and the protection of marsh would be beneficial in the long term. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to mud flats.

(d) Vegetated Shallows.

Some existing vegetated shallows would be significantly and permanently impacted by marsh restoration and nourishment of nine marsh restoration measures and five shoreline protection measures around Calcasieu Lake. Permanent impacts to state water bottoms through the conversion to marsh or the placement of rock include 14,346 acres from the nine marsh restoration measures and 278.4 acres from the five shoreline protection measures. This would result in the vegetation being covered by fill material. Not all of these shallow-water areas are vegetated (range of 0 to 40% coverage). In addition, proposed measures would encourage the growth of submerged aquatic vegetation in open water shallows such as through the reduction in water fetch and wave energy by shoreline protection measures. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to vegetated shallows.

(e) Coral Reefs.

The proposed action would not impact coral reefs.

(f) Riffle and Pool Complexes.

The proposed action would not impact riffle and pool complexes.

(6) Threatened and Endangered Species.

The CEMVN has determined that the proposed action "may affect but will not likely adversely affect" the piping plover or it's critical habitat, red knot, Sprague's pipit, West Indian manatee, Gulf sturgeon, loggerhead and Kemps Ridley sea turtles; would have no effect on the red-cockaded woodpecker, green, leatherback, and hawksbill sea turtles or loggerhead critical habitat and would not adversely impact other species of concern that could potentially be found in the project area. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to threatened and endangered species.

(7) Other Wildlife.

The NER RP measure areas would be temporarily unavailable for use by wildlife during dredging and construction activities. Temporary and localized increases in turbidity and total suspended solids, increased water temperatures and decreased dissolved oxygen would occur only during dredging and construction of the access corridors, the nine marsh restoration measures and the five shoreline protection measures. Although

these temporary and localized impacts can disrupt and preclude wildlife from using the access corridors, the nine marsh restoration measures and the five shoreline protection measure areas, these impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. Also during construction of marsh restoration measures, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. However, these temporary and localized adverse effects would be offset by the proposed action restoration and protection of estuarine marsh habitats which can provide an array of foraging, breeding, and cover habitat for a variety of birds, mammals, reptiles and other wildlife species. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to other wildlife.

(8) Actions to Minimize Impacts.

Dredged sediments would be placed for the nine marsh restoration sites to achieve a post-construction target elevation following dewatering that would be suitable for natural colonization by marsh vegetation. During construction, effluent from dewatering would be discharged into adjacent wetlands via spill box weirs. Temporary earthen containment/exclusion dikes would be constructed from in-situ material located within the marsh restoration/nourishment area using a mechanical (clamshell or bucket) dredge. Temporary access for the mechanical dredge would be via the pipeline corridor. The borrow area used for construction of the earthen containment dike would be refilled during the placement of dredged material. One foot of freeboard would be maintained at all times during dredge discharge operations. Containment/exclusion dikes would be breached in multiple places at three years following construction, if necessary, to restore connectivity and fish access if natural degradation is not sufficient. Breach locations would correspond to weir locations. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid and minimize potential adverse impacts special aquatic sites and to surrounding aquatic and terrestrial environment.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination.

The State of Louisiana, Department of Environmental Quality (LDEQ), mandates a mixing zone no greater than 200 feet from discharge locations in coastal lakes. Any contaminant release resulting from construction activities should diminish to ambient conditions before exiting the mixing zone. The discharge of dredged material at marsh restoration sites and placement of temporary access corridor material as sidecast adjacent to the temporary access corridors are not expected to introduce contaminants in the Southwest Coastal Louisiana Study Area or outside of the mixing zone. An Environmental Database Review conducted as part of the Phase I Environmental Site Assessment did not discover any recognized environmental conditions that would indicate a high potential of introducing contaminants through fill material or rock placement. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to mixing zones.

(2) Determination of Compliance with Applicable Water Quality Standards.

LDEQ mandates a mixing zone no greater than 200 feet from discharge locations in coastal lakes. The discharge of dredged material and stone during construction of marsh restoration, shoreline protection, and temporary access corridor measures are not expected to exceed water quality criteria in the Sabine Pass, Calcasieu Lake, Calcasieu Ship Channel, Freshwater Bayou, Vermilion Bay, Gulf of Mexico, or adjacent bayous more than 200 feet from the discharge sites. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to water quality.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and private water supply.

The proposed action would not impact municipal and private water supply. Large quantities of moderately saline to highly saline groundwater are generally located throughout southern Cameron Parish (with the exception of an area approximately 20 miles east of the town of Cameron) and southwestern Vermilion Parish. All fresh groundwater withdrawals in Cameron and Vermilion Parishes come from the Chicot aquifer system, which mainly underlies the north-central and north-eastern areas of Cameron Parish and most of Vermilion

Parish. Underlying aquifers in the southern portion of the parishes contain saltwater. The base of the Chicot aquifer system's fresh groundwater ranges from about 300 feet below the National Geodetic Vertical Datum of 1929 (NGVD29) in the southeastern part of Cameron Parish to about 800 feet below NGVD29 in the north-central area, and in Vermilion parish ranges from less than 300 feet below NGVD29 in southwestern area to about 1,000 feet below NGVD29 in northeastern Vermilion Parish. No fresh groundwater is present in the southern portion of the parishes (where many of the restoration area measures are located) or along the southeastern coastline (USGS 2014). The Town of Hackberry is the only drinking water source within the NER RP area. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to municipal and private water supplies.

(b) Recreational and commercial fisheries.

There would be temporary and localized reduction of opportunities for recreational and commercial fisheries during construction activities. There can also be increased turbidity and total suspended solids, increased water temperatures and lower dissolved oxygen associated with construction which can restrict recreational and commercial fisheries in the local area. These temporary and localized effects would occur primarily during construction of the nine marsh restoration measures and five shoreline protection measures in the immediate construction area. Following construction, restrictions on recreational fisheries and commercial fisheries activities would be lifted. Implementation of the marsh creation and shoreline protection measures could attract recreational and commercial fishery species due to the addition of marsh EFH and structure to the degrading marsh habitats. The shallow open water areas converted to shoreline protection would no longer be available for recreational or commercial fisheries. However, the restored marsh habitat would support recreational and commercial fisheries species by providing marsh EFH. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to recreational and commercial fisheries.

(c) Water-related recreation.

Water-related recreation would be temporarily unavailable at dredging and construction sites for the corridors, the nine marsh restoration measures and the five shoreline protection measures. Construction of the nine marsh restoration measures and the five shoreline protection measures would permanently restrict water-related recreation from these sites. Following completion of construction, water-related recreation would resume similar to preconstruction levels in surrounding waters, except for the nine marsh restoration sites and the five shoreline protection sites. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to water-related recreation.

(d) Aesthetics.

The proposed action would temporarily and locally affect aesthetics at dredging and construction sites. This effect would primarily be associated with the presence and noise of dredging and construction equipment, emission of reduced sulfur compounds including hydrogen sulfide, often characterized as an objectionable rotten-egg smell. However, these emissions would likely occur infrequently, at low levels and are not expected to be significant or detectable by any sensitive human occupied areas. There would be no expected odors detectible outside of the dredged borrow sites, temporary access corridors, nine marsh restoration measures and five shoreline protection measures construction areas. Following completion of construction activities, odors and turbid waters in the vicinity of project measures would return to those which existed prior to construction activities. Any such impacts would be minimized and controlled by utilizing the use of the best available practical techniques and BMPs. There would be permanent change to the viewscape by placement of shoreline protection rock to an otherwise fragmented and eroding marsh shoreline. However, the aesthetics of the project area would be improved by the marsh restoration and shoreline protection in an area that is otherwise highly fragmented and degrading marsh. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to aesthetics.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar preserves.

Two marsh restoration measures would be located partially on U.S. Fish and Wildlife Service (USFWS) properties, and are therefore recommended for construction by the USFWS. NER RP measure 124d Marsh Creation at Mud Lake would be located on the Sabine NWR. NER RP measure 3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel would be located on the Cameron Prairie NWR (**Figure 4**). NER RP measure 124d would initially create (159 acres) and nourish (448 acres) a total of 607 acres that would provide over the 50 year period of analysis 168 net acres and 4 AAHUs which would synergistically benefit the Sabine NWR. NER RP Measure 3c1 would initially create (1,347 acres) and nourish (734 acres) a total of 2,081 acres that would provide over the 50 year period of analysis 1,324 net acres and 607 AAHU which would synergistically benefit the Cameron Prairie NWR.

Implementation of three of the five shoreline protection measures (6b1, 6b2, and 6b3) would have a significant and long-term positive effect on wetlands in the Rockefeller State Wildlife Refuge and Game Preserve (Rockefeller Refuge). The installation of a field of light-weight aggregate core rock breakwaters offshore of the Gulf of Mexico shoreline of the Rockefeller Refuge would decrease the wave energy reaching the shoreline, which would reduce background erosion rates, protecting existing saline wetlands. In all cases, the impacts would be positive.

The other NER RP measures would not impact other parks, national historic monuments, national seashores, wilderness areas, research sites, and similar preserves. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves.

g. Determination of Cumulative Effects on the Aquatic Ecosystem

Cumulative effects are the changes in the aquatic ecosystem that are attributable to the incremental and collective effect of the individual discharges of dredged or fill material resulting from implementing the NER RP measures when added to other past, present and reasonably foreseeable future individual discharges of dredged and fill material regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Dredging and construction effects, such as increased turbidity and total suspended sediments, organic enrichment, chemical leaching, reduced dissolved oxygen, and elevated carbon dioxide levels, that would be temporary and localized. The only significant long term adverse cumulative effect expected from implementing the NER RP measures would be associated with the conversion of existing fragmented marsh and shallow water bottom habitats to transitional estuarine marsh habitat and rocked shoreline protection habitats. However, conversion of fragmented marsh and shallow water bottoms to these transitional estuarine marsh habitat and shoreline protection habitat would provide greater long-term positive benefits when considered within the context of the ongoing extensive land loss throughout coastal Louisiana and the project area which is converting extensive areas of marsh to shallow open water.

Over the 50-year period of analysis, the NER RP would protect, restore, and nourish a net total of 14,035 net acres of emergent marsh (including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures). At the end of the 50 year period of analysis, the marsh restoration and shoreline protection measures together would achieve a total net ecological benefit of 4,430 AAHUs; with 2,700 AAHUs from the nine marsh restoration measures, and 1,738 AAHUs from the five shoreline protection measures. The chenier restoration measures, although not part of this 404(b)(1) analysis, would restore a net total of 1,413 net acres with 538 AAHUs. The positive cumulative impacts of implementing the NER RP marsh restoration measures would be the additive, and in some instances the synergistic, effects of restoring and nourishing sites over the 50 year period of analysis with estimated benefits of 7,900 net acres and 2,700 AAHUs. The five NER RP shoreline protection measures would span approximately 251,528 linear feet, and are anticipated to protect/stabilize approximately 6,135 net acres and 1,738 AAHUs. Although not

impacting waters of the United States, the approximately 1,413 net acres from 35 reforestation sites in Cameron and Vermilion Parishes would be reforested over the 50 year period of analysis, resulting in 538 AAHUs.

Additional long term positive cumulative impacts would be related to increased recreational and commercial fishing opportunities provided by marsh restoration measures that would provide important, critical and essential habitats as well as protection of recreational marsh lands from wave erosion effects by the shoreline protection measures. The cumulative impacts of the proposed action would be a positive increasing the visual resources, especially the viewscape, in the form of providing additional acres of marsh wetlands (and chenier ridge) in an area that is otherwise being degraded, fragmented and lost throughout the southwest coastal basin, coastal Louisiana, and the Nation. Restoration of marsh would convert existing view sheds of open water into marsh wetlands interspersed with large bodies of open water and use the basic design elements of form, line, texture, color, and repetition to create an aesthetically pleasing view shed.
The cumulative effects of the NER RP measures would be in addition to, and in many instances synergistic to, the impacts and benefits from marsh acres restored, nourished and protected by other Federal, state, local, and private restoration efforts within or near the Southwest Coastal Louisiana Study Area, the Louisiana state coastal area, and the nation's coastal areas. Some of these other efforts include the following:

- Existing Coastal Restoration Projects and CWPPRA Projects – There are currently 149 active CWPPRA projects throughout coastal Louisiana. In September 2015, 101 projects were completed, benefiting over 97,401 acres. 21 projects are currently under active construction with 22 additional projects approved and in the engineering and design phase of development (source: https://lacoast.gov/new/About/FAQs.aspx; accessed November 23, 2015). Existing coastal restoration projects within the three parish area include: are 8 projects in Calcasieu Parish, 39 projects in Cameron Parish, and 12 projects in Vermilion Parish. **Table 5** lists the existing coastal restoration projects, including CWPPRA projects, within the three parishes and also describes the potential direct and secondary impacts of proposed NER RP measures on existing coastal restoration projects.

Table 5. Potential Direct and Indirect Impacts of NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
Calcasieu Parish Coastal Restoration Projects				
CS-09	Brown Lake Hydrologic Restoration (Deauthorized)	Hydrologic Restoration	37	NER RP measures would have no potential impacts on this deauthorized CWPPRA project.
CS-22	Clear Marais Bank Protection	Shoreline Protection	1,067	No potential impacts by NER RP restoration and protection measures.
CS-24	Perry Ridge Shore Protection	Shoreline Protection	1,203	No potential impacts by NER RP restoration and protection measures.
CS-27	Black Bayou Hydrologic Restoration	Hydrologic Restoration	3,594	No potential impacts by NER RP restoration and protection measures.
CS-30	GIWW - Perry Ridge West Bank Stabilization	Shoreline Protection	83	No potential impacts by NER RP restoration and protection measures.
LA-03a	Nutria Harvest for Wetland Restoration Demonstration	Demonstration, Herbivory Control	0	No potential impacts by NER RP restoration and protection measures.
LA-03b	Coastwide Nutria Control Program	Herbivory Control	14,963	No potential impacts by NER RP restoration and protection measures.
LA-30	Coastwide Reference Monitoring System	Monitoring	--	No potential impacts by NER RP restoration and protection measures.
Cameron Parish CWPPRA Projects				

Table 5. Potential Direct and Indirect Impacts of NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
CS-04a	Cameron-Creole Maintenance	Hydrologic Restoration	2,602	NER RP measure 3c1 could provide some indirect benefits to the CS-04a project, completed in 1997, by reducing the tidal prism in the Cameron-Creole Watershed. This would reduce the velocities through the water control structures by reducing fetch in the open water areas thereby providing some protection from wind-driven wave erosion.
CS-09	Brown Lake Hydrologic Restoration (Deauthorized)	Hydrologic Restoration	37	NER RP measures would have no potential impacts on this deauthorized CWPPRA project.
CS-11b	Sweet Lake/Willow Lake Hydrologic Restoration	Shoreline Protection	247	No potential impacts by NER RP restoration and protection measures.
CS-17	Cameron Creole Plugs	Hydrologic Restoration	865	No potential impacts by NER RP restoration and protection measures.
CS-18	Sabine National Wildlife Refuge Erosion Protection	Shoreline Protection	5,542	No potential impacts by NER RP restoration and protection measures.
CS-19	West Hackberry Vegetative Planting Demonstration	Demonstration, Sediment Trapping, Vegetative Planting	0	No potential impacts by NER RP restoration and protection measures.
CS-20	East Mud Lake Marsh Management	Marsh Management	1,520	NER RP measure 124c could provide secondary benefits to the CS-20 water control structures by reducing open water fetch and tidal prism which would reduce erosion from wind-driven waves and tidal velocities through the water control structures.
CS-21	Highway 384 Hydrologic Restoration	Hydrologic Restoration	150	No potential impacts by NER RP restoration and protection measures.
CS-23	Replace Sabine Refuge Water Control Structures at Headquarters Canal, West Cove Canal, and Hog Island Gully	Marsh Management	953	No potential impacts by NER RP restoration and protection measures.
CS-25	Plowed Terraces Demonstration	Demonstration, Sediment and Nutrient Trapping	0	No potential impacts by NER RP restoration and protection measures.
CS-26	Compost Demonstration (Deauthorized)	Demonstration	0	No potential impacts by NER RP restoration and protection measures.
CS-27	Black Bayou Hydrologic Restoration	Hydrologic Restoration	3,594	No potential impacts by NER RP restoration and protection measures.
CS-28-1	Sabine Refuge Marsh Creation, Cycle 1	Marsh Creation	214	No potential impacts by NER RP restoration and protection measures.
CS-28-2	Sabine Refuge Marsh Creation, Cycle 2	Marsh Creation	261	No potential impacts by NER RP restoration and protection measures.
CS-28-3	Sabine Refuge Marsh Creation, Cycle 3	Marsh Creation	187	No potential impacts by NER RP restoration and protection measures.
CS-28-4-5	Sabine Refuge Marsh Creation, Cycles 4 and 5	Marsh Creation	331	No potential impacts by NER RP restoration and protection measures.
CS-29	Black Bayou Culverts Hydrologic Restoration	Hydrologic Restoration	540	No potential impacts by NER RP restoration and protection measures.

Table 5. Potential Direct and Indirect Impacts of NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
CS-31	Holly Beach Sand Management	Shoreline Protection	330	NER RP Measure 5a would provide shoreline protection and stabilization that would secondarily benefit this existing CWPPRA project, which was completed in 2003.
CS-32	East Sabine Lake Hydrologic Restoration	Hydrologic Restoration	225	No potential impacts by NER RP restoration and protection measures.
CS-49	Cameron-Creole Freshwater Introduction	Freshwater Diversion	473	This authorized CWPPRA project, is scheduled to begin construction in September 2016. NER RP measure 3c1 would create marsh within and adjacent to the vegetative planting areas at the westernmost reaches of CS-49, which would increase the resiliency and habitat function of the wetlands in the area.
CS-53	Kelso Bayou Marsh Creation	Marsh Creation	274	No potential impacts by NER RP restoration and protection measures.
CS-54	Cameron-Creole Watershed Grand Bayou Marsh Creation	Marsh Creation	476	NER RP measure 3c1 would secondarily impact this CWPPRA project, authorized for construction in January 2015, by creating marsh adjacent to the westernmost reaches of CS-54 and providing some indirect protection from wave-induced erosion.
CS-59	Oyster Bayou Marsh Creation and Terracing	Marsh Creation, Terracing	433	NER RP 124c measure would create marsh adjacent to CS-59, scheduled to be completed in October 2016, which would increase the resiliency and habitat function of the wetlands in the area.
CS-66	Cameron Meadows Marsh Creation and Terracing	Marsh Creation, Terracing	264	No potential impacts by NER RP restoration and protection measures.
CS-78	No Name Bayou Marsh Creation	Marsh Creation	497	No potential impacts by NER RP restoration and protection measures.
LA-03a	Nutria Harvest for Wetland Restoration Demonstration	Demonstration, Herbivory Control	0	No potential impacts by NER RP restoration and protection measures.
LA-03b	Coastwide Nutria Control Program	Herbivory Control	14,963	No potential impacts by NER RP restoration and protection measures.
LA-08	Bio-Engineered Oyster Reef Demonstration	Demonstration	0	NER RP shoreline protection measure 6b1 would provide positive direct effects for the existing LA-08 oyster reef CWPPRA demonstration project by installing a lightweight aggregate core breakwater field thereby protecting LA-08 from high energy Gulf of Mexico wind-driven wave erosion
LA-30	Coastwide Reference Monitoring System	Monitoring	--	No potential impacts by NER RP restoration and protection measures.
ME-09	Cameron Prairie National Wildlife Refuge Shoreline Protection	Shoreline Protection	247	No potential impacts by NER RP restoration and protection measures.
ME-11	Humble Canal Hydrologic Restoration	Hydrologic Restoration	378	No potential impacts by NER RP restoration and protection measures.
ME-16	Freshwater Introduction South of Highway 82	Hydrologic Restoration	296	The SWC shoreline protection measures 6b2 and 6b3 would provide direct benefits to the outfall area of the ME-16 hydrologic restoration CWPPRA project, completed in 2006, by reducing Gulf of Mexico shoreline erosion through the installation of lightweight aggregate core breakwater fields.
ME-17	Little Pecan Bayou Hydrologic Restoration (Deauthorized)	Hydrologic Restoration	56	This CWPPRA hydrologic restoration project was deauthorized prior to construction, so would have no potential impacts on or by NER RP restoration and protection measures.
ME-18	Rockefeller Refuge Gulf Shoreline Stabilization	Shoreline Protection	256	The ME-18 project would be constructed from 2016 to 2018, and would consist of a lightweight

Table 5. Potential Direct and Indirect Impacts of NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
				aggregate core breakwater field extending from Joseph Harbor approximately 3 miles west. This would preclude the need to install the lightweight aggregate core breakwater field in this section as part of the 6b1measure, but the 6b1 measure would construct a lightweight aggregate core breakwater field from the western end of the ME-18 project to a point approximately 8 miles to the west.
ME-19	Grand-White Lakes Landbridge Protection	Shoreline Protection	213	No potential impacts by NER RP restoration and protection measures.
ME-20	South Grand Chenier Marsh Creation	Hydrologic Restoration	414	This CWPPRA project, which is expected to be completed in 2016, would provide indirect protection to SWC marsh restoration measure 47c3 by reducing erosion from the eastern direction in the southern area. The 3c1 measure would restore marsh adjacent to the westernmost reach of the marsh creation cells, which would provide some indirect protection from erosion.
ME-21	Grand Lake Shoreline Protection	Shoreline Protection	45	No potential impacts by NER RP restoration and protection measures.
ME-24	Southwest LA Gulf Shoreline Nourishment and Protection (Transferred)	Shoreline Protection	888	This CWPPRA project has not been authorized for construction. However, the NER RP shoreline protection measure 6b3 would protect ME-24 project from wind-driven wave erosion from the Gulf of Mexico once authorized and constructed.
ME-32	South Grand Chenier Marsh Creation - Baker Tract	Marsh Creation	393	No potential impacts by NER RP restoration and protection measures.
Vermilion Parish Coastal Restoration Projects				
LA-03a	Nutria Harvest for Wetland Restoration Demonstration	Demonstration, Herbivory Control	0	No potential impacts by NER RP restoration and protection measures.
LA-03b	Coastwide Nutria Control Program	Herbivory Control	14,963	No potential impacts by NER RP restoration and protection measures.
LA-06	Shoreline Protection Foundation Improvements Demonstration	Demonstration, Shoreline Stabilization	0	No potential impacts by NER RP restoration and protection measures.
LA-30	Coastwide Reference Monitoring System	Monitoring	--	No potential impacts by NER RP restoration and protection measures.
ME-04	Freshwater Bayou Wetland Protection	Hydrologic Restoration, Shoreline Protection	1,593	Although NER RP measure 127c3 is located nearby there would be no potential impacts by NER RP measures on ME-04, which was constructed in 1998.
ME-08	Dewitt-Rollover Vegetative Plantings Demonstration (Deauthorized)	Demonstration	0	No potential impacts by NER RP restoration and protection measures on this deauthorized project.
ME-12	Southwest Shore White Lake Demonstration (Deauthorized)	Demonstration	0	No potential impacts by NER RP restoration and protection measures on this deauthorized project
ME-13	Freshwater Bayou Bank Stabilization	Shoreline Protection	511	No potential impacts by NER RP restoration and protection measures.
ME-14	Pecan Island Terracing	Sediment and Nutrient Trapping	442	No potential impacts by NER RP restoration and protection measures.

Table 5. Potential Direct and Indirect Impacts of NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
ME-22	South White Lake Shoreline Protection	Shoreline Protection	844	No potential impacts by NER RP restoration and protection measures.
ME-23	South Pecan Island Freshwater Introduction (Deauthorized)	Hydrologic Restoration	98	No potential impacts by NER RP restoration and protection measures.
ME-24	Southwest LA Gulf Shoreline Nourishment and Protection (Transferred)	Shoreline Protection	888	NER RP shoreline protection measure 6b3 would provide secondary benefits for the ME-24 CWPPRA project by installing a lightweight aggregate core breakwater field, which would protection it from wind-driven wave erosion from the Gulf of Mexico.
ME-31	Freshwater Bayou Marsh Creation	Marsh Creation	279	No potential impacts of NER RP measure 127c3 because this CWPPRA project has not been authorized for construction.
TV-03	Vermilion River Cutoff Bank Protection	Shoreline Protection	65	No potential impacts by NER RP restoration and protection measures.
TV-09	Boston Canal/Vermilion Bay Bank Protection	Shoreline Protection, Vegetative Planting	378	No potential impacts by NER RP restoration and protection measures.
TV-11b	Freshwater Bayou Bank Stabilization - Belle Isle Canal to Lock (Inactive)	Shoreline Stabilization	241	NER RP 16b would construct a foreshore rock dike along a reach proposed by CWPPRA TV-11b, which has not been constructed. If TV-11b is constructed, the NER RP 16b reach of shoreline protection would not be required under TV-11b.
TV-12	Little Vermilion Bay Sediment Trapping	Shoreline Protection, Sediment Trapping	441	No potential impacts by NER RP restoration and protection measures.
TV-13a	Oaks/Avery Canal Hydrologic Restoration, Increment 1	Hydrologic Restoration	160	No potential impacts by NER RP restoration and protection measures.
TV-16	Cheniere Au Tigre Sediment Trapping Demonstration	Demonstration, Sediment and Nutrient Trapping	0	No potential impacts by NER RP restoration and protection measures.
TV-17	Lake Portage Land Bridge	Shoreline Protection	24	No potential impacts by NER RP restoration and protection measures.
TV-18	Four Mile Canal Terracing and Sediment Trapping	Sediment and Nutrient Trapping	167	No potential impacts by NER RP restoration and protection measures.
TV-63	Cole's Bayou Marsh Restoration	Hydrologic Restoration, Marsh Creation	398	No potential impacts by NER RP restoration and protection measures.

- Project CS-59 (Oyster Bayou Marsh Creation and Terracing) would be indirectly impacted by construction of marsh restoration NER RP measure 124c (**Figure 6**). Project CS-054 (Cameron-Creole Watershed Grand Bayou Marsh Creation) would be indirectly impacted by construction of marsh restoration NER RP measure 3c1 (**Figure 7**). Project CS-59 is on Priority Project List 20 with Phase 1 funding approval for engineering and design work to restore 609 acres and nourish about 7 acres of brackish marsh. Project CS-54 is on Project Priority List 21 with specific goals to create 510 acres of saline marsh, nourish 90 acres of existing saline marsh; create 17,500 linear feet of terraces; and, reduce wave/wake erosion. When overlap occurs, proposed NER RP measures would be constructed to avoid existing coastal restoration projects. This would generally include construction of temporary containment/exclusion dikes to contain dredged borrow sediments used for construction of the NER RP measure and also prevent dredged effluents from entering the existing coastal restoration project sites. Temporary containment/exclusion dikes would degrade naturally to restore connectivity with surrounding areas or would be degraded at three years after construction has been completed.

  - NER RP shoreline protection measure 5a (Holly Beach Shoreline Stabilization-Breakwaters) would be located immediately offshore of the projects CS-31 (Holly Beach Sand Management) and CS 33 (Cameron Parish Shoreline) indirectly benefiting these existing projects by providing shoreline protection and stabilization from high energy Gulf wave erosion.
  - Inactive project TV-11B could be impacted by NER RP marsh restoration measure 3c1 if constructed.
- The Louisiana Coastal Area (LCA), Ecosystem Restoration Study (2004 USACE) recommends 15 near-tern measures aimed at addressing the critical restoration needs. The components recommended for authorization include five critical near-term ecosystem restoration measures, a demonstration program consisting of a series of demonstration projects, a beneficial use of dredged material (BUDMAT) program, and a science and technology program. The five critical near-term ecosystem restoration measures, demonstration projects, and BUDMAT projects are all subject to the approval of feasibility level of detail decision documents by the Secretary of the Army. The January 31, 2005 Chief's Report approved the Near-Term Plan substantially in accordance with the 2004 LCA Study. Title VII of the Water Resources Development Act of 2007 (WRDA 2007) (Public Law 110-114) authorized an ecosystem restoration Program for the Louisiana Coastal Area substantially in accordance with the Near-Term Plan.
  - The Chenier Plain Freshwater Management and Allocation Reassessment Study (Chenier Plain Study), recommended in the 2005 Chief's Report was one of six large-scale restoration concepts that were purported to have the ability to "significantly restore environmental conditions that existed prior to large-scale alteration of the natural ecosystem" upon construction. Guidance provided by the Director of Civil Works on December 19, 2008 states that "the coastal restoration components proposed as part of the LCA Chenier Plain study will be evaluated as part of the Southwest Coastal Louisiana feasibility study". Although several of these projects have been authorized for construction, there is presently no willing local non-Federal Sponsor. Consequently, the authorized projects without an identified local non-Federal Sponsor are not considered reasonably foreseeable and are therefore not considered part of either the No Action Alternative (future without project conditions [FWOP]) or the future with project conditions. Nevertheless, the LCA Program is mentioned here since there is some potential that a willing local non-Federal Sponsor may be determined and these projects could therefore become part of the cumulative impacts assessment under the FWOP and future with project conditions.
  - The CEMVN and its local non-Federal Sponsor, Plaquemines Parish, recently completed the 44-acre West Bay Marsh Creation Tier 1 project, part of the LCA's Beneficial Use of Dredged Material (BUDMAT) Program.
  - BUDMAT project (Environmental Assessment #535). Plaquemines Parish is also the non-Federal Sponsor for two additional LCA BUDMAT projects: Ridge Restoration at Tiger Pass, and Restoration of Cat Island. These two projects are still in the study phase.
- An ongoing effort by CPRAB is development of the 2012 Louisiana's Comprehensive Master Plan for a Sustainable Coast (source: http://issuu.com/coastalmasterplan/docs/coastal_master_plan-v2?e=3722998/2447530; accessed November 23, 2015). However, the unauthorized and unfunded conceptual projects are not reasonably foreseeable under the FWOP conditions or the future with project conditions. Nevertheless, the Louisiana State Master Plan is mentioned here since there is some potential that these projects would become funded and therefore considered as part of a cumulative impacts assessment under the FWOP and future with project conditions. The 2012 State Master Plan indicates that the CPRAB has, since 2007:
  - Built or improved 159 miles of levees
  - Benefited 19,405 acres of coastal habitat
  - Secured approximately $17 billion in state and Federal funding for protection and restoration projects

- Identified and used dozens of different Federal, state, local and private funding sources of projects
- Moved over 150 projects into design and construction
- Constructed projects in 20 parishes
- Constructed 32 miles of barrier islands/berms
- The 2012 State Master Plan developed and evaluated a total of 397 projects, with each project having its own timeline and budget, including:
  - 248 restoration projects,
  - 33 structural risk reduction (protection) projects, and
  - 116 conceptual nonstructural flood risk reduction projects
- The 2012 State Master Plan developed a total of 42 projects for the southwest coast, with 36 projects to be constructed in the 1st Implementation Period (2012 -2032) including: 5 bank stabilization, 11 hydrologic restoration, 8 marsh creation, 4 ridge restoration, 6 shoreline protection, and 1 each structural protection and multiple protection measure; a total of 6 projects would be constructed in the 2nd Implementation Period (2032-2051) including: 2 each marsh creation and shoreline protection, and 1 each ridge restoration and multiple protection measures.
- However, the Tulane Institute on Water Resources Law & Policy 2014 Issue Paper "Turning Coastal Restoration and Protection Plans Into Realities: The Cost of Comprehensive Coastal Restoration and Protection" indicates that the 2012 State Master Plan has not come to terms with the true costs of saving coastal Louisiana and how to finance it:

  > *…the cost of implementing those measures will exceed the $50 billion figure set forth in the Plan, in all likelihood by a factor of at least two. When one includes the anticipated costs of the Urban Water Plan, federal flood protection, and other factors excluded from the 2012 Master Plan, the cost of restoring this coast and protecting its people can be expected to exceed $100 billion over 50 years.30 The reasons for this lie primarily in the 2012 Master Plan's use of 2010 dollars instead of inflation adjusted dollars and the exclusion of a range of projects and programs from the Plan's cost estimates. The use of present value dollars in the 2012 Master Plan and the Urban Water Plan was neither hidden nor inappropriate as a methodology, and no criticism of that methodology is intended. However, when looking forward to the challenge of financing everything that is planned and necessary, a more comprehensive approach must be used. The value of keeping this coast ecologically and economically in business has been repeatedly demonstrated to be immense and well in excess of the adjusted price of the 2012 Master Plan. The price of putting the pieces of coastal Louisiana and the Gulf Coast back together after Hurricanes Katrina and Rita alone approached $100 billion. Knowing what is at stake and coming to terms with the true costs of saving coastal Louisiana are prerequisites for a robust civic conversation about how best to finance it. It will require engagement at the local, state, and national levels from a broad range of public and private stakeholders, and answers will not come easily.*

- Restoration of injuries to natural resources damaged by the 2010 Deepwater Horizon oil spill:
  - The Natural Resource Damage Assessment (NRDA) is a legal process under the Oil Pollution Act of 1990 (OPA) and the Louisiana Oil Spill Prevention and Response Act of 1991 (LOSPRA) whereby designated trustees represent the public to ensure that natural resources injured in an oil spill are restored (source: http://la-dwh.com/AboutNRDA.aspx; accessed November 25, 2015). Both federal and state NRDA regulations provide a step-by-step process for trustees to determine injuries, to assess damages, and to develop and implement restoration projects that compensate the public for injuries to natural resources impacted by an incident. In general, the NRDA process involves three steps: (1) pre-assessment; (2) restoration planning; and (3) restoration implementation.
  - On July 11, 2011, Governor Bobby Jindal unveiled the "Louisiana Plan" which outlines 13 initial proposed early restoration projects (source: http://la-dwh.com/LouisianaPlanProjects.aspx; accessed November 25, 2015). The proposed projects

come in many forms including marsh restoration, barrier island restoration, shoreline projection measures, resource-specific projects, and projects aimed at addressing impacts to our citizens' ability to use Louisiana's natural resources. The projects are consistent with Louisiana's Coastal Master Plan; they are consistent with the criteria outlined in the early restoration framework agreement and applicable regulations; and they support the goal of compensating the public for natural resource injuries resulting from the Deepwater Horizon Oil Spill (**Table 6**).

Table 6. "Louisiana Plan" proposed early restoration projects

Project Name	Approximate Cost ($)
Oyster Reestablishment Program (Louisiana Oyster Cultch Project)	$15 M
Saltwater Hatchery	$48 M
Shell Island - Larger Lobe	$110 M
Chandeleur Islands Restoration	$65 M
Biloxi Marsh Shoreline Protection Phase 2	$45 M
Lake Hermitage Additional Increment - (Lake Hermitage Marsh Creation – NRDA Early Restoration Project)	$13.9 M
Grand Liard Marsh & Ridge Restoration	$31.3 M
Cheniere Ronquille Barrier Island Restoration	$44 M
Bay Side Segmented Breakwater at Grand Isle	$3.3 M
West Grand Terre Beach	$9 M
West Grand Terre Stabilization	$3 M
Barataria Basin Barrier Shoreline Restoration - Caminada Headland	$75 M
Maintain Land bridge between Caillou Lake and Gulf of Mexico	$71 M

- On October 5, 2015, the Deepwater Horizon Natural Resource Damage Assessment Trustees released the Deepwater Horizon Oil Spill Draft Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (PDARP/PEIS) for public review and comment (source: http://la-dwh.com/PDARP_PEIS/Draft_PDARP_PEIS.aspx; accessed November 25, 2015). The Trustees identified Alternative A as their preferred alternative. Alternative A (described in Section 5.5) is an integrated restoration portfolio that emphasizes the broad ecosystem benefits that can be realized through coastal habitat restoration in combination with resource-specific restoration in the ecologically interconnected northern Gulf of Mexico ecosystem. **Table 7** is a copy of Table 5.10-1 from the PDARP/PEIS, and shows the Trustees' allocations by goal and restoration type (rows) and restoration area (columns). This table also highlights where investments have already been made through the Trustees' Early Restoration efforts (source: http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/Chapter-5_Restoring-Natural-Resources1.pdf; accessed November 25, 2015). Under the PDARP/PEIS, the State of Louisiana would receive $5 billion of the total $8.1 billion restoration funding allocation for the Early Restoration work. Due to the large proportion of the wetlands and coastal and nearshore habitat funding allocated to Louisiana, wetland projects identified in the Louisiana Master Plan were used to evaluate the potential magnitude of benefits achievable here. However, as described in Section 5.5.2 of the PDARP/PEIS, the restoration dollars could be used for a variety of restoration approaches. For illustration purposes only, the approximately $4 billion allocated to Louisiana for this restoration type could be sufficient to create 20,000 to 40,000 acres of coastal marsh in Louisiana (LA Master Plan) along hundreds of miles of shoreline, supporting the diversity of fish, birds, and animals that depend on coastal marsh.

- The EPA, reporting on the Nation, states the number of restoration projects grows yearly. Current Federal initiatives call for a wide range of restoration actions, including improving or restoring 25,000 miles of stream corridor; achieving a net increase of 100,000 acres of wetlands each year and establishing two million miles of conservation buffers (source: http://water.epa.gov/type/wetlands/restore/principles.cfm; accessed March 12, 2015).

Table 7. Settlement of NRD claims and final allocations (source: http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/Chapter-5_Restoring-Natural-Resources1.pdf; accessed November 25, 2015).

Major Restoration Categories	Unknown Conditions	Regionwide	Open Ocean	Alabama	Florida	Louisiana	Mississippi	Texas	Total Restoration Funding*
1. Restore and Conserve Habitat									
Wetlands, Coastal, and Nearshore Habitats				65,000,000	5,000,000	4,009,062,700	55,500,000	100,000,000	4,234,562,700
Habitat Projects on Federally Managed Lands				3,000,000	17,500,000	50,000,000	5,000,000		75,500,000
Early Restoration (through Phase IV)				28,110,000	15,629,367	259,625,700	80,000,000		383,365,067
2. Restore Water Quality									
Nutrient Reduction (Nonpoint Source)				5,000,000	35,000,000	20,000,000	27,500,000	22,500,000	110,000,000
Water Quality (e.g., Stormwater Treatments, Hydrologic Restoration, Reduction of Sedimentation, etc.)					300,000,000				300,000,000
3. Replenish and Protect Living Coastal and Marine Resources									
Fish and Water Column Invertebrates			380,000,000						380,000,000
Early Restoration Fish and Water Column Invertebrates			20,000,000						20,000,000
Sturgeon			15,000,000						15,000,000
Sea Turtles		60,000,000	55,000,000	5,500,000	20,000,000	10,000,000	5,000,000	7,500,000	163,000,000
Early Restoration Turtles		29,256,165						19,965,000	49,221,165
Submerged Aquatic Vegetation						22,000,000			22,000,000
Marine Mammals		19,000,000	55,000,000	5,000,000	5,000,000	50,000,000	10,000,000		144,000,000
Birds		70,400,000	70,000,000	30,000,000	40,000,000	148,500,000	25,000,000	20,000,000	403,900,000
Early Restoration Birds		1,823,100		145,000	2,835,000	71,937,300		20,603,770	97,344,170
Mesophotic and Deep Benthic Communities			273,300,000						273,300,000
Oysters		64,372,413		10,000,000	20,000,000	26,000,000	20,000,000	22,500,000	162,872,413
Early Restoration Oysters				3,329,000	5,370,596	14,874,300	13,600,000		37,173,896
4. Provide and Enhance Recreational Opportunities									
Provide and Enhance Recreational Opportunities				25,000,000	63,274,513	38,000,000	5,000,000		131,274,513
Early Restoration Recreational Opportunities			22,397,916	85,505,305	120,543,167	22,000,000	18,957,000	18,582,688	287,986,076
5. Monitoring, Adaptive Management, Administrative Oversight									
Monitoring and Adaptive Management		65,000,000	200,000,000	10,000,000	10,000,000	225,000,000	7,500,000	2,500,000	520,000,000
Administrative Oversight and Comprehensive Planning		40,000,000	150,000,000	20,000,000	20,000,000	33,000,000	22,500,000	4,000,000	289,500,000
Adaptive Management NRD Payment for Unknown Conditions	700,000,000								700,000,000
Total NRD Funding	$700,000,000	$349,851,678	$1,240,697,916	$295,589,305	$680,152,643	$5,000,000,000	$295,557,000	$238,151,458	

*The total restoration funding allocation for the Early Restoration work; each restoration type; and monitoring, adaptive management, and administrative oversight is $8.1 billion (plus up to an additional $700 million for adaptive management and unknown conditions).

- The NOAA Restoration Center has restored 2,812 projects nationwide and its programs provide funding and technical assistance for coastal habitat restoration projects throughout the United States and territories. In Louisiana, the Restoration Center is planning, implementing or has restored 100 projects including CWPPRA and community-based restoration projects (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015). In Southwest Coastal Louisiana, the NOAA Restoration Center has 20 restoration projects (**Table 8**):
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Table 8. NOAA Restoration Center projects in Southwest Coastal Louisiana (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015)

Project	Program	Partner	Status	Habitat
Black Bayou Hydrologic Restoration Project	CWPPRA	LDNR	completed	*2960 acres tidal wetland habitat restored *634 acres tidal wetland habitat protected

Table 8. NOAA Restoration Center projects in Southwest Coastal Louisiana (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015)

Project	Program	Partner	Status	Habitat
Cameron Meadows Marsh Creation and Terracing	CWPPRA	CPRA	implementation	tidal wetland
Cameron Shoreline Vegetation Planting Phase II	Community-based	Cameron Parish, Cheniere Energy, Gulf Coast Soil & Water Conservation Service, State Farm Insurance Co., Lonnie G. Harper and Associates, LLC, Coalition to Restore Coastal Louisiana, America's Wetlands, Restore America's Estuaries, Disney, LDNR, 143 volunteers contributed 920 hours to this project.	completed	6.5 acres of dune habitat restored by installing a sand fence and shoreline planting
Peveto Beach Sand Fencing	Community-based	Imperial Calcasieu Resource Conservation and Development Council, Inc., 48 volunteers contributed 238 hours to this project.	completed	10 acres of dune habitat restored
Peveto Sand Fencing and Vegetation Project 2	Community-based	Gulf of Mexico Foundation, Imperial Calcasieu Resource Conservation and Development Council, Inc., 12 volunteers contributed 372 hours to this project.	completed	1.72 acres of dune habitat restored
Oyster Bayou Marsh Creation	CWPPRA	Office of Coastal Protection and Restoration (LA OCPR), CPRA	implementation	tidal wetland
Bayou Verdine CERCLA –Sabine 1999 Unit Hydrologic Restoration and Marsh Creation	DARRP	Contributed to this project	completed	Create 14.7 acres of marsh in open water areas. Additionally, a 260-acre area of marsh and shallow mud flats will be restored to tidal hydrology
Cameron-Creole Watershed Mottled Duck Research and Terracing Project	Community-based	National Fish and Wildlife Foundation, Ducks Unlimited, Miami Corporation, Black Lake Land and Oil, LLC, British Petroleum (BP) America, Louisiana Department of Natural Resources	completed	Ducks Unlimited is working to construct 70,000 linear feet of earthen terraces benefiting 900 acres of fisheries habitat located in the Cameron-Creole Watershed in southwest Louisiana. 530 acres of tidal wetland habitat restored and

Table 8. NOAA Restoration Center projects in Southwest Coastal Louisiana (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015)

Project	Program	Partner	Status	Habitat
				100 acres of tidal wetland habitat restored
Bio-Engineered Oyster Reef Demonstration	CWPPRA	CPRA, LDNR	implementation	The demonstration project consisted of an Oysterbreak, approximately 1000 feet long to provide oyster reef/shell bottom
Rockefeller Refuge Gulf Shoreline Stabilization Project	CWPPRA	LDNR	implementation	the construction of a continuous rock breakwater extending approximately 50,691 feet from the west bank of Joseph Harbor to the east bank of Beach Prong to protect tidal wetlands
Pecan Island Terrace Creation Project	CWPPRA	LDNR	completed	constructed 198,400 linear feet of adjacent terrace cells; 425 acres of soft bottom mud/sand habitat restored 145 acres of tidal wetland habitat restored
Christian Marsh Terracing Project	Community-based	Coalition to Restore Coastal Louisiana, Randy Moertle and Associates, CPRA, McIlhenney Corporation, Restore America's Estuaries, Louisiana State University, Vermilion Corporation, Cargill, Incorporated, COYPU Foundation, Vermilion Soil and Water Conservation District, National Audubon Society, 87 volunteers contributed 696 hours to this project	Completed	Created over 25,000 linear feet of terraces, enhancing and protecting an additional 300 acres of adjacent marsh.
Louisiana Acadiana Bay Oyster Reef Construction and Gulf-wide Oyster Planning	Community-based	State of Louisiana, Louisiana State University Agriculture Extension Service, National Fish and Wildlife Foundation, The Nature Conservancy	Completed	installed ~670 linear feet of bioengineered oyster reef along the coastal shoreline of the Paul J. Rainey Wildlife Sanctuary in Vermilion Bay in southwest Louisiana; 0.15 acres of oyster/shell bottom habitat restored
Vermilion Bay Oyster Reef Restoration and Shoreline Protection	Community-based	LDWF, Louisiana Wetlands Association, 30 volunteers contributed 200 hours	Completed	This project implemented the first large-scale shell recycling program in Louisiana. A 600-foot oyster reef was constructed, which protected the adjacent shoreline, renewed oyster productivity

Table 8. NOAA Restoration Center projects in Southwest Coastal Louisiana (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015)

Project	Program	Partner	Status	Habitat
				in the bay, and benefited marine habitat.
Coles Bayou Marsh Restoration	CWPPRA	Office of Coastal Protection and Restoration (LA OCPR), Louisiana Coastal Protection and Restoration Authority	Planning	Objective of this project is to create and nourish brackish marsh and improve hydrology in order to increase freshwater and sediment inflow into the interior wetlands, the latter through culvert installation.
Little Vermilion Bay Sediment Trapping Project	CWPPRA	LDNR	Completed	390 acres of tidal wetland habitat restored 51 acres of tidal wetland habitat protected
McIlhenney Planting Program- Little White Lake	Community-based	Louisiana State Agricultural Center, McIlhenney Corporation, Randy Moertle and Associates, Boy Scouts of America, Coalition to Restore Coastal Louisiana, 91 volunteers contributed 910 hours to this project.	Completed	5 acres of tidal wetland habitat restored
Four Mile Canal Terracing and Sediment Trapping	CWPPRA	LDNR	Completed	214 acres of tidal wetland habitat restored 113 acres of tidal wetland habitat protected
Rainey Wildlife Sanctuary Terrace Project	Community-based	LDNR, Coalition to Restore Coastal Louisiana, 20 volunteers contributed 400 hours to this project	Completed	640 acres of tidal wetland habitat restored
M/V Formosa Six	DARRP	LDNR, LDWF, National Fish and Wildlife Foundation, LDEQ, NRCS	Completed	142 acres of tidal wetland habitat restored

- Some other large scale ecosystem restoration projects affecting coastal waters of the United States include the following:
    - The CALFED Environmental Restoration Program, approved by the California state legislature in fall 2000, has been successfully acquiring and protecting important lands in the Delta and along its tributaries. To date, more than 130,000 acres of habitat targeted for species of import to the Delta have been enhanced, protected and restored, mostly through easements obtained by working with local land owners and communities (source: http://calwater.ca.gov/calfed/objectives/ecosystem_restoration.html#EcoHistory; accessed December 2, 2015).
    - The Chesapeake Bay Program is a unique regional partnership that has led and directed the restoration of the Chesapeake Bay since 1983. The Chesapeake Bay Program partners include

the states of Maryland, Pennsylvania and Virginia; the District of Columbia; the Chesapeake Bay Commission, a tri-state legislative body; the Environmental Protection Agency, representing the federal government; and participating citizen advisory groups (source: http://www.chesapeakebay.net/about; accessed December 2, 2015)

- The Comprehensive Everglades Restoration Program (CERP), provides a framework and guide to restore, protect and preserve the water resources of central and southern Florida, including the Everglades. It covers 16 counties over an 18,000-square-mile area and centers on an update of the Central & Southern Florida (C&SF) Project also known as the Restudy (source: http://141.232.10.32/about/about_cerp_brief.aspx; accessed December 2, 2015).
- The Mississippi Coastal Improvements Program Comprehensive Plan (MsCIP) is a system wide approach linking structural and nonstructural hurricane and storm damage risk reduction with ecosystem restoration with the goal of providing a coastal community more resilient to hurricanes and storms (source: http://www.sam.usace.army.mil/Portals/46/docs/program_management/mscip/docs/MSCIP%20Chief%20Report.pdf; accessed December 2, 2015).
- The Coastal Texas Protection and Restoration Project a comprehensive plan to determine the feasibility of carrying out projects for flood damage reduction, hurricane and storm damage reduction, and ecosystem restoration in the coastal areas of the State of Texas (source: http://www.swg.usace.army.mil/Portals/26/docs/PAO/0827%20Hou-Galv%20Coastal%20TX%20Public%20mtg%20August%2027%202014.pdf; accessed December 2, 2015).

- The Cameron Parish Master Plan for Coastal Restoration & Protection identifies a total of 253 priority projects including: 150 hydrologic restoration, 17 beneficial use/marsh creation, 2 oyster reef preservation projects, 9 shoreline/embankment maintenance projects, and 75 canal maintenance projects. The intent is to have the parish projects looked at in a holistic way to be considered for the 2017 State Master Plan. These conceptual projects are not authorized or funded for construction and are therefore not considered reasonably foreseeable in the FWOP or future with project conditions. They are included at the request of Cameron Parish.
- Calcasieu Parish's priority project is the Rabbit Island Project and then the entire Cameron Parish Project list at this time. Calcasieu Parish believes that protecting Cameron Parish will protect Calcasieu Parish. Calcasieu Parish anticipates updating their coastal plan which will include a priority projects list. Those projects will be viable projects for consideration of funding for protecting Lake Charles to the 500 year level of protection as deemed necessary by the Coastal Master Plan for Louisiana 2012. These conceptual projects are not authorized or funded for construction and are therefore not considered reasonably foreseeable in the FWOP or future with project conditions. They are included at the request of Cameron Parish.
- The Vermilion Parish Coastal Priority Project list identifies a total of 42 priority projects including: 10 hurricane protection projects, 17 shoreline protection and bank stabilization projects, 6 marsh creation projects, 7 hydrologic restoration projects, and 2 ridge restoration projects. These conceptual projects are not authorized or funded for construction and are therefore not considered reasonably foreseeable in the FWOP or future with project conditions. They are included at the request of Vermilion Parish.
- Other Gulf shore protection and restoration projects have been constructed along the Gulf shoreline through other funding sources. Segmented breakwaters have been constructed under at least two separate projects to the west of the proposed Holly Beach Shoreline Stabilization (5a) measure. The proposed breakwater would provide shoreline protection from the eastern end of the existing breakwaters eastward to the Calcasieu Pass jetty and compliment that existing project. The shoreline where the proposed Holly Beach measure would be built has been nourished with material dredged from the bottom of the Gulf of Mexico to help ensure that shoreline erosion did not compromise Louisiana Highways 27/82. Rock and riprap have also been placed at critical locations where shoreline erosion has threatened the highway. The proposed Holly Beach measure is compatible with and would augment these prior efforts. There have been proposals to construct shore protection measures along

the Gulf where the proposed Gulf shoreline restoration [Calcasieu River to Freshwater Bayou (6b1, 6b2, and 6b3)] measures are located, but no projects have been built.

The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse cumulative impacts to aquatic and terrestrial organisms and their habitats.

h. Determination of Secondary Effects on the Aquatic Ecosystem

Secondary or indirect effects are effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. The NER RP 35 chenier reforestation measures would have no secondary effects on the aquatic ecosystem. In addition to secondary effects described above, there would be long-term losses of shallow open water habitats in the Southwest Coastal Louisiana project area due to construction of NER RP marsh restoration and shoreline protection measures. However, there is an abundance of shallow open water habitat throughout the Southwest Coastal Louisiana project area for use by aquatic organisms and other users. **Table 5** summarizes the direct and secondary (indirect) effects of NER RP measures on existing coastal restoration projects in Calcasieu, Cameron and Vermilion Parishes.

NER RP Measures 124d and 3c1 would be partially located on USFWS properties and are therefore recommended for construction by the USFWS.

Projects CS-59 would be potentially indirectly impacted by construction of marsh restoration NER RP measure 124c. Project CS-054 would be potentially indirectly impacted by construction of marsh restoration NER RP measure 3c1. The NER RP measures would be constructed immediately adjacent and surrounding the existing coastal restoration projects. However, when overlap occurs, proposed NER RP measures would be constructed to avoid existing coastal restoration projects by construction of temporary containment/exclusion dikes to contain dredged borrow sediments used for construction of the NER RP measure and also prevent dredged effluents from entering the existing coastal restoration project sites. Inactive project TV-11B could be impacted by NER RP marsh restoration measure if reactivated.

In addition, existing mitigation projects are also located within areas proposed for restoration under the NER RP. **Figure 8** and **Table 4** contains information about mitigation projects that occur within the NER RP project area. In most instances, these mitigation projects were developed to provide a sustainable buffer from wave action and storm surge generated by tropical storms and hurricanes. When overlap occurs, proposed NER RP measures would not be constructed until the mitigation projects satisfy their permitted obligations.

The nourishment, restoration and protection of degraded marsh and shallow open water to transitional estuarine coastal marsh habitats would indirectly benefit plankton, benthic, nekton and wildlife resources by providing increased dissolved organic compounds and detritus that would, in turn, provide food and energy resources for benthic organisms and the aquatic food web. This would eventually increase local epifauna which, in turn, would help reduce turbidity, regenerate ammonia and phosphorous, and serve as important sources of food for birds, nekton, and people. An increase in the export of dissolved organic compounds and detritus from the restored, nourished and protected marsh habitats would benefit local plankton populations by increasing the planktonic food web. Some local plankton populations would be displaced to other shallow open water areas, of which there are an increasing abundance due to the extensive coastal land loss. Also as described above, the NER RP would provide and protect important, essential and in some instances critical habitats used by various terrestrial and aquatic organisms for shelter, nesting, feeding, roosting, cover, nursery, EFH and other life requirements would likely lead to localized increase in productivity. Furthermore, implementing the NER RP measures would further complement, sustain and protect existing coastal restoration projects, mitigation and USFWS properties. There could also be localized increases in recreational and commercial fisheries due to the increased areal extent of transitional estuarine EFH. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse secondary impacts to aquatic and terrestrial organisms and their habitats.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation

No significant adaptations of the guidelines were made relative to this evaluation.

b. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impacts on the Aquatic Ecosystem

The discharge represents the least environmentally damaging practicable alternative. The proposed action consists of measures to minimize the adverse effects of coastal marsh and shoreline land loss. This would include the discharge for hydraulic placement of borrow sediments for marsh restoration measures and the placement of geotextile fabric and rock for shoreline stabilization and protection.

c. Compliance with Applicable State Water Quality Standards

The material released during dredging and disposal operations are not expected to exceed Louisiana Water Quality Standards.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act

The proposed action does not appear to violate effluent standards prohibited under Section 307 of the Clean Water Act.

e. Compliance with the Endangered Species Act of 1973

The proposed action is compliant with the Endangered Species Act of 1973, as amended. The proposed action would not significantly affect endangered or threatened species or their critical habitats.

f. Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972

The proposed action is compliant with specified protection measures for marine sanctuaries designated by the Marine Protection, Research, and Sanctuaries Act of 1972. All marsh restoration disposal sites and effects are located in inland waters. Some of the shoreline protection measures would be located in the Gulf of Mexico near shore area to protect barrier shorelines. However, no effects would occur to marine sanctuaries in the Gulf of Mexico.

g. Evaluation of Extent of Degradation of the Waters of the United States

(1) Significant Adverse Effects on Human Health and Welfare

(a) Municipal and Private Water Supplies.

The proposed action would not cause or contribute to significant degradation of waters of the United States including adverse effects on municipal and private water supplies. Rather, the proposed action would protect and restore marsh wetland which would improve water quality filtering water and trapping sediments and retaining excess nutrients and other pollutants such as heavy metals. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to municipal and private water supplies.

(b) Recreational and Commercial Fisheries.

Dredging and discharge of sediments for marsh restoration and placement of geotextile and rock for shoreline protection would result in a loss of benthic prey items and availability of open water habitat. Temporary and localized increases in turbidity, total suspended sediments, and water temperatures and decreases in dissolved oxygen would return to pre-construction conditions following completion of construction. Following construction, temporary containment/exclusion dikes would naturally degrade or would be degraded at three years following construction, if necessary, to re-establish connectivity with surrounding waters thereby providing access for recreational and commercial fish species. Both recreational and commercial fishery catch

would likely return to pre-construction conditions or show improvements due to the restoration and protection of marsh. Shoreline protection measures would provide protection to marsh from erosive tidal and wind driven waves thereby protecting restored and other valuable intertidal estuarine marsh habitats utilized by many aquatic species for shelter, nesting, feeding, cover, nursery, and other life requirements. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to recreational and commercial fisheries.

(c) Plankton.

Effects on plankton would be temporary, localized and expected to occur primarily during construction of the nine marsh restoration measures and five shoreline protection measures. Adverse effects would be primarily related to increased turbidity and total suspended sediments, increased water temperatures and decreased dissolved oxygen. Following construction these temporary effects would diminish and conditions would return to those observed prior to construction. Bacterioplankton would resume consuming organic materials, which would increase in availability due to restored and protected marshes. Zooplankton, or animal plankton would continue to feed on other plankton and other organisms. The protected and restored marsh areas would be expected to increase the local ecosystem health. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to plankton.

(d) Fish.

Effects on fish during construction of the nine marsh restoration measures and five shoreline protection measures would result in the temporary displacement of fish during dredging and placement and other construction activities due to increased turbidity and total suspended sediments, localized increase in water temperatures and decrease dissolved oxygen. Following construction, these temporary conditions would diminish and the area would return to conditions similar to those observed prior to construction. Following construction, temporary containment/exclusion dikes would naturally degrade or would be degraded at three years following construction, if necessary, to re-establish connectivity with surrounding waters thereby providing access for fish. The proposed action is expected to restore and protect marsh EFH and areas of inter-tidal emergent vegetation, which provide an array of foraging, breeding, spawning, and cover habitat for a variety of adult and juvenile fishes. The protected and restored marsh areas would be expected to increase local ecosystem health. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to fish.

(e) Shellfish.

Shrimp and crab are the primary shellfish inhabiting the Study Area. Effects of the nine marsh restoration measures and five shoreline protection measures on sessile shellfish species would be similar to those described above for benthic organisms. Effects on more mobile shellfish (e.g. shrimp and crabs) would be similar to those described above for fish. Following construction, temporary containment/exclusion dikes would naturally degrade or would be degraded at three years following construction to re-establish connectivity with surrounding waters thereby providing access for shellfish. The proposed action is expected to restore and preserve marsh that provide an array of foraging, breeding, and cover habitat for a variety of shellfish. The protected and restored marsh areas would be expected to increase local ecosystem health. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to shellfish.

(f) Wildlife.

The nine marsh restoration measures and five shoreline protection measures would, as described above, restore and protect valuable intertidal estuarine marsh and shoreline habitats utilized by an array of birds, mammals and reptiles for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to wildlife.

(g) Special Aquatic Sites.

Some existing special aquatic sites would be significantly and permanently positively affected, as described above, by marsh restoration and nourishment of nine marsh restoration measures and five shoreline protection measures. These include: sanctuaries and refuges, including existing coastal restoration projects CS-54 and CS-59, portions of Sabine NWR and Cameron Prairie NWR, existing mitigation projects (**Table 4**), wetlands, mud flats, and vegetated shallows, threatened and endangered species, and other wildlife. The proposed action would have no effects or impacts on coral reefs or riffle and pool complexes. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to special aquatic sites.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems.

The proposed action would not cause or contribute to significant degradation of waters of the United States including adverse effects on life stages of organisms dependent on the aquatic ecosystems. The proposed action is expected to restore and preserve marsh and areas of inter-tidal emergent vegetation, which provide an array of foraging, breeding, spawning, and cover habitat for a variety of adult and juvenile fishes, birds, mammals, and reptiles. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity and Stability.

The proposed action would not cause or contribute to significant degradation of waters of the United States including adverse effects on ecosystem diversity, productivity and stability. The proposed action would restore and protect marsh and areas of inter-tidal emergent vegetation, thereby restoring and protecting diversity, productivity, and stability of the Southwest Coastal Louisiana Study Area. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts on aquatic ecosystem diversity, productivity and stability.

(4) Significant Adverse Effects on Recreational, Aesthetic, and Economic Resources.

The proposed action would not cause or contribute to significant degradation of waters of the United States including adverse effects on recreational, aesthetic, and economic resources. The proposed action would restore and preserve marsh and areas of inter-tidal emergent vegetation, thereby providing and protecting marsh wetland areas that contribute to recreational, aesthetic, and economic benefits. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts on recreational, aesthetic, and economic resources.

h. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem

Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharges on the aquatic ecosystem. Substrate at the shallow open-water disposal sites are similar to dredged material that would be discharged during marsh restoration. Dredged material discharged at marsh restoration sites would be confined by earthen retention dikes, existing marsh or other natural measures, and the existing shorelines and the five shoreline protection measures to reduce migration of fill into the Gulf of Mexico and other adjacent waterways. Dredged material would be discharged at the nine marsh restoration sites to elevations conducive to marsh development. Construction activities at the dredge borrow areas, the nine marsh restoration sites and the five shoreline protection sites would be conducted using the best available practical techniques and BMPs to minimize potential adverse impacts of discharges on the aquatic ecosystem.

i. On the Basis of the Guidelines, the Proposed Disposal Site(s) for the Discharge of Dredged Material (specify which) is or are (select one)

(1) Specified as complying with the requirements of these guidelines; or,

NA

(2) Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem; or,
On the basis of the guidelines, the proposed disposal sites for the discharge of dredged material comply with the requirement of these guidelines, with the inclusion of appropriate and practicable conditions to minimize pollution or adverse effects on the aquatic ecosystem.

(3) Specified as failing to comply with the requirements of these guidelines.

NA

IV. Evaluation Responsibility

a. Water Quality Input Prepared by: William P. Klein, Jr., Biologist
b. Project Description and Biological Input Prepared by: William P. Klein, Jr., Biologist

_____ _____

Date

Joan Exnicios
Chief, Environmental Planning

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(2) Specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem; or,
On the basis of the guidelines, the proposed disposal sites for the discharge of dredged material comply with the requirement of these guidelines, with the inclusion of appropriate and practicable conditions to minimize pollution or adverse effects on the aquatic ecosystem.

(3) Specified as failing to comply with the requirements of these guidelines.

NA

IV. Evaluation Responsibility

a. Water Quality Input Prepared by:

b. Project Description and Biological Input Prepared by: William P. Klein, Jr., Biologist

February 18, 2016
Date

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Chief, Environmental Planning

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SOUTHWEST COASTAL LOUISIANA INTEGRATED FINAL FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex B

Revised Louisiana Coastal Resources Program Consistency Determination

JOHN BEL EDWARDS
GOVERNOR

THOMAS F. HARRIS
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

February 26, 2016

Troy Constance
Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267
Via e-mail: Troy.G.Constance@usace.army.mil

RE: **C20160002,** Coastal Zone Consistency
New Orleans District, Corps of Engineers (COE-NOD)
Direct Federal Action
Louisiana Coastwide Authority, Southwest Coastal Louisiana Project; National Economic Development (NED) and National Ecosystem Restoration (NER) Recommended Plans,
Vermilion, Cameron and Calcasieu Parishes, Louisiana

Dear Mr. Constance:

This letter is in response to your staff's inquiries for additional information regarding our recent Coastal Zone Consistency decision (C20160002) for the Southwest Coastal (SWC), Louisiana Project; National Economic Development (NED) and National Ecosystem Restoration (NER). Recommended Plans, as described in the consistency determination filed with the Louisiana Department of Natural Resources, Office of Coastal Management (OCM) on January 5, 2016, and more fully described in the Southwest Coastal Louisiana Study Integrated Final Feasibility Report and Environmental Impact Statement.

After close coordination between your staff and OCM personnel, we can reiterate that at this feasibility phase, both the NED and the NER Recommended Plans (RPs) and plan features are generally consistent with the Louisiana Coastal Resources Program (LCRP). Because the project is at the Feasibility Study stage, detailed information about project design and construction, and the potential effects on coastal resources, has not yet been generated. Therefore OCM's concurrence with your consistency determination has been evaluated appropriately under the provisions of NOAA Federal Consistency Regulations for phased consistencies (15 CFR Part 930.37(d)).

Consistency determinations, broadly, are prepared when sufficient information has been developed to reasonably determine the consistency of the activity with the State's approved coastal management plan. The consistency determination must include a detailed description of the proposed activity and reasonably foreseeable coastal effects, and comprehensive data and information sufficient to support the consistency determination. When this level of detail is not available, the phased consistency provides for State agreement that the federal activity is consistent at that early stage of planning, while anticipating that additional information and decisions will be developed in later phases, such as Preconstruction Engineering and Design, and will be subject to further consistency review. The phased consistency affords the Corps of Engineers and the State of Louisiana the opportunity to work

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towards full consistency as project design proceeds.

As noted in our concurrence letter, each specific measure in the NER RP will have details of design and construction which must be determined before their coastal effects can be fully evaluated. Also, over the period of implementation adaptive management responses to changes in technology, varied site conditions and project performance might result in refinements to the plan measures. The phased consistency will help expedite future efforts to evaluate coastal effects and ensure compliance with the Louisiana Coastal Resources Program (LCRP).

Examples of some of the information which is incomplete at the current phase were identified for five specific plan features of the recommended plan in an electronic mail message, dated January 29, 2016, from Jeff Harris of my staff to Dr. William Klein, and have been thoroughly discussed between our organizations at the staff level. These include, but are not limited to, sediment discharge management plans, staging and pipe laydown areas, access routes and methods, booster pump locations and placement, effects on existing infrastructure, etc. A copy of the e-mail is attached for your easy reference. OCM anticipates that the final consistency determinations for Recommend Plan measures will include project information of comparable detail. In that regard, OCM will issue concurrence letters for each specific NER RP measure, following our satisfactory review of measure-specific consistency determinations along with the supporting detail that is developed during the Project Design phase.

OCM has worked with the Corps on many projects in the Louisiana coast and finds no reason for concern that would prevent implementation of the recommended plan or any feature of the plan. The New Orleans District has successfully completed numerous consistency determinations for activities in the Louisiana coastal zone; our experience suggests that the consistency requirements for later phases of this project will be achieved through the usual project development process, and will be similar in nature to that of prior Corps projects in Louisiana.

Through continued close collaboration between the USACE and OCM staffs we anticipate concurring with the full consistency determination for each of NER project features. Proceeding by way of the phased consistency determination assures that both our agencies can be successful in meeting our missions and achieving a positive outcome for Louisiana's coast.

I look forward to continuing a close collaboration between our organizations. If you have any additional questions please contact Mr. Jeff Harris of my staff.

Sincerely,

/S/ Keith Lovell
Assistant Secretary

cc: Joan Exnicios, COE-NOD
Sandra Stiles, COE-NOD
William Klein, COE-NOD

ATTACHMENT

(* Note: Latitude/longitude coordinates have been deleted for clarity)

From: Jeff Harris [mailto:Jeff.Harris@LA.GOV]
Sent: Friday, January 29, 2016 3:01 PM
To: Klein, William P Jr MVN <William.P.Klein.Jr@usace.army.mil>
Subject: [EXTERNAL] RE: C20160002 LCA Southwest Coastal Louisiana (UNCLASSIFIED)

Bill--

I've done a preliminary review of the three of the NER RD measures, 3a1, 3c1, and 47a1, and 47a2 and 47c1 will largely be similar to 47a1. I've identified some concerns, mostly due to lack of detail in the proposed plans, and I wanted to give you as much time as possible to review and address them. Rather than dumping all of it on you on Feb. 11.

I want to stress that this is preliminary. The comments below are, literally, my review notes.

Look them over and we can discuss next week.

Have a great weekend,

--Jeff

3a1 Beneficial Use of Dredged Material from Calcasieu Ship Channel
▫ Disposal dikes along shoreline: located on wetlands? Impacts? Need description or cross section showing relationship.
▫ Need plats & description of staging areas, discharge pipe laydown areas.
▫ Booster pump locations are vague. Propose to —minimizel wetland impacts also vague.
▫ Existing internal dike located at approx. * : How will it be dealt with, within the disposal area? How will the new & existing dike intersection be constructed? Description or plat needed.
▫ Access to disposal area: across GIWW bankline, or at weir at approx. * ? Impacts? Restored?
▫ Access of clamshell dredge: across shoreline? Impacts? Restored?
▫ Pg B-73, Guideline 3.8: For all NER RD, beach crossings will be restored to at least preproject conditions. Good

3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel
▫ "Navigation traffic is not anticipated to be impacted." What measures will be taken so boats can cross the pipeline, in Calcasieu Lake and along the back dike canal?
▫ Access to disposal area: across shoreline, or at the weirs at approx. * ? Impacts? Restored?
▫ Access of clamshell dredge: across shoreline? Impacts? Restored?
▫ Need plats & description of staging areas, discharge pipe laydown areas.
▫ Confirm that no dredging is anticipated to be necessary for moving booster pumps to their proposed locations. Oyster impacts.
▫ Pg B-73, Guideline 3.8: For all NER RD, beach crossings will be restored to at least preproject conditions. Good

47a1 Marsh Restoration Using Dredged Material South of Highway 82
▫ The disposal area has complex internal geography. Sediment discharge management plans?
▫ Need plats & description of staging areas, discharge pipe laydown areas.
▫ Oil field access road within the disposal area at approx. * . How will the containment dikes impact this road? How will sediment be conveyed across it? How will it be kept clear?

▫ At least 12 active or inactive oil and gas wells are located within the disposal area. How will access to these be maintained? Does it need to be maintained for P&A'ed wells?
▫ Canal dredging "not anticipated." 2013 aerials show channel to be narrow, partially filled. Alternate plans?
▫ There are at least three pipeline crossings along the proposed access route, at approx. * ; and one road crossing at approx. * . Will this require changes to the access plans?
▫ Borrow area wave refraction: No study until PED stage? Potential beach erosion?
▫ Pg K-9 refers to typical cross section of borrow area in Annex A; no cross section present.
▫ Pg B-73, Guideline 3.8: For all NER RD, beach crossings will be restored to at least preproject conditions. Good

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NEW ORLEANS DISTRICT
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

January 5, 2016

Regional Planning and Environment
Division South
Environmental Planning Branch

Mr. Keith Lovell
Interagency Affairs – LADNR
Field Services Division
P.O. Box 44487, Capital Station
Baton Rouge, LA 70804-4487

Dear Mr. Lovell:

Reference your letters dated June 30, 2014, and June 2, 2015 regarding Consistency Zone Consistency #C20150064 for the Southwest Coastal Louisiana project. As noted in these letters, at the programmatic level, this project was considered consistent with the Louisiana Coastal Resources Program by the LADNR. However, these letters notified us that as more detailed information is developed and planning proceeds, consistency reviews would be necessary for each of the individual elements which make up the Southwest Coastal Louisiana Project.

The attached revised consistency determination includes detailed and constructible nonstructural flood risk reduction plan features for the National Economic Development Recommended Plan (NED RP), as well as detailed and constructible ecosystem restoration plan features for the National Ecosystem Restoration Recommended Plan (NER RP) as will be presented in the Integrated Final Feasibility Study and Environmental Impact Statement. Following this updated project information, a detailed analysis of the applicable Coastal Use Guidelines for both the NED and NER RP is provided. Also included are fact sheets describing, in more detail, the NER RP features.

The primary change to the NED RP is the mandatory requirement to acquire and demolish structures located within the FEMA Regulatory Floodway has been removed. The NED RP is now entirely voluntary. The nonstructural NED RP measures include: elevating eligible residential structures; dry floodproofing eligible non-residential structures, including warehouses and industrial complexes, and; construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses.

The NER RP proposes three types of ecosystem restoration: 9 marsh restoration features; 5 shoreline protection features; and 35 chenier reforestation features. The Calcasieu Calcasieu Ship Channel Salinity Barrier feature and the Cameron-Creole

Spillway Salinity Control Structure feature are recommended for long-term study. Two marsh restoration features, located partially on U.S. Fish and Wildlife Service (USFWS) properties, are recommended for construction by the USFWS. Feature 124d Marsh Restoration at Mud Lake would be located on Sabine National Wildlife Refuge (NWR). Feature 3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel would be located on the Cameron Prairie NWR.

Many of the NER RP features would be constructed in the immediate vicinity of Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) projects. The NER RP shoreline protection Feature 5a (Holly Beach Shoreline Stabilization-Breakwaters) would be located immediately offshore of the projects CS-31 (Holly Beach Sand Management) and CS 33 (Cameron Parish Shoreline). The NER RP marsh restoration feature 124c would overlap portions of Project CS-59 (Oyster Bayou Marsh Creation and Terracing). The NER RP marsh restoration feature 3c1 would overlap portions of Project CS-054 (Cameron-Creole Watershed Grand Bayou Marsh Creation). When overlap occurs, proposed NER RP features would be constructed to avoid existing coastal restoration projects by construction of temporary containment/exclusion dikes that would contain dredged borrow sediments used for construction of the NER RP feature and also prevent dredged effluents from entering the existing coastal restoration projects sites. Temporary containment/exclusion dikes would degrade naturally to restore connectivity with surrounding areas or would be degraded at three years after construction has been completed.

Existing mitigation projects are also located within areas proposed for restoration under the NER RP. Mitigation projects are designed and constructed to offset anticipated losses from permitted activities. This revised Consistency Determination contains specific information about mitigation projects that occur within the project area. In most instances, these mitigation projects were developed to provide a sustainable buffer from wave action and storm surge generated by tropical storms and hurricanes. When overlap occurs, the proposed NER RP features would not be constructed until the mitigation projects satisfy their 20-year permitted obligations.

Based upon the revised evaluation, the U.S. Army Corps of Engineers, Mississippi Valley Division, New Orleans District, has determined that the proposed action is consistent, to the maximum extent practicable, with the State of Louisiana's Coastal Resources Program.

Questions should be mailed to the attention of Ms. Sandra E. Stiles; U.S. Army Corps of Engineers; Regional Planning and Environment Division South; New Orleans

Environmental Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267. Ms. Sandra E. Stiles may be contacted at (504) 862-1583 if questions arise.

Sandra Stiles

for Joan M. Exnicios
Chief, Environmental Planning Branch

Attachments:

Southwest Coastal Louisiana, Revised Louisiana Coastal Resources Consistency Determination

Appendix K Fact Sheets and Maps for Features of the National Ecosystem Restoration Recommended Plan

JOHN BEL EDWARDS
GOVERNOR

THOMAS F. HARRIS
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

February 12, 2016

Joan Exnicios
Environmental Branch
Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267
Via e-mail: Joan.M.Exnicios@usace.army.mil

RE: **C20160002,** Coastal Zone Consistency
New Orleans District, Corps of Engineers (COE-NOD)
Direct Federal Action
Louisiana Coastwide Authority, Southwest Coastal Louisiana Project; National Economic Development (NED) and National Ecosystem Restoration (NER) Recommended Plans,
Vermilion, Cameron and Calcasieu Parishes, Louisiana

Dear Ms. Exnicios:

The Office of Coastal Management (OCM) has received the above referenced federal application for consistency review with the approved Louisiana Coastal Resources Program (LCRP) in accordance with Section 307(c) of the Federal Coastal Zone Management Act of 1972, as amended.

National Economic Development Recommended Plan

After careful review, OCM finds that the NED Recommended Plan, as amended, is fully consistent with the LCRP. Further coordination with OCM on individual NED measures is not required provided those measures meet the stipulations described in the January 21, 2016, e-mail from Dr. William Klein of your staff. Specifically, those stipulations are:

1. No NED activities will be conducted in wetlands. This includes work areas, access routes, staging areas, and borrow and discharge locations. Wetlands would be defined by a Corps of Engineers wetland delineation, or as identified on LDNR's SONRIS GIS system, or other suitable source.
2. No NED work on cheniers will involve excavation; any necessary fill will be hauled in from approved borrow sites. Minor foundation excavation for purposes of raising a structure will be permissible provided the excavations are restored to preproject conditions.
3. NED projects will not significantly alter the local hydrology.
4. NED projects which do not meet these criteria will require pre-construction coordination with LDNR Office of Coastal Management, and may require an individual consistency determination or other authorization.

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Measures which do not meet those stipulations or which otherwise may have reasonably foreseeable coastal effects which have not been evaluated for consistency with the LCRP will require further review by OCM prior to implementation.

National Ecosystem Restoration Recommended Plan

Significant decisions or alternatives for the proposed NER measures remain undecided and will be finalized only after additional information is developed during the design phase. Therefore, review of this determination has proceeded per National Oceanic and Atmospheric Administration (NOAA) regulations on federal consistency at 15 CFR §930.36(d) for phased consistency determinations. OCM finds that this feasibility phase of the NER Recommended Plan is consistent with the LCRP, however, pursuant to federal regulations, consistency determinations must be submitted for each major decision in subsequent phases of the project measures that are subject to Federal discretion. The federal agency shall ensure that the measures under development continue to be consistent to the maximum extent practicable with the LCRP until such plans are finalized.

In order to fully review the activities addressed by this consistency determination, clear descriptions and depictions of proposed activities must be provided. Information necessary for OCM review includes precise locations and dimensions of proposed access routes; work and staging areas; temporary and permanent rights-of way; and estimates of temporary and permanent impacts to wetlands, shorelines, cheniers, and other sensitive coastal features, including those resulting from access to and staging for work sites.

As planning for the proposed measures proceeds and detailed information is developed, please provide additional consistency determinations as appropriate to ensure compliance with the LCRP. Please understand that this concurrence letter specifically does not authorize any construction or other NER Recommended Plan activities which may have reasonably foreseeable effects on coastal land use, water use, or natural resources.

If you have any questions concerning these comments, please contact Jeff Harris of the Consistency Section at (225) 342-7949.

Sincerely,

/S/ Don Haydel
Acting Administrator
Interagency Affairs/Field Services Division

DH/SK/jdh

cc: Sandra Stiles, COE-NOD
William Klein, COE-NOD
Dave Butler, LDWF
Kaili Patterson, OCM/FI
Darin Thomassee, OCM/FI
Laurie Cormier, Calcasieu Parish
Kara Bonsall, Cameron Parish

From: Jennifer Mouton
To: Klein, William P Jr MVN; Jeff Harris
Cc: Varnado, Paul A MVN; MacInnes, Andrew D MVN; Axtman, Timothy J MVN; Broussard, Darrel M MVN; Stiles, Sandra E MVN; Exnicios, Joan M MVN; Gilmore, Tammy H MVN; Tye Fitzgerald; Ken Duffy; Bren Haase; Brian Lezina
Subject: [EXTERNAL] RE: C20160002 LCA Southwest Coastal Louisiana (UNCLASSIFIED)
Date: Thursday, February 04, 2016 5:18:10 PM
Attachments: Borrow Typical Section.pdf

Jeff – here is a typical design drawing for the borrow area for 47a1, 47a2 and 47c1. The design for the borrow area for measures 127c3 and 306a1 would be very similar. At this time, we do not have actual geotechnical data for any borrow areas so the current design (as reflected in the attached plat and the Appendix K fact sheets) is our best estimate using best engineering judgment of what borrow areas will be needed. The location of the borrow area included an initial rudimentary assessment that took into account constraints such as pipelines, known hazards, structures, etc. More precise information on the borrow areas will be developed during the engineering and design phase when sediment sampling and bathymetric surveys will take place. Updated designs and dimensions will be provided to LDNR prior to construction activities. Should there be any significant changes in the design of this features or their borrow areas, a revised consistency determination will be provided to LDNR for review.

I will ensure that the attached drawing is included in the next iteration of Appendix K, Annex A. Thanks. Jennifer

From: Jennifer Mouton
Sent: Thursday, February 04, 2016 8:22 AM
To: 'Klein, William P Jr MVN'; Jeff Harris
Cc: Varnado, Paul A MVN; MacInnes, Andrew D MVN; Axtman, Timothy J MVN; Broussard, Darrel M MVN; Stiles, Sandra E MVN; Exnicios, Joan M MVN; Tammy Gilmore; Tye Fitzgerald; Ken Duffy; Bren Haase; Brian Lezina
Subject: RE: C20160002 LCA Southwest Coastal Louisiana (UNCLASSIFIED)

Jeff – please see our responses below. Thanks for your quick review and comments. Jenn

3a1 Beneficial Use of Dredged Material from Calcasieu Ship Channel

- Disposal dikes along shoreline: located on wetlands? Impacts? Need description or cross section showing relationship.

Part of the constructed containment dikes will be on the shoreline. The others will be constructed along existing ridges and in open water. Wetland impacts will be restricted to the footprint of the constructed dikes and any adverse impacts will be offset by the creation and restoration of wetlands as described in the study. We have provided typical design drawings for containment dikes which contain the construction details such as slope, fill elevation, borrow area dimensions, etc. Project specific design drawings and plats have not yet been developed but will completed once the project goes to the engineering and design phase. Updated drawings and plats will be submitted to LDNR at that time and prior to construction. Should any significant changes occur in design or project features, an updated consistency determination will be submitted to LDNR for review.

- Need plats & description of staging areas, discharge pipe laydown areas.

Site specific plats and cross-sections beyond the measure factsheet and map in Appendix K, p. K-5, have not yet been developed. However, as it is currently depicted, the discharge pipe will be floated in via the GIWW along the bank line. The discharge pipe will be moved around in the outfall area so as to distribute sediment in such a way as to provide a dewatered surface elevation conducive to marsh vegetation establishment. The frequency and distance of pipeline relocation will depend on the quality (grain size and water/sediment ratio) of the slurry. The staging area and equipment, as envisioned, will be outside of the feature area and barged in via open water. No dredging is anticipated to be required to locate the staging barge. Should any changes be made to the design or project features, an updated consistency determination with site specific plats and descriptions will be submitted to LDNR for review prior to construction.

- Booster pump locations are vague. Propose to "minimize" wetland impacts also vague.

The booster pump quantity and locations were estimated based on previous marsh creation projects. The exact quantity and location of booster pumps are best determined by the size/horsepower of the Contractor's equipment. While all reasonable efforts will be made to comply with the project features as proposed in the Appendix K fact sheet and map, should the need arise to alter booster pump locations in such a way as to cause adverse impacts to wetlands, an updated project description, design and plat will be provided to LDNR to review and consistency determination. Additionally, any adverse impacts to the wetlands, should they occur, due to booster pumps, will be temporary with restoration of the impacted areas to the pre-project conditions. It should be noted that at this stage of project design, it is anticipated that all booster pumps will be barge-mounted, and floated at the margin of the navigation, thus avoiding wetland impacts altogether. However, as mentioned above, the precise locations of the booster pumps will be dependent on the equipment used for dredging the Calcasieu Ship Channel and is unknown at this time. These details will become known during the bid process and subsequent to the engineering and design phase of this specific measure. Any significant changes to the project design or features will be fully described in an updated consistency determination request and submitted to LDNR for review prior to construction.

- Existing internal dike located at approx. Long 99.2244o: How will it be dealt with, within the disposal area? How will the new & existing dike intersection be constructed? Description or plat needed.

The this time, site specific plats have not yet been developed. However, it is anticipated that existing internal dikes and terraces will largely be left in place, and slurry will be added around them thus allowing the two marsh creation areas to be constructed in a side-by-side fashion. For the purposes of the WVA benefits, the existing internal dike was treated as existing marsh and counted as re-nourished rather than created. The existing internal dike will be breached once the southern retention dike is in place so that water exchange and fish access can occur. The number and locations of the breaches will be determined in PED. Updated project plats will be submitted to LDNR once they have been developed during the engineering and design phase. Any significant changes to the project design or project features will be fully described in an updated consistency determination request and submitted to LDNR for review prior to project construction.

- Access to disposal area: across GIWW bankline, or at weir at approx. 30.0585 o, 93.4550 o? Impacts? Restored?

This crossing will be finalized during engineering and design. As presently configured, the discharge pipeline crossing is located adjacent to the rock weir you mentioned. All crossing will be restored to pre-construction conditions prior to project completion. Any significant changes will be forwarded to LDNR for review prior to construction.

- Access of clamshell dredge: across shoreline? Impacts? Restored?

A clamshell dredge will not be used in construction of the Marsh Creation Area, as it would require flotation access through the existing GIWW bank line. Therefore, no impacts from the dredge are expected. Instead, marsh buggies will be used in the Marsh Creation Area and will access the Marsh Creation Area at the same location as the discharge pipeline to minimize impacts. Impacts due to the use of marsh buggies will be minimized by the use of the established best management practices for use of marsh buggies during construction. At project construction completion, this crossing will be restored to pre-construction conditions. Should any changes to this design or construction method occur, an updated project description and design plat will be submitted to LDNR for review to determine coastal consistency.

- Pg B-73, Guideline 3.8: For all NER RD, beach crossings will be restored to at least pre-project conditions. Good

No additional information needed.

3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel

- "Navigation traffic is not anticipated to be impacted." What measures will be taken so boats can cross the pipeline, in Calcasieu Lake and along the back dike canal?

The discharge pipeline will be submerged and marked, per USCG requirements, at the locations mentioned in the above comment. In addition, close communication and coordination with the Calcasieu and Lake Charles River Pilots will be maintained at all times during construction to ensure no impacts to navigation safety. Navigation precautions similar to those followed during the construction of Mississippi River beneficial use of dredged material projects will be utilized to ensure minimal disruptions to navigation traffic.

- Access to disposal area: across shoreline, or at the weirs at approx. 29.8483 o, 93.2476 o and 29.8632 o, 93.2355 o ? Impacts? Restored?

Access to the Marsh Creation Areas will be across the shoreline/levee. The discharge pipeline and equipment will not cross over any weirs. Although temporary adverse impacts may occur during construction at the bank line crossings, these areas will be restored to pre-construction conditions prior to project completion. Should any changes to this construction method occur, an updated consistency determination request will be submitted to LDNR for review prior to project construction.

- Access of clamshell dredge: across shoreline? Impacts? Restored?

A clamshell dredge will not be used in construction of the Marsh Creation Area, as it would require flotation access through the existing GIWW bank line. Therefore, no impacts from the dredge are expected. Instead, marsh buggies will be used in the Marsh Creation Area and will access the Marsh Creation Area at the same location as the discharge pipeline to minimize impacts. Impacts due to the use of marsh buggies will be minimized by the use of the established best management practices for use of marsh buggies during construction. At project construction completion, this crossing will be restored to pre-construction conditions. Should any changes to this design or construction method occur, an updated project description and design plat will be submitted to LDNR for review to determine coastal consistency.

- Need plats & description of staging areas, discharge pipe laydown areas.

Site specific plats and cross-sections beyond the measure factsheet and map in Appendix K, p. K-8, have not yet been developed. However, as it is currently depicted, the discharge pipe will be floated in via the Calcasieu Ship Channel and Calcasieu Lake. The discharge pipe will be moved around in the outfall area so as to distribute sediment in such a way as to provide a dewatered surface elevation conducive to marsh vegetation establishment. The frequency and distance of pipeline relocation will depend on the quality (grain size and water/sediment ratio) of the slurry. The staging area and equipment, as envisioned, will be outside of the feature area and barged in via open water. Should any changes be made to the design or project features, an updated consistency determination with site specific plats and descriptions will be submitted to LDNR for review prior to construction.

- Confirm that no dredging is anticipated to be necessary for moving booster pumps to their proposed locations. Oyster impacts.

At this time, we do not anticipate any dredging to be necessary. However, we do not know the draft necessary for a Contractor's booster pumps, so some dredging may be required. If dredging is necessary, all access dredging will be backfilled upon completion of the project. Calcasieu Lake is a Tier 2 oyster seed ground. We have entered into agreements with LDWF to dredge Tier 2 Seed Grounds, specifically Calcasieu Lake (access route and borrow area), and would expect to have the same agreement for construction of this project. Any activities that affect oyster seed grounds or harvest areas will be done in accordance with LDWF requirements and will be obtained prior to any project construction activities commencing.

- Pg B-73, Guideline 3.8: For all NER RD, beach crossings will be restored to at least pre-project conditions. Good

No additional information needed.

47a1 Marsh Restoration Using Dredged Material South of Highway 82

- The disposal area has complex internal geography. Sediment discharge management plans?

A discharge plan will be finalized during engineering and design. At this time, given the large area of fill, we plan to break the large Marsh Creation Area into to smaller adjoining cells where applicable. A sediment discharge management plan can be forwarded to LDNR upon request and prior to project construction.

- Need plats & description of staging areas, discharge pipe laydown areas.

Site specific plats and cross-sections for the 47 projects beyond the measure factsheets and maps in Appendix K, p. K-9-17, have not yet been developed. However, as it is currently depicted, the discharge pipe will be floated in via the existing access channel from the Gulf of Mexico. The discharge pipe will be moved around in the outfall area so as to distribute sediment in such a way as to provide a dewatered surface elevation conducive to marsh vegetation establishment. The frequency and distance of pipeline relocation will depend on the quality (grain size and water/sediment ratio) of the slurry. The staging area and equipment, as envisioned, will be outside of the feature area and barged in via open water. Alternative access for equipment can be made via Highway 82 if necessary. Should any changes be made to the design or project features, an updated consistency determination with site specific plats and descriptions will be submitted to LDNR for review prior to construction.

- Oil field access road within the disposal area at approx. 29.7483 o, 92.9035 o. How will the containment dikes impact this road? How will sediment be conveyed across it? How will it be kept clear?

We will work with the road/landowner should they require the oil field access road to remain accessible. One way to achieve this is to use the road as one of the divisions between Marsh Creation Area cells similar to the existing internal dike as described in Measure 3a1. Dredge material would then be discharged on either side of the road. Where the discharge pipe needs to cross the access road a ramp can be constructed. Any impacts to existing access roads or banklines will be restored to their pre-project condition at the completion of construction.

- At least 12 active or inactive oil and gas wells are located within the disposal area. How will access to these be maintained? Does it need to be maintained for P&A'ed wells?

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It appears that drawing was inadvertently omitted from the report. A typical cross section will be forwarded to you as soon as possible.

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Sent: Monday, February 01, 2016 8:00 AM
To: Jeff Harris
Cc: Varnado, Paul A MVN; MacInnes, Andrew D MVN; Axtman, Timothy J MVN; Broussard, Darrel M MVN; Stiles, Sandra E MVN; Exnicios, Joan M MVN; Jennifer Mouton
Subject: RE: C20160002 LCA Southwest Coastal Louisiana (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

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We will get comment responses to you as soon as possible. \

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Subject: [EXTERNAL] RE: C20160002 LCA Southwest Coastal Louisiana (UNCLASSIFIED)

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Look them over and we can discuss next week.

Have a great weekend,

--Jeff

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- Disposal dikes along shoreline: located on wetlands? Impacts? Need description or cross section showing relationship.
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To: Klein, William P Jr MVN; Jeff Harris
Cc: Vamado, Paul A MVN; MacInnes, Andrew D MVN; Axtman, Timothy J MVN; Broussard, Darrel M MVN; Stiles, Sandra E MVN; Exnicios, Joan M MVN; Gilmore, Tammy H MVN; Tye Fitzgerald; Ken Duffy; Bren Haase; Brian Lezina
Subject: [EXTERNAL] RE: C20160002 LCA Southwest Coastal Louisiana (UNCLASSIFIED)
Date: Thursday, February 04, 2016 8:24:04 AM

Jeff – please see our responses below. Thanks for your quick review and comments. Jenn

3a1 Beneficial Use of Dredged Material from Calcasieu Ship Channel

- Disposal dikes along shoreline: located on wetlands? Impacts? Need description or cross section showing relationship.

Part of the constructed containment dikes will be on the shoreline. The others will be constructed along existing ridges and in open water. Wetland impacts will be restricted to the footprint of the constructed dikes and any adverse impacts will be offset by the creation and restoration of wetlands as described in the study. We have provided typical design drawings for containment dikes which contain the construction details such as slope, fill elevation, borrow area dimensions, etc. Project specific design drawings and plats have not yet been developed but will completed once the project goes to the engineering and design phase. Updated drawings and plats will be submitted to LDNR at that time and prior to construction. Should any significant changes occur in design or project features, an updated consistency determination will be submitted to LDNR for review.

- Need plats & description of staging areas, discharge pipe laydown areas.

Site specific plats and cross-sections beyond the measure factsheet and map in Appendix K, p. K-5, have not yet been developed. However, as it is currently depicted, the discharge pipe will be floated in via the GIWW along the bank line. The discharge pipe will be moved around in the outfall area so as to distribute sediment in such a way as to provide a dewatered surface elevation conducive to marsh vegetation establishment. The frequency and distance of pipeline relocation will depend on the quality (grain size and water/sediment ratio) of the slurry. The staging area and equipment, as envisioned, will be outside of the feature area and barged in via open water. No dredging is anticipated to be required to locate the staging barge. Should any changes be made to the design or project features, an updated consistency determination with site specific plats and descriptions will be submitted to LDNR for review prior to construction.

- Booster pump locations are vague. Propose to "minimize" wetland impacts also vague.

The booster pump quantity and locations were estimated based on previous marsh creation projects. The exact quantity and location of booster pumps are best determined by the size/horsepower of the Contractor's equipment. While all reasonable efforts will be made to comply with the project features as proposed in the Appendix K fact sheet and map, should the need arise to alter booster pump locations in such a way as to cause adverse impacts to wetlands, an updated project description, design and plat will be provided to LDNR to review and consistency determination. Additionally, any adverse impacts to the wetlands, should they occur, due to booster pumps, will be temporary with restoration of the impacted areas to the pre-project conditions. It should be noted that at this stage of project design, it is anticipated that all booster pumps will be barge-mounted, and floated at the margin of the navigation, thus avoiding wetland impacts altogether. However, as mentioned above, the precise locations of the booster pumps will be dependent on the equipment used for dredging the Calcasieu Ship Channel and is unknown

at this time. These details will become known during the bid process and subsequent to the engineering and design phase of this specific measure. Any significant changes to the project design or features will be fully described in an updated consistency determination request and submitted to LDNR for review prior to construction.

- Existing internal dike located at approx. Long 99.2244o: How will it be dealt with, within the disposal area? How will the new & existing dike intersection be constructed? Description or plat needed.

The this time, site specific plats have not yet been developed. However, it is anticipated that existing internal dikes and terraces will largely be left in place, and slurry will be added around them thus allowing the two marsh creation areas to be constructed in a side-by-side fashion. For the purposes of the WVA benefits, the existing internal dike was treated as existing marsh and counted as re-nourished rather than created. The existing internal dike will be breached once the southern retention dike is in place so that water exchange and fish access can occur. The number and locations of the breaches will be determined in PED. Updated project plats will be submitted to LDNR once they have been developed during the engineering and design phase. Any significant changes to the project design or project features will be fully described in an updated consistency determination request and submitted to LDNR for review prior to project construction.

- Access to disposal area: across GIWW bankline, or at weir at approx. 30.0585 o, 93.4550 o? Impacts? Restored?

This crossing will be finalized during engineering and design. As presently configured, the discharge pipeline crossing is located adjacent to the rock weir you mentioned. All crossing will be restored to pre-construction conditions prior to project completion. Any significant changes will be forwarded to LDNR for review prior to construction.

- Access of clamshell dredge: across shoreline? Impacts? Restored?

A clamshell dredge will not be used in construction of the Marsh Creation Area, as it would require flotation access through the existing GIWW bank line. Therefore, no impacts from the dredge are expected. Instead, marsh buggies will be used in the Marsh Creation Area and will access the Marsh Creation Area at the same location as the discharge pipeline to minimize impacts. Impacts due to the use of marsh buggies will be minimized by the use of the established best management practices for use of marsh buggies during construction. At project construction completion, this crossing will be restored to pre-construction conditions. Should any changes to this design or construction method occur, an updated project description and design plat will be submitted to LDNR for review to determine coastal consistency.

- Pg B-73, Guideline 3.8: For all NER RD, beach crossings will be restored to at least pre-project conditions. Good

No additional information needed.

3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel

- "Navigation traffic is not anticipated to be impacted." What measures will be taken so boats can cross the pipeline, in Calcasieu Lake and along the back dike canal?

The discharge pipeline will be submerged and marked, per USCG requirements, at the locations mentioned in the above comment. In addition, close communication and coordination with the Calcasieu and Lake Charles River

Pilots will be maintained at all times during construction to ensure no impacts to navigation safety. Navigation precautions similar to those followed during the construction of Mississippi River beneficial use of dredged material projects will be utilized to ensure minimal disruptions to navigation traffic.

- Access to disposal area: across shoreline, or at the weirs at approx. 29.8483 o, 93.2476 o and 29.8632 o, 93.2355 o ? Impacts? Restored?

Access to the Marsh Creation Areas will be across the shoreline/levee. The discharge pipeline and equipment will not cross over any weirs. Although temporary adverse impacts may occur during construction at the bank line crossings, these areas will be restored to pre-construction conditions prior to project completion. Should any changes to this construction method occur, an updated consistency determination request will be submitted to LDNR for review prior to project construction.

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A clamshell dredge will not be used in construction of the Marsh Creation Area, as it would require flotation access through the existing GIWW bank line. Therefore, no impacts from the dredge are expected. Instead, marsh buggies will be used in the Marsh Creation Area and will access the Marsh Creation Area at the same location as the discharge pipeline to minimize impacts. Impacts due to the use of marsh buggies will be minimized by the use of the established best management practices for use of marsh buggies during construction. At project construction completion, this crossing will be restored to pre-construction conditions. Should any changes to this design or construction method occur, an updated project description and design plat will be submitted to LDNR for review to determine coastal consistency.

- Need plats & description of staging areas, discharge pipe laydown areas.

Site specific plats and cross-sections beyond the measure factsheet and map in Appendix K, p. K-8, have not yet been developed. However, as it is currently depicted, the discharge pipe will be floated in via the Calcasieu Ship Channel and Calcasieu Lake. The discharge pipe will be moved around in the outfall area so as to distribute sediment in such a way as to provide a dewatered surface elevation conducive to marsh vegetation establishment. The frequency and distance of pipeline relocation will depend on the quality (grain size and water/sediment ratio) of the slurry. The staging area and equipment, as envisioned, will be outside of the feature area and barged in via open water. Should any changes be made to the design or project features, an updated consistency determination with site specific plats and descriptions will be submitted to LDNR for review prior to construction.

- Confirm that no dredging is anticipated to be necessary for moving booster pumps to their proposed locations. Oyster impacts.

At this time, we do not anticipate any dredging to be necessary. However, we do not know the draft necessary for a Contractor's booster pumps, so some dredging may be required. If dredging is necessary, all access dredging will be backfilled upon completion of the project. Calcasieu Lake is a Tier 2 oyster seed ground. We have entered into agreements with LDWF to dredge Tier 2 Seed Grounds, specifically Calcasieu Lake (access route and borrow area), and would expect to have the same agreement for construction of this project. Any activities that affect oyster seed grounds or harvest areas will be done in accordance with LDWF requirements and will be obtained prior to any project construction activities commencing.

- Pg B-73, Guideline 3.8: For all NER RD, beach crossings will be restored to at least pre-project conditions.

Good

No additional information needed.

47a1 Marsh Restoration Using Dredged Material South of Highway 82

- The disposal area has complex internal geography. Sediment discharge management plans?

A discharge plan will be finalized during engineering and design. At this time, given the large area of fill, we plan to break the large Marsh Creation Area into to smaller adjoining cells where applicable. A sediment discharge management plan can be forwarded to LDNR upon request and prior to project construction.

- Need plats & description of staging areas, discharge pipe laydown areas.

Site specific plats and cross-sections for the 47 projects beyond the measure factsheets and maps in Appendix K, p. K-9-17, have not yet been developed. However, as it is currently depicted, the discharge pipe will be floated in via the existing access channel from the Gulf of Mexico. The discharge pipe will be moved around in the outfall area so as to distribute sediment in such a way as to provide a dewatered surface elevation conducive to marsh vegetation establishment. The frequency and distance of pipeline relocation will depend on the quality (grain size and water/sediment ratio) of the slurry. The staging area and equipment, as envisioned, will be outside of the feature area and barged in via open water. Alternative access for equipment can be made via Highway 82 if necessary. Should any changes be made to the design or project features, an updated consistency determination with site specific plats and descriptions will be submitted to LDNR for review prior to construction.

- Oil field access road within the disposal area at approx. 29.7483 o, 92.9035 o. How will the containment dikes impact this road? How will sediment be conveyed across it? How will it be kept clear?

We will work with the road/landowner should they require the oil field access road to remain accessible. One way to achieve this is to use the road as one of the divisions between Marsh Creation Area cells similar to the existing internal dike as described in Measure 3a1. Dredge material would then be discharged on either side of the road. Where the discharge pipe needs to cross the access road a ramp can be constructed. Any impacts to existing access roads or banklines will be restored to their pre-project condition at the completion of construction.

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- Borrow area wave refraction: No study until PED stage? Potential beach erosion?
- Pg K-9 refers to typical cross section of borrow area in Annex A; no cross section present.
- Pg B-73, Guideline 3.8: For all NER RD, beach crossings will be restored to at least preproject conditions. Good

---

From:	Klein, William P Jr MVN
To:	Jeff Harris
Cc:	Varnado, Paul A MVN; MacInnes, Andrew D MVN; Stiles, Sandra E MVN; Kinsey, Mary V MVN; Drobot, Ann E MVN; Axtman, Timothy J MVN
Subject:	updated numbers for Southwest Coastal Louisiana Consistency determination (UNCLASSIFIED)
Date:	Wednesday, January 27, 2016 8:57:00 AM
Attachments:	Revised CZM table 2a Klein 01272016.docx

CLASSIFICATION: UNCLASSIFIED

Jeff Harris:

Upon further review we have discovered that borrow areas were double counted for marsh restoration features.

Please see attached updated Table 2a column total for Borrow Areas for marsh restoration measures.

Please revise 14,410 acres total to 7,028 acres total.

Thank You!

Bill

William P. Klein, Jr.
US Army Corps of Engineers
PO Box 60267
New Orleans, LA 70160-0267
504-862-2540
william.p.klein.jr@usace.army.mil

CLASSIFICATION: UNCLASSIFIED

From: Klein, William P Jr MVN
To: Jeff Harris
Cc: Varnado, Paul A MVN; MacInnes, Andrew D MVN; Stiles, Sandra E MVN; Klein, William P Jr MVN
Subject: FW: C20160002 LCA Southwest Coastal Louisiana (UNCLASSIFIED)
Date: Thursday, January 21, 2016 2:03:00 PM

CLASSIFICATION: UNCLASSIFIED

Jeff
The following updated section has been added to the LDNR Consistency Determination on page B-7, following the general description of the NED Plan on B-5 to B-6 and prior to the "Details of the Nonstructural NED RP section. Thank you for accepting these revisions via email.

LDNR Specific Concerns about the NED RP
By electronic mail on January 21, 2016, the LDNR requested the USACE to provide specific responses to the below comments despite although several of these comments are covered in different sections throughout the document.

1. No NED activities will be conducted in wetlands. This includes work areas, access routes, staging areas, and borrow and discharge locations. Wetlands would be defined by a Corps of Engineers wetland delineation, or as identified on LDNR's SONRIS GIS system, or other suitable source.

RESPONSE: Concur. If wetlands would be impacted by NED construction, the structure would no longer be eligible for nonstructural measures. Will include revised language as requested up front. Also, I already have in report (responses to some specific Coastal Guidelines) that work would be done on previously disturbed residential and commercial lands and that we would not impact waters of the USA (which includes wetlands).

2. No NED work on cheniers will involve excavation; any necessary fill will be hauled in from approved borrow sites. Minor foundation excavation for purposes of raising a structure will be permissible provided the excavations are restored to preproject conditions.

RESPONSE: No NED work will take place on cheniers (excavation or fill). All NED measures will be confined to existing structure locations and previously impacted sites and any required borrow material would be from an approved site.

3. NED projects will not significantly alter the local hydrology.

RESPONSE: Concur. Part of the definition of a nonstructural measure is that it reduces human exposure to a flood hazard without altering the nature or extent of that hazard. Nonstructural measures are tightly confined to the flood-proofed structure and they will not impact local hydrology. Additional language would be included in the CD up front. I already mention in some Consistency guidelines that the NED plan would not impact hydrology.

4. NED projects which do not meet these criteria will require pre-construction coordination with LDNR Office of Coastal Management, and may require an individual consistency determination or other authorization.

RESPONSE: Concur. Responses to LDNR's above cited specific concerns has been provided in the general description section prior to responses of individual Consistency Guidelines.

Please let me know if you require any additional information.
Thank you,

Bill

-----Original Message-----
From: Jeff Harris [mailto:Jeff.Harris@LA.GOV]
Sent: Thursday, January 21, 2016 10:55 AM
To: Klein, William P Jr MVN <William.P.Klein.Jr@usace.army.mil>
Cc: Jennifer Mouton <Jennifer.Mouton@LA.GOV>; Varnado, Paul A MVN <Paul.A.Varnado@usace.army.mil>; MacInnes, Andrew D MVN <Andrew.D.Macinnes@usace.army.mil>; Stiles, Sandra E MVN <Sandra.E.Stiles@usace.army.mil>
Subject: [EXTERNAL] C20160002 LCA Southwest Coastal Louisiana

Bill—

As we discussed by telephone this morning, I've begun reviewing the referenced consistency determination and have some concerns that should be addressed for the National Economic Development Recommended Plan.

The issue is that, at this stage, the specific locations and work activities involved in the proposed NED floodproofing are not yet determined, and concurring with a broad consistency statement without knowing details about the actual activities is problematic. We can, however, fully concur with the consistency determination (by which I mean, I can recommend full concurrence to my superiors) for the NED portion of the project, if the consistency determination includes statements along the following lines:

- No NED activities will be conducted in wetlands. This includes work areas, access routes, staging areas, and borrow and discharge locations. Wetlands would be defined by a Corps of Engineers wetland delineation, or as identified on LDNR's SONRIS GIS system, or other suitable source.

- No NED work on cheniers will involve excavation; any necessary fill will be hauled in from approved borrow sites. Minor foundation excavation for purposes of raising a structure will be permissible provided the excavations are restored to preproject conditions.

- NED projects will not significantly alter the local hydrology.

- NED projects which do not meet these criteria will require pre-construction coordination with LDNR Office of Coastal Management, and may require an individual consistency determination or other authorization.

I realize several of these points are covered in different places throughout the document. For OCM's purposes, we'd prefer a single concise statement of these criteria.

If acceptable, please send a revision to the consistency determination indicating that you wish to include these criteria. If we need to discuss further, please don't hesitate to write or call.

Thanks,

--Jeff

225-342-7949

COASTAL ZONE CONSISTENCY DETERMINATION

Reference June 30, 2014, and June 2, 2015 letters from the Louisiana Department of Natural Resources, Office of Coastal Management (LDNR) regarding Consistency Zone Consistency #C20150064 for the Southwest Coastal Louisiana project. As noted in these letters, at the programmatic level, this project was considered consistent with the Louisiana Coastal Resources Program (LCRP) by the LDNR. However, these letters notified the CEMVN that as information is developed and planning proceeds, consistency reviews will be necessary for each of the individual elements which make up the Southwest Coastal Louisiana Project. Hence, the following revised consistency determination contains more detailed feasibility level description of the proposed action. The Southwest Coastal Louisiana Study is comprised of two components consisting of a nonstructural National Economic Development (NED) plan and a National Ecosystem Restoration (NER) plan. The NED Recommended Plan (RP) is the Nonstructural 0-25-Year Floodplain Plan (Modified Plan 8 –RP) that would provide hurricane and storm damage risk reduction. The NER RP is the Small Integrated Restoration Alternative, a comprehensive ecosystem restoration plan addressing land loss and ecosystem degradation. The NER RP is cost effective, and is the least-cost comprehensive best buy plan. The NER RP would minimize land loss; enhance plant productivity by reducing major stressors; and reinforce and protect critical landscape features. Table 1 provides a brief description of the NER RP measures. Tables 2a, 2b, and 2c provide the NER RP measure details, description of construction equipment, and quantities and types of fill to be placed in wetlands. Figures 1, 2 and 3 display locations of the NER RP measures. Following this updated project information, a more detailed analysis of the applicable Coastal Use Guidelines for both the Nonstructural NED RP and NER RP is provided. The State of Louisiana, through the Coastal Protection and Restoration Authority Board (CPRAB), would be the non-Federal Sponsor and therefore responsible for the operation, maintenance, repair, replacement, and rehabilitation costs (OMRR&R).

INTRODUCTION

Section 307 of the Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et. seq. requires that "each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs." In accordance with Section 307, a Consistency Determination has been prepared for the proposed Southwest Coastal Louisiana project. Coastal Use Guidelines were written to implement the policies and goals of the Louisiana Coastal Resources Program, and serve as a set of performance standards for evaluating projects. Compliance with the Louisiana Coastal Resources Program, and therefore, Section 307, requires compliance with applicable Coastal Use Guidelines.

PURPOSE AND NEED FOR THE PROPOSED ACTION

Problem

The people, economy, unique environment, and cultural heritage of southwest Louisiana are at risk due to storm surge flooding and wave impacts from tropical storms. The area's low elevation, proximity to the Gulf of Mexico, land subsidence, and rising sea level, are expected to exacerbate coastal flooding, shoreline erosion, saltwater intrusion, and loss of wetland and chenier habitats in the future.

Purpose

The study purpose is to evaluate coastal storm flood damages and coastal ecosystem degradation in Cameron, Calcasieu, and Vermilion parishes in Louisiana. The intent is to develop potential solutions to these water resource problems. The Federal objective of water and related land resources planning is to provide the greatest net contribution to Nonstructural NED RP consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. The ecosystem objective is to contribute to NER by restoring function and structure to significant ecological resources.

Study Objectives

1. Reduce the risk of damages and losses from hurricane and storm surge flooding in southwest Louisiana.
2. Manage tidal flows to improve drainage and prevent salinity from exceeding 2 parts per thousand (ppt) for fresh marsh and 6 ppt for intermediate marsh.
3. Increase wetland productivity in southwest coastal Louisiana in fresh and intermediate marshes to maintain function by reducing the time that water levels exceed marsh surfaces.
4. Reduce shoreline erosion and stabilize canal banks in southwest coastal Louisiana areas to protect adjacent wetlands.
5. Restore landscapes, including marsh, shoreline, and cheniers in southwest coastal Louisiana, to maintain their function as wildlife habitat and improve their ability to serve as protective barriers.

Constraints

- Federally authorized commercial navigation.
- Federally threatened and endangered species (i.e., piping plover) and their critical habitats.
- Essential fish habitat, especially intertidal wetlands.
- Historic and cultural resources.

General

The Southwest Coastal Louisiana (SWC) project, encompassing approximately 4,700 square miles and including all of Calcasieu, Cameron, and Vermilion parishes, would provide nonstructural hurricane and storm surge damage risk reduction measures/measures as well as ecosystem restoration measures/measures throughout the project area (**Figure 1**).

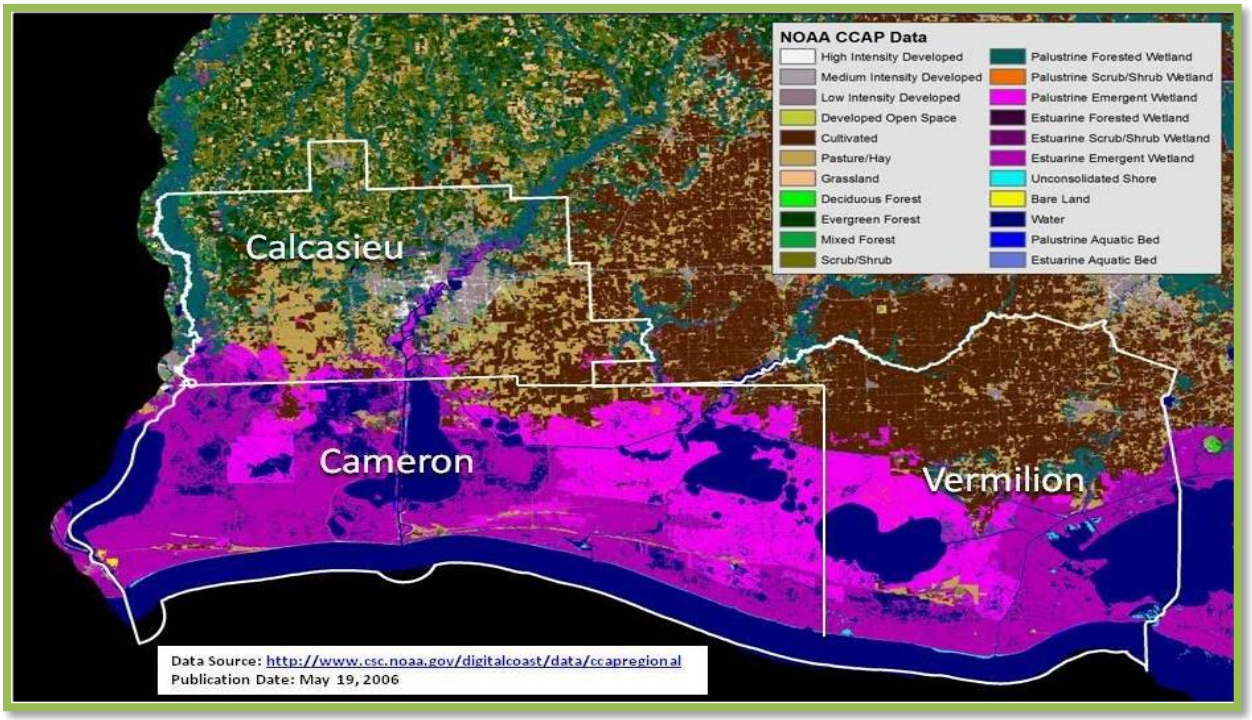

Figure 1. Southwest Coastal Louisana study area.

Impacts of both the Nonstructural NED RP and the NER RP are also described in the Final Integrated Report & EIS. Cameron Parish is located in the southwest corner of Louisiana. The southern boundary of the parish is the Gulf of Mexico. Eighty-two percent of Cameron Parish is coastal marshes. Geographically, it is one of

the largest parishes in Louisiana. The parish is chiefly rural and the largest communities are Cameron and Hackberry. Cameron is located along LA-82, while Hackberry is located along LA-27. Other smaller communities include Creole, Johnsons Bayou, and Holly Beach. Calcasieu Parish is located due north of Cameron Parish. The town of Lake Charles is the parish seat, which is the largest urban area in the study area. Only a small portion of the parish is located in the coastal zone. Vermilion Parish is located due east of Cameron Parish. The southern boundary of the parish is the Gulf of Mexico. Large expanses of Vermilion Parish are open water (lakes, bays, and streams). Approximately 50 percent of the land is coastal marshes. The parish is chiefly rural and the town of Abbeville is the parish seat as well as the largest urban area in the parish. Other communities include Delcambre, Kaplan, and Gueydan, which are all located along LA-14 in the northern part of the study area. Pecan Island and Forked Island are smaller communities, both located along LA-82 in lower Vermilion Parish. Located along LA-333, Intracoastal City is the nearest access to Vermilion Bay and the Gulf of Mexico in this region and supports the area's oil and shrimp industries.

NED Recommended Plan: Southwest Coastal Louisiana communities are at increasing risk to hurricane and storm surge flooding due to wetland loss, sea level rise, and land subsidence. The purpose of the voluntary Nonstructural NED RP is to provide hurricane and storm damage risk reduction to reduce the risk of flood damages caused by hurricane and storm surges. Eligible properties must have a first floor elevation at or below the 2025 25-year Base Flood Elevation (BFE). Eligible structures would be raised to the 2075 100-year BFE. Proposed measures of the voluntary Nonstructural NED RP include:

- elevating eligible residential structures;
- dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes, and;
- construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses.

NER Recommended Plan: The purpose of the NER RP is to restore environmental conditions for the Chenier Plain ecosystem as more fully described in the 2004 Louisiana Coastal Area, Ecosystem Restoration Study. Ecosystem restoration measures are focused on areas of critical need where restoration would replace lost habitats and/or help prevent predicted habitat losses. The Nonstructural NER RP would provide important, essential and critical habitats used for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements of migratory birds, wildlife, finfish, shellfish and other aquatic organisms; increase productivity and essential fish habitat (EFH); increase transitional coastal wetland habitats between estuarine and marine environments; and restore imperiled chenier forest habitats used as stopover habitat by migrating neotropic birds. Restoration and protection of coastal wetlands and chenier habitats would help buffer and protect human habitations by ameliorating hurricane and storm surges. Restoration of coastal wetlands would also help improve water quality by filtering pollutants and sediments. The U.S. Army Corps of Engineers, Mississippi Valley Division, New Orleans District (CEMVN) proposes three types of ecosystem restoration measures in the Calcasieu/Sabine and Mermentau/Tech-Vermilion basins:

- 9 marsh restoration measures;
- 5 shoreline protection measures; and
- 35 chenier reforestation and invasive species control 35 locations in Cameron and Vermilion Parishes.
- The Calcasieu Ship Channel Salinity Barrier measure is being recommended for long term study.
- The Cameron-Creole Spillway Salinity Control Structure measure is being recommended for long-term study.
- Two marsh restoration measures, located partially on U.S. Fish and Wildlife Service (USFWS) properties, are recommended for construction by the USFWS. Measure 124d Marsh Creation at Mud Lake would be located on Sabine National Wildlife Refuge (NWR). Measure 3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel would be located on the Cameron Prairie NWR.

The CEMVN does not anticipate a need for compensatory mitigation as a result of implementing either the Nonstructural NED RP or the NER RP. Environmental Justice (EJ) requires the fair treatment and meaningful

involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The Nonstructural NED RP and the NER RP would not adversely impact minority or low-income populations and is fully compliant with Executive Order 12898.

NATIONAL ECONOMIC DEVELOPMENT RECOMMENDED PLAN

A primary goal of the Nonstructural NED RP is to reduce flood risk for residential and non-residential structures that have first floor elevations at or below the 0-25-year floodplain (**Figure 2**), based on hydrologic conditions predicted to occur in 2025 (the beginning of the 50 year period of analysis). Participation in the Nonstructural NED RP is voluntary, and would provide reduced risk of hurricane and storm surge flood damage for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses.

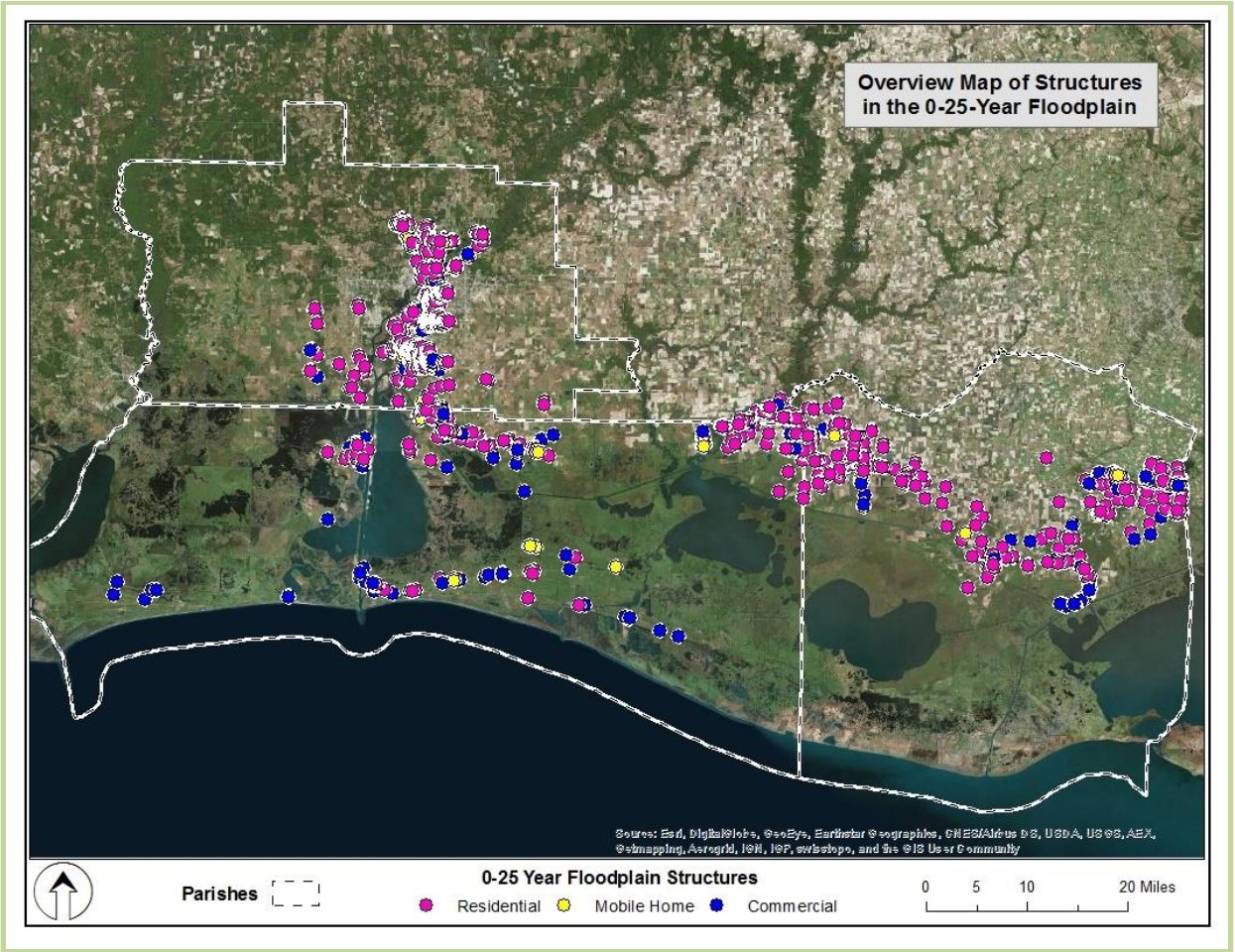

Figure 2. Nonstructural NED RP eligible structures in the 0-25-year floodplain.

Eligible structures would require additional structure specific analysis during the preconstruction engineering and design (PED) and construction phases to determine the best, most cost-effective measures to be employed for reducing risk of hurricane storm surge damage. Consequently, each eligible structure would be inspected by a floodplain engineer, structural engineer, cost engineer, civil engineer, environmental specialist, real estate specialist, and experts from other disciplines if necessary to determine the type of nonstructural measure to be employed for each structure. The inspection of individual structures has not been performed at this stage of the study.

Flood-proofing is generally described as any combination of structural and nonstructural additions, changes, or adjustments to structures, which reduce or eliminate the risk of hurricane and storm surge flood damage to real estate or improved real property, water, and sanitation facilities or structures with their contents. The most common flood-proofing measures are: the elevation of structures; the removal of at-risk structures from floodplains and floodways; detached flood-proofing around structures through the construction of small localized storm surge risk reduction measures no higher than 6 feet above grade; and actions by local governments to strengthen local floodplain management regulations, building and zoning codes, and training and educating local floodplain management officials.

The Nonstructural NED RP consists of the following hurricane and storm surge flood damage risk reduction measures of which participation of eligible structures is voluntary:

1. Elevation to the 100-year base flood elevation based on year 2075 hydrology of eligible residential structures. If the required elevation is greater than 13 feet above ground level, the structure would be identified for voluntary acquisition. Tenants of structures that would be elevated are eligible for certain benefits in accordance with Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs of 1970, Public Law 91-646, 84 Stat. 1894 (42 U.S.C. 4601), as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987, Title IV of Public Law 100-17, 101 Stat. 246-256; 49 Code of Federal Regulations 24; and HUD Handbook 1378.
2. Dry flood-proofing to the BFE generally means the use of a variety of techniques that make a structure waterproof and substantially impenetrable to floodwaters. For example, the walls, doors, windows, and other openings of eligible non-residential structures are made impermeable to water penetration.
3. Construction of localized storm surge risk reduction measures of less than 6 feet in height around industrial complexes and warehouses.

Hurricane and storm surge flood damage risk reduction actions taken to comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12) will be the obligation of the Non-Federal Sponsor (NFS), which will work to ensure development, compliance, and enforcement by municipal and parish governments in Cameron, Vermilion, and Calcasieu Parishes with local floodplain management plans and regulations, adoption of more stringent local floodplain regulations, adoption of more restrictive parish and municipal building codes, land use and zoning regulations, and other developmental controls. The NFS shall prevent obstructions or encroachments on the property being flood-proofed (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as the addition of facilities which might reduce the level of protection the Nonstructural NED RP affords, hinder operation and maintenance of the Nonstructural NED RP, or interfere with the Nonstructural NED RP's proper function.

Although the National Flood Insurance Program (NFIP) provides some relief for historic structures from having to comply with floodplain management requirements, the NFIP and FEMA recognize that historic structures should participate in mitigation measures that can reduce the impacts of flood damages. Under the NFIP regulations and the floodplain regulations of some of the communities in the study area, a historic structure is not eligible for elevation if the elevation or alteration through flood-proofing methods would preclude the structure's continued designation as an "historic structure" or would be damaging to the historical character or value of the structure as determined by the Louisiana State Historic Preservation Office.

Given the total Project cost and the estimated total investment required to complete the Nonstructural NED RP, it is anticipated that implementation of the Nonstructural Plan would occur over an approximate 14-year period (assuming funding of ~$50 million/year). However, the scale of the Project is highly dependent upon the number of structures actually receiving nonstructural measures and the amount of funding allocated in any given year. The combined effects of the Biggert-Waters Insurance Reform Act, the modified conditions imposed by the Homeowner Flood Insurance Affordability Act, and the likelihood of property transfers provide an incentive for property owners to have their structures flood-proofed. In addition, the clear and present risk of future storm events, and subsequent disaster declarations and relief funding, indicate potential

situations for advantageously incentivizing and accelerating implementation. Awareness of and education about these issues would help lead to successful Project implementation, and would help ensure a successful Nonstructural Plan that meets the SWC study goals.

LDNR Specific Concerns about the NED RP

By electronic mail on January 21, 2016, the LDNR requested the USACE to provide specific responses to the below comments despite although several of these comments are covered in different sections throughout the document.

1. No NED activities will be conducted in wetlands. This includes work areas, access routes, staging areas, and borrow and discharge locations. Wetlands would be defined by a Corps of Engineers wetland delineation, or as identified on LDNR's SONRIS GIS system, or other suitable source.

   RESPONSE: Concur. If wetlands would be impacted by NED construction, the structure would no longer be eligible for nonstructural measures. Will include revised language as requested up front. Also, I already have in report (responses to some specific Coastal Guidelines) that work would be done on previously disturbed residential and commercial lands and that we would not impact waters of the USA (which includes wetlands).

2. No NED work on cheniers will involve excavation; any necessary fill will be hauled in from approved borrow sites. Minor foundation excavation for purposes of raising a structure will be permissible provided the excavations are restored to preproject conditions.

   RESPONSE: No NED work will take place on cheniers (excavation or fill). All NED measures will be confined to existing structure locations and previously impacted sites and any required borrow material would be from an approved site.

3. NED projects will not significantly alter the local hydrology.

   RESPONSE: Concur. Part of the definition of a nonstructural measure is that it reduces human exposure to a flood hazard without altering the nature or extent of that hazard. Nonstructural measures are tightly confined to the flood-proofed structure and they will not impact local hydrology. Additional language would be included in the CD up front. I already mention in some Consistency guidelines that the NED plan would not impact hydrology.

4. NED projects which do not meet these criteria will require pre-construction coordination with LDNR Office of Coastal Management, and may require an individual consistency determination or other authorization.

   RESPONSE: Concur. Responses to LDNR's above cited specific concerns has been provided in the general description section prior to responses of individual Consistency Guidelines.

Details of the Nonstructural NED RP

The following process shall apply to property owners who are willing and determined by the NFS to be preliminarily eligible to have their residential structures elevated:

- Property owners must execute an authorization for entry which would grant USACE and the NFS authorization to enter in and upon the structure and land for purposes of investigating, inspecting, surveying, performing limited environmental testing and a hazardous, toxic, and radioactive waste (HTRW) assessment, evaluating the condition of the structure, determining elevation requirements, verifying the current elevation, performing an appraisal, and conducting other activities necessary for USACE to make a determination of structure eligibility;
- The property owner must submit satisfactory proof of ownership and a current Elevation Certificate;

- Title research and appraisals would be completed by the NFS. The property must have clear title. The property owner would be responsible to clear the title of all ownership issues and obtain any necessary subordination agreements from holders of liens, encumbrances, or third party interests at the property owner's sole expense; the failure to provide clear title shall result in a determination of ineligibility;
- An ASTM Phase I HTRW/Asbestos investigation (and if warranted, may be accompanied by additional HTRW investigations), inspections, surveys, and boundary monumentations would be completed. The land and the structure must be certified as "clean" by the appropriate State office before any Project funds may be expended. All asbestos must be abated and disposed of properly. Asbestos impacted by flood proofing would be removed at Project cost, while HTRW impacted by flood proofing must be remediated by the property owner prior to the initiation of the flood proofing work;
- After all inspections, investigations, assessments, and other activities are completed, a determination of eligibility for elevation would be made by USACE;
- A Flood-Proofing Agreement containing an easement(s) in favor of the NFS, that authorizes the Government, the NFS or their contractors to enter the property for purposes of implementing the flood-proofing action and for inspection and enforcement purposes, an agreement to hold harmless the NFS and the Government for any damages arising from the flood-proofing work, and a covenant running with the land shall be executed by all owners of the property. The covenant shall prohibit the conversion of any part of the structure located below the lowest habitable finished floor for human habitation and the alteration of the structure in any way to impede the movement of flood waters under the structure, as well as prohibiting the construction of any other structure in a manner that would impede the movement of floodwaters under the structure. The Flood-Proofing Agreement, together with the easement(s) and covenant running with the land, as well as any required subordination agreements, shall be recorded by the NFS in the public records of the Parish in which the property is located;
- After the Flood-proofing Agreement together with the easement and covenant and any required subordination agreements are recorded in the public records, the elevation of the structure would be commenced, completed, inspected, and after final approval by the District Engineer, a notice of construction completion would be issued to the NFS and the individual elevation project would be closed out as complete.

Elevation of eligible residential structures

Elevation of eligible residential structures would be performed "in place". The habitable floors would be raised to levels which would reduce risk to the residential structures from hurricane and storm surge flooding to reduce future losses by allowing the free movement of floodwaters beneath and around the raised structures. State and local building and zoning codes must be taken into consideration in the implementation process. Some zoning codes contain restrictions on "substantial improvements" to existing non-confirming structures which require that the entire structure be brought up to current building code requirements which may increase the costs beyond that of the elevation costs alone. In addition, zoning codes may have height restrictions for buildings in residential areas that might affect the ability of certain structures to be raised without obtaining a variance or other form of relief from the zoning code. Other eligibility considerations may include whether the structure is eligible for participation in another state, local, or Federal elevation program to avoid redundancy.

Dry flood-proofing of eligible non-residential structures

Dry flood-proofing consists of sealing all areas below the hurricane and storm surge flood damage risk reduction level of a structure to make it watertight and ensure that floodwaters cannot get inside by making walls, doors, windows and other openings impermeable to water penetration. Based on NFIP testing conducted at the Engineering Research and Development Center, dry flood-proofing can generally only be performed on the walls and portions of a conventionally built structure from the ground level to up to three feet. Walls are coated with sealants, waterproofing compounds, or plastic sheeting is placed around the walls and covered, and back-flow from water and sewer lines prevention mechanisms such as drain plugs,

standpipes, grinder pumps and back-up valves are installed. Openings, such as doors, windows, sewer lines and vents, may also be closed temporarily, with sandbags or removable closures, or permanently. Dry flood-proofing achieves hurricane and storm surge flood damage risk reduction but it is not recognized by the NFIP for any flood insurance premium rate reduction when applied to residential structures, and may not be used under the NFIP for new or substantially damaged buildings located in a Special Flood Hazard Area. A structural analysis of the wall strength is required to achieve higher level of risk reduction. Closure panels may be used at openings. This measure is viable for appropriate structures if design hurricane and storm surge flood depths are generally less than 3 feet, and hydrodynamic forces would also be a consideration. For structures with crawlspaces, the only effective way to dry flood-proof is to make the first floor impermeable to the passage of floodwater. Some common flood proofing measures include:

- Backflow valves;
- Closures on doors, windows, stairwells and vents--they may be temporary or permanent;
- Rearranging or protecting damageable property--e.g., relocate or raise utilities;
- Sump pumps and sub-drains; and
- Water resistant material; metal windows, doors and jambs; waterproof adhesives; sealants and floor drains.

The following process would apply to non-residential property owners who are willing and determined by the NFS to be preliminarily eligible to have their structures dry flood-proofed:

- Property owners who wish to have their structure dry flood-proofed must execute an authorization for entry using a form provided by the NFS which would grant USACE and the NFS authorization to enter in and upon the structure and land for purposes of investigating, inspecting, surveying, performing limited environmental testing and a HTRW assessment, evaluating the condition of the structure, determining flood-proofing requirements, verifying the current elevation, performing an appraisal, and conducting other activities necessary to make for USACE to make a determination of structure eligibility;
- The property owner must submit satisfactory proof of ownership and a current Elevation Certificate;
- Title research and appraisals would be completed by the NFS. The property must have a clear title. The property owner would be responsible to clear the title of all ownership issues and obtain any necessary subordination agreements from holders of liens, encumbrances, or third party interests at the property owner's sole expense; the failure to provide clear title shall result in a determination of ineligibility;
- An ASTM Phase I HTRW/Asbestos investigation, inspections (and if warranted, may be accompanied by additional HTRW investigations), surveys and boundary monumentations would be performed. The land and the structure must be certified as "clean" by the appropriate State office before any Project funds may be expended. All asbestos must be abated and disposed of properly. Asbestos impacted by flood-proofing would be removed at Project cost, while HTRW impacted by flood proofing must be remediated by the property owner prior to the initiation of the flood proofing work;
- After all inspections, investigations, assessments, and other activities are completed, a determination of eligibility for dry flood-proofing would be made by USACE;
- All property owners shall execute a Flood-Proofing Agreement containing an easement(s) in favor of the NFS, that authorizes the Government, the NFS or their contractors to enter the property for purposes of implementing the flood-proofing action and for inspection and enforcement purposes, includes an agreement to hold harmless the NFS and the Government for any damages arising from the flood-proofing work, and a covenant running with the land prohibiting the removal or alteration of the flood-proofing measures or the construction of additions to the existing structure or new structures that are not flood-proofed in accordance with the Project purpose. The Flood-Proofing Agreement, together with the easement(s) and covenant running with the land, as well as any required subordination agreements, shall be recorded by the NFS in the public records of the Parish in which the property is located;

- Each structure that is dry flood proofed must have an approved sanitary disposal system and be in compliance with local and state health and building codes;
- After the Flood-proofing Agreement together with the easement and covenant and any required subordination agreements are recorded in the public records, the dry flood-proofing work would be commenced, completed, inspected, and after final approval by the District Engineer, a notice of construction completion would be issued by to the NFS and the individual dry flood-proofing project would be closed out as complete.

Construction of localized storm surge risk reduction measures of less than 6 feet in height around industrial complexes and warehouses

These voluntary measures are intended to reduce the frequency of flooding but not eliminate floodplain management and flood insurance requirements. Localized storm surge risk reduction measures less than 6 feet in height installed around industrial complexes and warehouses that are eligible for the Project. These risk reduction measures could be constructed of earth, concrete, masonry, or steel and placed around a single structure or a contiguous group of structures. Some local governments may have adopted floodplain management rules that exceed the minimum requirements of the NFIP, and may limit the ability of certain flood-proofing measures to be constructed if the effects of the localized storm surge risk reduction measures create the potential for drainage problems by displacing flood storage. The following process would apply to willing non-residential property owners who are determined by the NFS to be preliminarily eligible to have localized storm surge risk reduction measures of less than 6 feet in height constructed around their industrial complex and/or warehouse:

- Property owners who wish to have localized storm surge risk reduction measures constructed around their industrial complex and/or warehouse must execute an authorization for entry using a form provided by the NFS which would grant USACE and the NFS authorization to enter in and upon the structure and land for purposes of investigating, inspecting, surveying, performing limited environmental and HTRW assessment, evaluating the condition of the land and structure, determining flood-proofing requirements, verifying the current elevation, performing an appraisal, and conducting other activities necessary for USACE to make a determination of eligibility for the construction of localized storm surge risk reduction measures;
- The property owner(s) must submit satisfactory proof of ownership and a current Elevation Certificate;
- Title research and appraisals would be completed by the NFS. The property must have clear title. The property owner(s) would be responsible to clear the title of all ownership issues and obtain any necessary subordination agreements from holders of liens, encumbrances, or third party interests at the property owner's sole expense; the failure to provide clear title shall result in a determination of ineligibility;
- An ASTM Phase I HTRW/Asbestos investigation (and if warranted, may be accompanied by additional HTRW investigations), inspections, surveys and boundary monumentations would be performed. The land and the structure must be certified as "clean" by the appropriate State office before any Project funds may be expended;
- After all inspections, investigations, assessments, and other activities are completed, a determination of eligibility would be made by USACE;
- All property owners shall execute a Flood-Proofing Agreement containing an easement(s) in favor of the NFS that authorizes the Government, the NFS or their contractors to enter the property for purposes of constructing the localized storm surge risk reduction measures and for inspection and enforcement purposes, includes an agreement to hold harmless the NFS and the Government for any damages arising from the construction of the localized storm surge risk reduction measures and a covenant running with the land prohibiting the removal or alteration of the localized storm surge risk reduction measures. The Flood-Proofing Agreement, together with the easement(s) and covenant running with the land and any required subordination agreements shall be recorded by the NFS in the public records of the Parish in which the property is located;
- After the Flood-proofing Agreement together with the easement and covenant and any required

subordination agreements are recorded in the public records, the localized storm surge risk reduction work would be commenced, completed, inspected, and after final approval by the District Engineer, a notice of construction completion would be issued by to the NFS and the individual flood-proofing project would be closed out as complete.

Hurricane storm surge damage risk reduction actions to be taken by the NFS in Calcasieu, Cameron, and Vermilion Parishes

Hurricane and storm surge flood damage risk reduction actions taken to comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12) would be the obligation of the NFS, which would work to ensure development, compliance, and enforcement by municipal and Parish governments in Cameron, Vermilion, and Calcasieu Parishes with local floodplain management plans and regulations, adoption of more stringent local floodplain regulations, adoption of more restrictive parish and municipal building codes, land use and zoning regulations, and other developmental controls. The NFS obligations in this regard include:

- Not less than once each year the NFS would inform affected interests of the extent of protection afforded by the Nonstructural NED RP;
- The NFS would participate in and comply with applicable Federal floodplain management and flood insurance programs;
- The NFS would comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires a non-Federal interest to prepare a floodplain management plan within one year after the date of signing the Project Partnership Agreement, and to implement such plan not later than one year after completion of construction of the Nonstructural NED RP, or functional elements of the Nonstructural NED RP. The plan shall be designed to reduce the impacts of future hurricane and storm surge flood events in the project area, including but not limited to, addressing those measures to be undertaken by non-Federal interests to preserve the level of hurricane storm surge risk reduction provided by the Nonstructural NED RP. The NFS would provide an information copy of the plan to the Government upon its preparation; and
- The NFS would publicize floodplain information in the area concerned and would provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with hurricane and storm surge flood risk reduction levels provided by the Nonstructural NED RP.

Additionally, the NFS would be obligated to prevent obstructions or encroachments on the properties that have been flood-proofed (including prescribing and enforcing regulations to prevent such obstructions or encroachments) or the addition of facilities which might reduce the level of protection the Nonstructural NED RP affords, hinder operation and maintenance of the Nonstructural NED RP, or interfere with the Nonstructural NED RP's proper function.

Presently, Calcasieu Parish, Cameron Parish, and Vermilion Parish, including the cities and towns of Abbeville, Dequincy, Delcambre, Erath, Iowa, Kaplan, Lake Charles, Maurice, Sulphur, Vinton, and Westlake are all communities participating in the NFIP (See FEMA Community Status Book, Louisiana June 2015).

Residential Structure Elevation Criteria

Property owners who wish to have their residential structure elevated must currently own both the structure and the land on which the structure is located. Proof of ownership shall require a Certificate of Title and a Certificate of Mortgage that identifies the names of all of the owners of the property, as well as any third party interest holders and any holders of a lien or encumbrance against the property. Additionally, the property owner shall provide written verification from the tax assessor that no taxes are due and payable on the property, as well as documentation from any holder of a mortgage, lien, or encumbrance, that the mortgage, lien, or encumbrance is in good standing or has been satisfied and released. Residential structures that are eligible for elevation and the property owner(s) must meet the following eligibility criteria:

1. The structure is in a condition suitable for human habitation;

2. The property has a clear title;
3. The property is not located in a Regulatory Floodway or on Federal leased land;
4. The structure can be elevated to meet the required BFE so that the habitable floors are raised to levels which would protect the residential structures from storm surge flooding to reduce future losses from the likelihood of the 100-Year Flood Event to the extent practicable. However, in no event would a structure be raised greater than 13 feet above the ground level;
5. The structure and land is not contaminated with HTRW or materials;
6. The property owner is willing to enter into a Flood Proofing Agreement and execute the required easements and restrictive covenant running with the land;
7. Based on a visual assessment, the structure does not have signs of actual or potential significant structural defects, distress, or failure (i.e., no evidence of corrosion of steel framing or concrete; no water or insect damage to wood framing; no framing that is in obvious need of repair or replacement, no settlement, cracking, buckling, or collapse of the foundation; no damage to load bearing or masonry walls; no damage to veneer or siding, no evidence of unrepaired roof leaks, etc.);
8. The property owner does not owe taxes or other debts to any state or local governmental entity or to the Federal government;
9. The property is located in a community that participates in the NFIP and the property owner has a current Elevation Certificate;
10. The property owner has not previously received any disaster assistance for the elevation of the structure;
11. The structure complies with the building code and floodplain management codes under which the structure was originally permitted;
12. The property owner is willing to expend any costs that may be necessary in connection with the elevation of the structure which are not eligible costs;
13. There are no special considerations or unique circumstances which prohibit elevation;
14. The property owner agrees to insure the elevated home to an amount at least equal to the maximum limit of coverage made available with respect to the particular property, whichever is less, through the NFIP as long as the property owner holds title to the property; and
15. The property owner, and all successors in title to the property owner, agree to record notice to subsequent purchasers and lien holders in the appropriate jurisdiction's land records that includes the name of the current property owner (including book/page reference to record of current title, if readily available), a legal description of the property, and the following statement of flood insurance requirements:

    This property has received Federal elevation assistance. Federal law requires that flood insurance coverage on this property must be maintained during the life of the property regardless of transfer of ownership of such property. Pursuant to 42 U.S.C. §5154a, failure to maintain flood insurance on this property may prohibit the owner from receiving federal disaster assistance with respect to this property in the event of a flood disaster. The property owner is also required to maintain this property in accordance with the flood plain management criteria of Title 44 of the Code of Federal Regulations Part 60.3 and the floodplain management regulations adopted by the community within which this property is located.

Failure to abide by the above conditions may prohibit the property owner and/or any subsequent purchasers from receiving Federal disaster assistance with respect to the property in the event of any future flood disasters. Residential structures which have been designated as a "Severe Repetitive Loss" property in accordance with FEMA criteria, are eligible for elevation.

If a property owner and/or the property owner's family member who is an occupant of the structure, is physically disabled or has mobility impairments such as in the case of elderly homeowners, a physician actively licensed by the state of Louisiana and in good standing must provide a written medical opinion and confirmation that special handicapped access is required before any means of special access may be included in the elevation. Multiple special access points are eligible for funding where necessary to meet state or local building code compliance. Where ramps are used to provide access, the ramps shall be designed to meet Federal

standards for slope and width. Where ramps are not technically feasible, a mechanical chairlift may be installed. Special access features shall be subject to state and local building and other applicable codes.

Tenants who reside in structures being elevated may be eligible for certain benefits in accordance with Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs of 1970, Public Law 91-646, 84 Stat. 1894 (42 U.S.C. 4601), as amended by the Surface Transportation and Uniform Relocation Assistance Act of 1987, Title IV of Public Law 100-17, 101 Stat. 246-256; 49 Code of Federal Regulations 24; and HUD Handbook 1378 (collectively referred to as the URA). The URA provides for different replacement housing payments based on a displaced person's occupancy status and length of occupancy. Temporary relocation should not extend beyond one year before the person is returned to his or her previous unit or location. Any residential tenant who has been temporarily relocated for more than one year must be offered all permanent relocation assistance which may not be reduced by the amount of any temporary relocation assistance previously provided. Appropriate advisory services, including reasonable advance written notice of the following:

- Date and approximate duration of the temporary relocation;
- Address of the suitable decent, safe, and sanitary dwelling to be made available for the temporary period;
- Terms and conditions under which the tenant may lease and occupy a suitable decent, safe and sanitary dwelling in the building/complex upon completion of the project;
- Provisions of reimbursement for all reasonable out of pocket expenses incurred in connection with the temporary relocation;
- In addition to relocation advisory services, residential displaced persons may be eligible for other relocation assistance including relocation payments for moving expenses and replacement housing payments for the increased costs of renting or purchasing a comparable replacement dwelling; and
- All temporary housing costs must be approved in advance in writing by the NFS.

Nonstructural NED RP Implementation Methods

Traditional method. The "traditional method" of implementation is generally described in publications of the USACE National Flood Proofing Committee and Flood Risk Management Planning Center of Expertise. Under the traditional method, the USACE District utilizes a Federal procurement to obtain design and construction contractors for the various flood-proofing measures. The property owner enters into a Flood Proofing Agreement, which contains an easement for inspection and enforcement and a restrictive covenant running with the land in favor of the NFS and/or USACE. The form of the Agreement (and easement and covenant) would be prepared during PED and would be submitted to CEMVD and HQUSACE for review and approval. The Agreement would identify among other things, a "not-to-exceed" dollar amount, the Government contractor performing the flood proofing work, restrictions on the future development and alteration of the structure after the flood proofing work is completed, and requirements for compliance with local flood management regulations and/or the NFIP. The Agreement would require the property owners and their heirs and assigns, to covenant, warrant, and agree to forever release, discharge, indemnify, defend, and hold and save harmless USACE and the NFS (and their contractors) from and against any liability or any claim of any kind or nature whatsoever which might arise out of the work performed on the structure in connection with the Project, and any damages or injuries resulting either directly or indirectly from any elevation work and/or any flooding of the land or of the structure. In addition, the Agreement would authorize right of entry to the property and the structure by the NFS and USACE for the elevation work. The Agreement and the "Residential Structure Elevation Covenant Running With The Land" shall prohibit future alteration or new construction for human habitation on the property at an elevation lower than the predicted 2075 100-year BFE and shall contain the following restrictions: (a) upon completion of the elevation work, no part of the structure located below the level of the lowest habitable finished floor would thereafter be converted to living area for human habitation, or otherwise altered in any manner which would impede the movement of waters beneath the structure; (b) the area below the predicted 2075 100-year BFE shall be used solely for the parking of vehicles, limited storage, or access to the structure and would never be used for human habitation; (c) that mechanical,

electrical or plumbing devices shall not be installed below the BFE. These restrictions and the following statement must be specifically included in every deed and instrument that conveys or purports to convey title to or any interest in the land or structures thereon which is executed subsequent to the execution of the covenant:

> *This property has received Federal elevation assistance. Federal law requires that flood insurance coverage on this property must be maintained during the life of the property regardless of transfer of ownership of such property. Pursuant to 42 U.S.C. §5154a, failure to maintain flood insurance on this property may prohibit the owner from receiving Federal disaster assistance with respect to this property in the event of a flood disaster. The property owner is also required to maintain this property in accordance with the flood plain management criteria of Title 44 of the Code of Federal Regulations Part 60.3 and the floodplain management regulations adopted by the community within which this property is located.*

The executed Agreement would be recorded with an elevation certificate in the public records of the jurisdiction where the property is located.

The Government would procure contracts that would allow a contractor to perform flood-proofing work on multiple structures through a series of one or more task orders and who would be responsible for all work associated with the elevation from approval of the elevation plans for each structure to final inspection. A notice of construction completion would be provided at the appropriate time for each flood-proofed structure through an official letter from the District Engineer to the NFS. The NFS would maintain a copy of recorded elevation certificate and a certified copy of the original recorded Flood Proofing Agreement. The final inspection checklist shall be signed by the local floodplain administrator/coordinator. Upon completion of the flood-proofing of each structure, a Notice of Construction Completion is issued by USACE to the NFS, and the NFS is responsible for ensuring and maintaining compliance with any enforceable restrictions for the structure and property. The property owner is required to operate and maintain the integrity of their specific nonstructural measures.

A Certificate of Occupancy must be issued by a qualified building official to certify that the construction was properly completed. When the elevation work is completed, all structures must be covered by flood insurance in an amount at least equal to the costs of the flood-proofing work or to the maximum limit of coverage made available with respect to the property, whichever is less. Upon completion of the elevation, the property owner must provide USACE with an NFIP Elevation Certificate prepared by a professional land surveyor and verifying that the structure has been elevated to the required elevation and any elevation certificates showing the elevation level before the structure was elevated.

Elevation Costs

Eligible Elevation Costs. Property inspections would be conducted for eligible properties whose property owners have submitted the required proof of ownership and Elevation Certificate. The inspection does not guarantee acceptance of the structure for elevation. A determination that a structure is qualified for elevation would be made after all inspections, investigations, assessments, title research and all other work required to determine eligibility for elevations is complete and prior to the development of the elevation scope of work. If additional work is required as a condition of building permit issuance, and if such work is not listed as eligible above, the property owner would be required to provide funds equal to the amount of the cost to complete the required work. In no event shall the structure be elevated, if it is formally determined that the structure is not physically sound and capable of being raised safely.

Structure elevation work that are eligible costs shall include actual costs (itemized costs for each task), including but not limited to: design costs, costs of obtaining all required permits (i.e., zoning or land use approvals; environmental permits or required certifications; historic preservation approvals; and building permits), and costs of title searches, surveys, appraisal fees, Louisiana state sales tax, and costs for the following tasks:

- raising the structure;
- raising the roof and extending the walls of a side structure attached to the main structure (i.e., garage);

- raising mechanical equipment (i.e., air conditioner, furnace, water heater, electrical panel, fuel storage, valves, or meters);
- connecting, disconnecting, and extending utility connections for electrical power, fuel, incoming potable water, wastewater discharge;
- meeting access requirements of applicable building codes (i.e., stairs with landings, guardrails);
- creating large vent openings in the foundation and walls to meet requirements for flood water entry and exit;
- completing an Elevation Certificate to verify the as-built relationship between the lowest habitable finished floor and the Base Flood Elevation;
- only trees which restrict the demolition and reconstruction work on any structure may be removed;
- relocation assistance funds for displaced tenants are available to cover some expenses incurred during the actual raising of the structure for a period of no more than 90 days;
- debris removal (all demolition debris (hazardous and non-hazardous) shall be removed and taken to an approved landfill);
- site grading and site restoration including restoring landscaping to its preconstruction condition; and
- temporary site protection measures such as temporary construction fencing.

Ineligible Costs. The costs associated with the following tasks are ineligible:

- any work not strictly necessary for the safe completion of the structure elevation;
- any repair of existing deficiencies, including structural and system deficiencies;
- modifications or improvements to a septic system except for extension of lines from the raised structure to the existing system;
- cost for elevation of more than one foot above Base Flood Elevation;
- modifications to structures that are not attached to the structure;
- modifications to tubs, pools, spas, hot tubs, and related structures or accessories;
- modifications to decks and patios except for modifications that are expressly required by building codes (i.e., stairways and landing modifications);
- environmental site remediation costs are not eligible;
- costs to bring a non-conforming structure into compliance with current building code, housing code and/or other applicable codes;
- unless a satisfactory medical opinion if provided by a duly licensed physician that special access is required for a handicapped or mobility challenge property owner or the property owner's family member residing in the home, costs associated with special access improvements such as elevators, lifts, ramps, etc.;
- structures not considered the primary residence (i.e., detached garage, shed and/or barns); and
- if the elevation or alteration through flood-proofing methods would preclude the structure's continued designation as an "historic structure" or would be damaging to the historical character or value of the structure as determined by the Louisiana State Historic Preservation Office.

Methods for Prioritizing Nonstructural Elevation Work

The method for scheduling or prioritizing the implementation of voluntary non-structural elevation work would be determined during the period of PED. Any implementation of a decision on scheduling or prioritization would be subject to the availability of Federal funds. Some of the methods for scheduling or prioritizing non-structural elevation work that would be considered are as follows; however, additional methods of scheduling or prioritizing such work may be considered:

Clustering. If numerous property owners in a contiguous neighborhood or subdivision agree to participate, that particular area could be targeted for priority in structure elevation implementation. A focus on clustered properties can create a ranking hierarchy of which properties to address first. The size of a cluster would need

to be defined but could consist of zip codes or neighborhoods. This approach would rank efficiency as the main factor in determining which eligible properties should be prioritized.

Risk-Level. Willing property owners may not exist in clusters. In such cases, an alternative option is to focus on the willing property owners that exhibit the highest risk for flood damages. For example, if 1,000 property owners execute Flood-Proofing Agreements, the owners who reside in the 0-5-year floodplain would be prioritized for construction. Once these properties are elevated, the next highest-risk properties (6-10-year floodplain) would be targeted. This approach would rank risk exposure as the main factor in determining which eligible properties should be prioritized.

First-Come, First-Served. This approach would involve creating a list of eligible property owners and ranking them by how quickly their contracts and eligibility documentation are processed. This approach would help ensure that resources would be used effectively by focusing on properties that have owner support for the flood-proofing measures.

NATIONAL ECOSYSTEM RESTORATION (NER) PLAN

The National Ecosystem Restoration Recommended Plan (Alternative CM-4) is the Small Integrated Restoration Alternative. The NER RP is a comprehensive ecosystem restoration plan addressing land loss problems and ecosystem degradation. The NER RP is cost effective, and is the least cost comprehensive best buy plan. The NER RP would minimize land loss, enhance plant productivity by reducing major stressors, and reinforce and protect critical landscape features. The NER RP includes hydraulic dredging and placement of dredged borrow sediments for marsh restoration, placement of geotextile fabric and rock for shoreline protection/stabilization, and planting trees for chenier reforestation. All of the project measures are independent, but would work synergistically together with other existing ecosystem restoration projects in the area and facilitate hydrologic and geomorphic stability and resilience in the project area**.** The NER RP would cost approximately $982 million. Marsh restoration measures would be constructed in Calcasieu, Cameron and Vermilion Parish at an approximate cost of $622 million. Shoreline protection/stabilization measures and chenier reforestation measures would both be constructed in Cameron and Vermilion Parishes at approximate costs of $360 million and $246,000, respectively.

Table 1 provides a brief description of NER RP measures. **Figures 3** and **4** depict the locations of NER RP measures in the project area. **Table 2** presents the major changes to the NER RP between what was reported in the Revised Integrated Draft Report Consistency Determination as compared to the Integrated Final Report Consistency Determination. **Tables 3**, **4,** and **5** provide details regarding quantities for each NER RP measure. **Table 6** provides borrow site dimensions for marsh restoration.

There are a total of 49 ecosystem restoration features or measures:

- 9 Marsh Restoration measures
- 35 Chenier Reforestation measures;
- 5 Shoreline Protection measures
- The Calcasieu Ship Channel Salinity Barrier measure is being recommended for long-term study.
- The Cameron-Creole Spillway Salinity Control Structure measure is being recommended for long-term study.
- Two marsh restoration measures, located partially on U.S. Fish and Wildlife Service (USFWS) properties, are recommended for construction by the USFWS. Measure 124d Marsh Restoration at Mud Lake would be located on Sabine National Wildlife Refuge (NWR). Measure 3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel would be located on the Cameron Prairie NWR (**Figure 5**).

Table 1. NER RP Measure Descriptions

Basin	Category	Measure	Description
Mermentau/Teche-Vermilion (Plan M-4)	Marsh Restoration	47a1	Marsh restoration using dredged material south of LA-82, about 4.5 miles east of Grand Chenier. 933 marsh acres would be restored and 88 acres (272 AAHUs) would be nourished from 3M cubic yards of dredged material with one nourishment cycle.
		47a2	Marsh restoration using dredged material south of LA-82, approximately 4.5 miles west of Grand Chenier. 1,297 marsh acres would be restored and 126 acres (381 AAHUs) would be nourished from 8.8M cubic yards of dredged material with one nourishment cycle.
		47c1	Marsh restoration using dredged material south of LA-82, approximately 4.5 miles west of Grand Chenier. 1,304 marsh acres (353 AAHUs) would be restored and 4 acres would be nourished from 8.6M cubic yards of dredged material with one nourishment cycle.
		127c3	Marsh restoration at Pecan Island, west of the Freshwater Bayou Canal and approximately 5 miles north of the Freshwater Bayou locks. 832 marsh acres would be restored and 62 acres (241 AAHUs) would be nourished from 7.3M cubic yards of dredged material with one nourishment cycle.
		306a1	Rainey marsh restoration at Christian Marsh, east of the Freshwater Bayou Canal and approximately 5 miles north of the Freshwater Bayou locks. 627 marsh acres would be restored and 1,269 acres (151 AAHUs) would be nourished from 8.1M cubic yards of dredged material with one nourishment cycle.
	Shoreline Protection/ Stabilization	6b1	Gulf shore protection/stabilization from Calcasieu River to Freshwater Bayou. 11.0 miles of Gulf shore protection consisting of a reef breakwater with a lightweight aggregate core. Located ~150 ft offshore consisting of geotextile fabric and stone built to an 18 ft crest width. Measure would protect 2,140 acres (625 AAHUs) of brackish marsh.
		6b2	Gulf shore protection/stabilization from Calcasieu River to Freshwater Bayou. 8.1 miles of Gulf shoreline protection consisting of a reef breakwater with a lightweight aggregate core. Located ~150 ft offshore using geotextile fabric and stone built to an 18 ft crest width. Measure would protect 1,583 acres (466 AAHUs) of brackish marsh
		6b3	Gulf shore protection/stabilization from Calcasieu River to Freshwater Bayou. 6.3 miles of Gulf shoreline protection consisting of a reef breakwater with a lightweight aggregate core. Located ~150 ft offshore using geotextile fabric and stone built to an 18 ft crest width. Measure would protect 1,098 acres (312 AAHUs) of brackish marsh.
		16b	Fortify spoil banks of Freshwater Bayou. Approximately 13.4 miles of rock revetment at three critical locations to prevent shoreline breaching. Rock revetment would be built to +3 ft with a 4 ft crown. Two maintenance lifts would be required. Measure would protect 1,288 acres (279 AAHUs) of brackish marsh.
	Chenier Reforestation	CR	13 separate chenier locations would be replanted. Approximately 435 seedlings per acre, at 10 ft x 10 ft spacing, with invasive species control incorporated.
Calcasieu/ Sabine (CM-4) (Includes all measures in this table)	Marsh Restoration	3a1	Beneficial use of dredged material from the Calcasieu Ship Channel. Located adjacent to the south shore of the GIWW west of the Calcasieu Ship Channel near Black Lake. Restore 599 marsh acres (191 AAHUs) with 5.3M cubic yards of dredged material with one renourishment cycle.
		3c1	Beneficial use of dredged material from the Calcasieu Ship Channel. Located adjacent to the eastern rim of Calcasieu Lake and situated within the Cameron-Creole Watershed area. 1,347 marsh acres would be restored and 743 acres would be nourished (607 AAHUs) from 9.4M cubic yards of dredged material with one renourishment cycle.
		124c	Marsh restoration at Mud Lake. Located adjacent and north of Highway 82 and east of Mud Lake. 1,908 marsh acres would be restored and 708 acres (500 AAHUs) would be nourished from 10.4M cubic yards of dredged material with one renourishment cycle.

Basin	Category	Measure	Description
		124d	Marsh restoration at Mud Lake. Located west of the Calcasieu Ship Channel and adjacent to the south rim of West Cove. 159 marsh acres would be restored and 448 acres would be nourished (4 AAHUs) from 1.4M cubic yards of dredged material with one renourishment cycle.
	Shoreline Protection/ Stabilization	5a	Holly Beach Shoreline Stabilization Breakwaters. Construction of 8.7 miles of rock and low action breakwaters and is a continuation of existing breakwaters. Crown elevation of +3.5 ft with a crown width of 24 ft. Two maintenance lifts would be required. Measure would protect 26 acres (56 AAHUs) of saline marsh
	Chenier Reforestation	CR	22 separate chenier locations would be replanted. Approximately 435 seedlings per acre, at 10 ft x 10 ft spacing, with invasive species control incorporated.

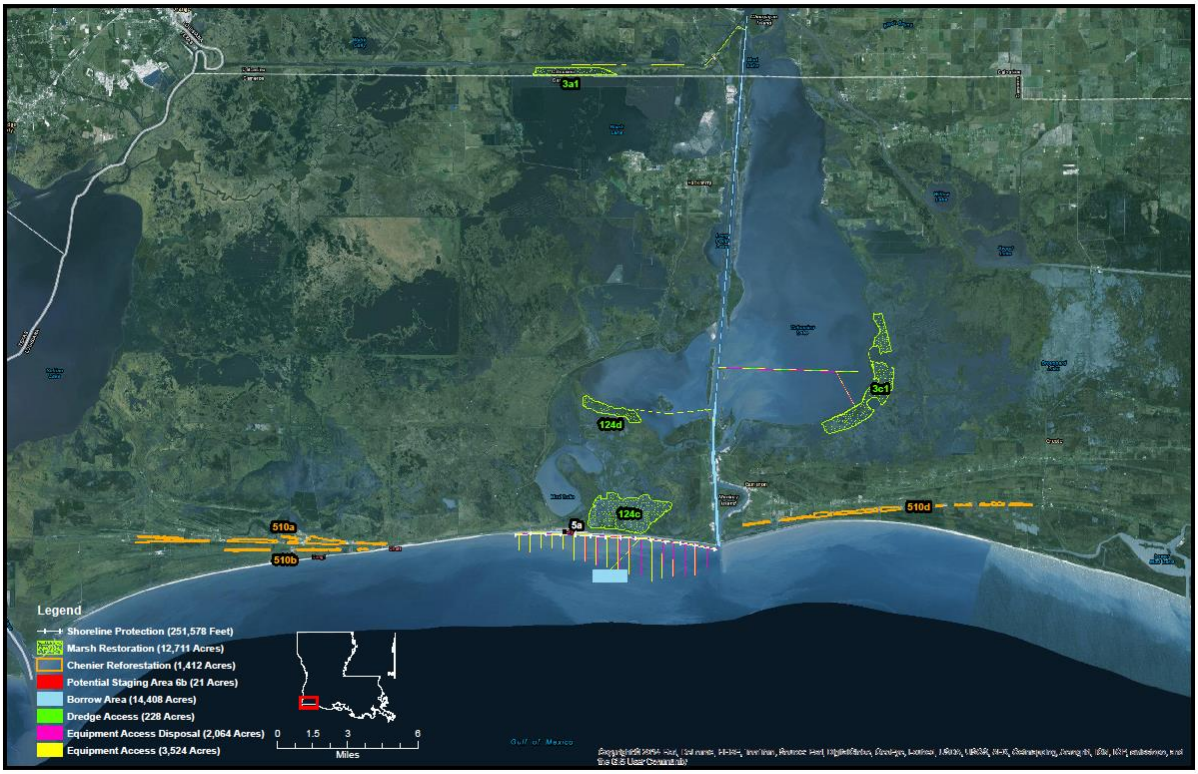

Figure 3. NER RP measures in western portion of study area.

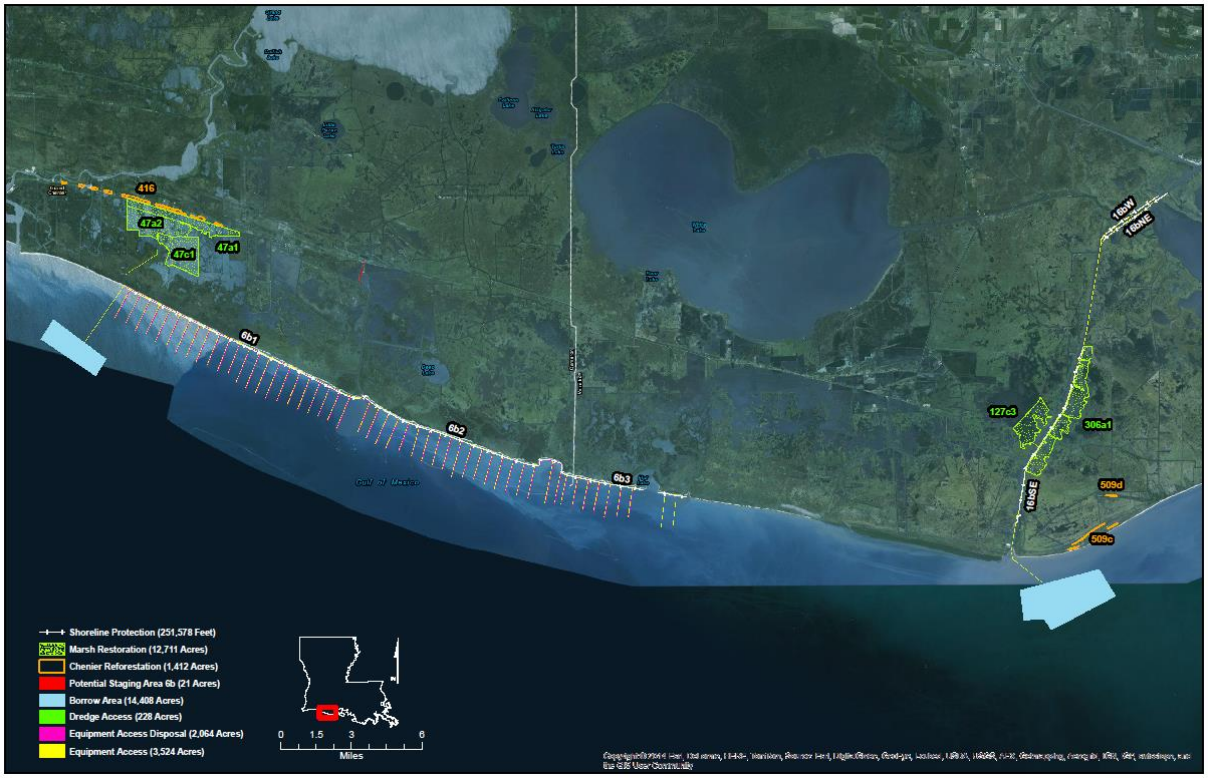

Figure 4. NER RP eastern portion of study area.

Table 2. Major Changes to NER RP

Item	Revised Integrated Draft Report & EIS	Integrated Final Report & EIS
General	Draft NED Plan recommended for programmatic authorization. Draft NER Plan recommended for construction authorization	Both Nonstructural NED and NER RP recommended for construction authorization.
Measure 7	Included	Recommended for separate analysis, and removed from RP.
Measure 74a	Included	Recommended for separate analysis, and removed from RP.
Measure 16b	156 AAHU; 662 net acres	Corrected to 279 AAHU; 1,288 net acres
Measure 306a1	645 AAHU	Corrected to 151 AAHU
Measure 3c1	607 AAHU; 1,324 net acres	Removed CWPPRA benefits; corrected to 607 AAHU & 1,324 net acres.
Measure 124c	472 AAHU; 1,245 net acres	Removed CWPPRA benefits; corrected to 500 AAHU & 1,228 net acres.
Salinity Patterns		Hydro-salinity measures which could influence salinity patterns are being recommended for additional separate study.
Sediment Transport		Hydro-salinity measures which could influence sediment transport are being recommended for additional separate study.
Pipeline Placement		Additional information on dredge pipeline placement and use of marsh buggies.
Impoundment		Additional information on retention/exclusion dikes provided.
Oil, Gas, and Other Mineral Activities		Additional information on oil, gas, other mineral activities in area.
Mitigation Areas		Additional information included lists and graphic displays of existing mitigation projects located near NER RP measures.

Table 3. Details of the marsh restoration features of the TSP (See Appendix K for fact sheets and maps detailing each NER TSP marsh restoration feature).

Measure Number	Measure Name	Basin	Marsh Type	Acres Restored	Acres Nourished	Total Acres	Net Benefits (acres)	Average Annual Habitat Units (AAHU)	Borrow Volume (cy)	Borrow Area (acres)	Renourishment Volume (cy)	Initial Construction Costs (US $)	TY 30 Renourishment (US $)
3a1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	Calcasieu	Brackish	599	-	599	454	191	5,339,286	139	1,000,000	$66,593,748	$17,759,470
3c1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	Calcasieu	Brackish	1,347	734	2,081	1,324	607	9,458,313	314	3,651,841	$168,194,346	$70,984,253
47a1	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	Brackish	933	88	1,021	895	272	3,022,782	1,716[1]	1,500,000	$105,234,982	$21,239,680
47a2	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	Brackish	1,297	126	1,423	1,218	381	8,831,084	1,716[1]	1,500,000	$97,348,440	$17,585,890
47c1	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	Brackish	1,304	4	1,308	1,135	353	8,557,120	1,716[1]	1,800,000	$95,372,834	$14,981,607
124c	Marsh Restoration at Mud Lake	Calcasieu	Saline	1,077	708	1,837	1,228	500	10,369,956	531	2,001,611	$112,219,520	$24,680,885
124d	Marsh Restoration at Mud Lake	Calcasieu	Brackish	159	448	607	168	4	1,420,943	378	1,200,000	$28,882,160	$17,636,205
127c3	Marsh Restoration at Pecan Island	Mermentau	Brackish	832	62	894	735	241	7,301,057	3,950[2]	781,000	$61,662,041	$15,683,451
306a1	Rainey Marsh Restoration Southwest Portion (Christian Marsh)	Mermentau	Brackish	627	1,269	1,896	743	151	8,128,181	3,950[2]	3,500,000	$75,885,692	$37,551,555
	Totals			8,175	3,439	11,666	7,900	2,700	62,428,722	7,028	16,934,452	$811,393,763	$238,102,996

3- This borrow source provides the sediment for all three restoration features but the full amount of available material will not be dredged each cycle. Therefore this total acreage is only counted once in the column total.

4- This borrow source provides the sediment for both restoration features but the full amount of available material will not be dredged each cycle. Therefore this total acreage is only counted once in the column total.

(Table 3 continued)

Measure Number	Measure Name	Impact to State Water Bottoms permanent (acres)	Floatation Footprint (acres)	Disposal Footprint (acres)	Dike Footprint (feet)	Dike Footprint (acres)	Impact to State Water Bottoms (temporary)	Dredge Pipeline Route (feet)	Dredge Pipeline Route (acres)	Piping Plover Critical Habitat (temporary impact acres)	Construction Period
3a1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	139	132	-	44,700	30.8	-	43,942	30	-	16 months
3c1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	314	182	-	97,250	51.4	-	61,497	42	-	33 months
47a1	Marsh Restoration Using Dredged Material South of Highway 82	1,716	47	-	68,300	47.0	-	35,519	24	0.14	23 months
47a2	Marsh Restoration Using Dredged Material South of Highway 82	1,716	47	-	41,000	28.2	-	30,898	21	0.14	24 months
47c1	Marsh Restoration Using Dredged Material South of Highway 82	1,716	47	-	35,200	24.2	-	29,858	21	0.14	23 months
124c	Marsh Restoration at Mud Lake	531	28	-	78,100	31.5	-	9,485	7	1.8	27 months
124d	Marsh Restoration at Mud Lake	314	182	-	32,500	22.4	-	21,452	15	-	9 months
127c3	Marsh Restoration at Pecan Island	3,950	110	-	46,000	31.7	-	37,074	26	-	12 months
306a1	Rainey Marsh Restoration Southwest Portion (Christian Marsh)	3,950	178	-	108,000	74.4	-	59,731	41	-	17 months
	Totals	14,347	953		551,50	341.6		329,456	227	2.2	---

Table 4. Details of the shoreline protection features of the TSP (See Appendix K for fact sheets and maps detailing each NER TSP shoreline protection feature).

Measure Number	Measure Name	Basin	Marsh Type	Net Benefits (acres)	Average annual habitat units (AAHU)	Shoreline Feature Length (ft)	Rock (tons)	Grade Rock (lbs)	Geotextile Fabric (sq yds)	Lightweight Aggregate (tons)	1st Maintenance Lift (tons)	2nd Maintenance Lift (tons)	Initial Construction Costs (US $)	TY15 Maintenance (US $)
5a	Holly Beach Shoreline Stabilization – Breakwaters	Calcasieu	Saline	26	56	46,014	860,540	250	386,460	0	129,081	86,054	$144,044,021	$16,786,222
6b1	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	Brackish	2,140	625	58,293	868,480	250	447,830	479,150	86,848	0	$198,480,921	NA
6b2	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	Brackish	1,583	466	42,883	687,140	250	363,270	357,010	68,714	0	$145,876,561	NA
6b3	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	Brackish	1,098	312	33,355	561,530	250	244,205	279,030	56,153	0	$115,270,890	NA
16b	Fortify Spoil Banks of the GIWW and Freshwater Bayou	Mermentau	Brackish	1,288	279	70,983	617,640	250	516,860	0	92,646	61,764	$36,018,600	$5,695,468
	Totals			6,135	1,738	251,528	3,595,330		1,958,625	1,115,190	433,442	147,818	$639,690,993	$22,481,690

(Table 4 continued)

Measure Number	Measure Name	TY 25 Maintenance (US $)	Impacts to State Water Bottoms (permanent)	Breakwater Footprint (feet)	Flotation Footprint* (acres)	Temporary Disposal Footprint* (acres)	Impact to State Water Bottoms (temporary acres)	Critical Habitat (acres)	Temporary Staging Area (acres)	Crown Elevation (feet NAVD88)	Crown Width (feet)	Slopes	Aprons (feet)	Construction Period
5a	Holly Beach Shoreline Stabilization – Breakwaters	$11,247,740	57.4	57.4	479	462	941	-	-	3.50	24	2:1	10-ft front & 6-ft back	19 months
6b1	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	$15,389,345	65.9	65.9	725	711	1436	-	21	3.25	18	2:1	10-ft front & 6-ft back	31 months
6b2	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	$11,343,672	40.2	40.2	507	497	1004	-	21	3.25	18	2:1	10-ft front & 6-ft back	23 months
6b3	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	$9,041,421	37.8	37.8	372	289	661	-	21	3.25	18	2:1	10-ft front & 6-ft back	18 months
16b	Fortify Spoil Banks of the GIWW and Freshwater Bayou	$3,966,404	77.1	77.1	358	-	-	-	-	3.00	4	4:1	none	13 months
	Totals	$50,988,582	278.4	278.4	2,441	1,959	4,042	-	63	-	-	-	-	---

**- Access for heavy equipment to construct shoreline stabilization features consists of dredging a channel in open water to allow construction equipment to reach shoreline areas and placing the dredged material alongside the channel so the necessary channel depth is maintained. This material stored adjacent to the channel will be returned to the access channel after construction. These impacts are temporary and will naturally revert to existing conditions over time.*

(Table 4 continued)

Linear Feet for Access and Temporary Disposal							
Measure	**5a**	**6b1**	**6b2**	**6b3**	**16b***	**Total Feet**	**Miles**
Disposal	159,741	239,001	168,533	98,683	0	665,958	126.1
Equipment Access	161,957	244,857	173,050	126,542	0	706,406	133.8

**- No dredging or temporary disposal is anticipated for Feature 16b since Freshwater Bayou has adequate water depths to allow the necessary construction equipment access.*

Table 5. Details of the chenier reforestation features of the TSP (see Appendix K for fact sheets and maps detailing the NER TSP chenier reforestation features).

Measure Name	Net Benefits (acres)	Benefits (AAHU)	Species	Total Fence Length (feet)	Fence Height (feet)	Planting Density (#/acre)	Spacing (feet)	Min. Survival % at Year 4*	Equip-ment Access Corridor (feet)	Equip-ment Access Corridor (acres)	State Water Bottoms (permanent)	State Water Bottoms (tempor-ary)	Critical Habitat (acres)	Staging Area (acres)
Chenier Reforestation (CR)	1,413	538	Live Oak; Hackberry	150,000	7.5	435	10 x 10	57%	13,867	10	0	0	0	0

**- For a given planting, a minimum of 250 seedlings/saplings per acre must be present (with a 60 to 40 hard mast to soft mast ratio) at the end of the fourth year (i.e., Year 5) following successful attainment of the one-year survivorship criteria. Costs to ensure the minimum survival percent are considered 'construction' and will be cost-shared accordingly.*

Table 5. Southwest Coastal Louisiana Study Borrow Site Dimensions

Marsh Restoration Measures	Length by Width (ft)[1]	Borrow Area (acres)	Borrow Area Cut depth (ft)	Access Route Length by Width (ft)	Access Route Area (acres)	Access Route Cut Elevation (ft)[2]
3a1	USACE authorized channel dimensions			No dredging required for access		
3c1	USACE authorized channel dimensions			3,500 x 96	7.7	-8
47a1, 47a2, 47c1[3]	4,922 x 14,855	1,679	-15	10,000 x 96	22	-8
124c	2,937x7,880	531	-15	4,000 x 96	8.8	-8
124d	USACE authorized channel dimensions	USACE authorized channel dimensions		21,453 x 96	47.3	-8
127c3[4]	11,516 x 18,655	4,932	-15	1,400 x 96	2.2	-8
306a1[4]	11,516 x 18,655	4,932	-15	No dredging required for access		

[1]- Impacts to the shoreline due to the off shore borrow areas would be modeled in the PED Phase. Presently all off shore borrow areas were delineated, based on previous engineering experience, to have no significant impacts to the existing shoreline.
[2]-All excavated access routes would be backfilled upon construction completion.
[3]- These restoration features will utilize the same borrow source for construction but at different times.
[4]- These restoration features will utilize the same borrow source for construction but at different times.

Marsh Restoration Measures

Proposed marsh restoration measures are located in fragmented, degraded and low quality interior fragmented marshlands throughout the entire study area. Each of the nine marsh restoration measures involves dredging sediments and disposing into shallow open water and/or fragmented marsh areas (minimum of 100 acres) that have water levels of less than 2 feet and that have been optimized to preserve or restore critical geomorphologic features to create new vegetated wetlands. The nine marsh restoration measures would initially create (8,175 acres) and nourish (3,439 acres) a total of approximately 11,666 acres, resulting in an estimated 7,900 net acres and 2,700 average annual habitat units (AAHUs) restored and nourished over the 50 year period of analysis. Dredged borrow sediment sources would be the Calcasieu Ship Channel and other nearby sites located immediately offshore in the Gulf of Mexico (see **Figures 3** and **4,** attached Fact Sheets and Appendix K in the Integrated Final Report). The locations of the nine marsh restoration measures include:

- three areas on the south side of Highway 82 approximately 4.5 miles west of Grand Chenier;
- Pecan Island west of the Freshwater Bayou Canal approximately 5 miles north of the Freshwater Bayou locks;
- Christian Marsh located east of Freshwater Bayou Canal and approximately 5 miles north of Freshwater Bayou locks;
- southern shoreline of GIWW west of Calcasieu Ship Channel near Black Lake;
- eastern rim of Calcasieu Lake within the Cameron-Creole Watershed;
- east of Mud Lake and north of Highway 82; and
- Mud Lake west of Calcasieu Ship Channel adjacent to southern rim of West Cove.

Although the period of analysis for all NER RP measures is 50 years, the operation, maintenance, repair, replacement, and rehabilitation costs (OMRR&R), the responsibility of the non-Federal Sponsor, is for as long as a project remains authorized as a Federal project. The AAHUs estimated for the NER measures are based on maintenance cycles described in **Tables 3, 4** and **5**, and the attached Fact Sheets.

Existing Coastal Restoration Projects Directly Impacted by the NER RP Measures: Many of the NER RP measures would be constructed in the immediate vicinity of Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) projects (**Figure 5**). **Table 7** lists the names of existing coastal restoration projects within the Southwest Coastal Louisiana project area corresponding to **Figure 5**. The following existing coastal restoration projects would be impacted by the implementation of the NER RP.

- Shoreline protection Measure 5a (Holly Beach Shoreline Stabilization-Breakwaters) would be located immediately offshore of the projects CS-31 (Holly Beach Sand Management) and CS 33 (Cameron Parish Shoreline).
- Project CS-59 (Oyster Bayou Marsh Creation and Terracing) would be directly impacted by construction of marsh restoration NER RP measure 124c (**Figure 6**). Project CS-054 (Cameron-Creole Watershed Grand Bayou Marsh Creation) would be directly impacted by construction of marsh restoration NER RP measure 3c1 (**Figure 7**). When overlap occurs, proposed NER RP measures would be constructed to avoid existing coastal restoration projects by construction of temporary containment/exclusion dikes that would contain dredged borrow sediments used for construction of the NER RP measure and also prevent dredged effluents from entering the existing coastal restoration projects sites. Temporary containment/exclusion dikes would degrade naturally to restore connectivity with surrounding areas or would be degraded at three years after construction has been completed.

Mitigation Projects Directly Impacted by NER RP Measures: Existing mitigation projects are also located within areas proposed for restoration under the NER RP. Existing mitigation projects, identified by Mitigation Manger Kelley Templet with the LADNR, Office of Coastal Management, were constructed by various companies (e.g., oil and gas, Union Pacific, and others) and are designed and constructed to offset unavoidable anticipated losses to wetlands from permitted activities. **Figure 8** and **Table 8** contains information about mitigation projects that occur within the project area. In most instances, these mitigation projects were developed to provide a sustainable buffer from wave action and storm surge generated by tropical storms and hurricanes. Where overlap occurs, proposed NER RP measures would not be constructed until the mitigation projects satisfy their 20-year permitted obligations.

Fact Sheets located in Appendix K of the Integrated Final Report and EIS also contain additional NER RP measure details, description of construction equipment, and quantities and types of fill to be placed in wetlands.

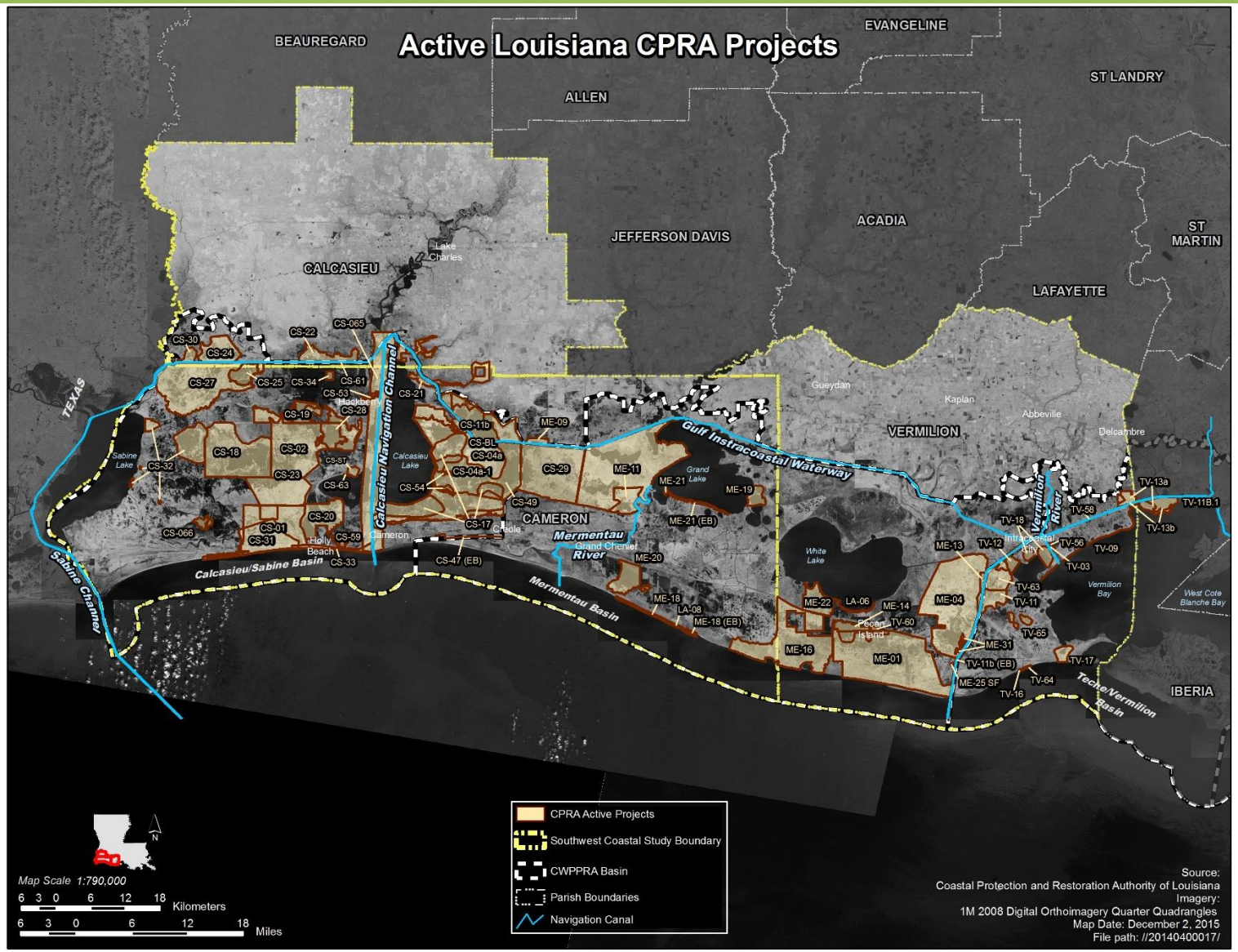

Figure 5. Ecosystem Restoration Activities in the Southwest Coastal Louisiana Project Area.

Table 7. List of Existing Coastal Restoration Projects Displayed in Figure 5.		
CS-01 Holly Beach Breakwaters Project	CS-19 West Hackberry Vegetative Planting Demo	TV-11 Freshwater Bayou Bank Protection
CS-28-1 Sabine Refuge Marsh Creation, Cycle 1	CS-32 East Sabine Lake Hydrologic Restoration	ME-14 Pecan Island Terracing
CS-27 Black Bayou Hydrologic Restoration	CS-BL Blind Lake LA-06 SP Foundation	TV-11b (EB) EB - Freshwater Bayou Bank
*CS-59 Oyster Bayou Marsh Creation and Terracing	Improvements Demo	Stabilization
(impacted by NER RP Measure 124c)	CS-20 East Mud Lake Marsh Management	ME-16 Freshwater Introduction South of Highway
CS-02 Rycade Canal Marsh Management	CS-33* -impacted by NER RP Measure 5a Cameron	82
CS-28-2 Sabine Refuge Marsh Creation, Cycle 2	Parish Shoreline Restoration	TV-11B.1 Acadiana Gulf of Mexico Access Channel
CS-27 Black Bayou Hydrologic Restoration	CS-ST Sabine Terraces LA-08 Bio-Engineered	ME-18 Rockefeller Refuge Gulf Shoreline
CS-61 Brannon Ditch	Oyster Reef Demo	Stabilization
CS-04a Cameron-Creole Maintenance	CS-21 Highway 384 Hydrologic Restoration	TV-12 Little Vermilion Bay Sediment Trapping
CS-28-3 Sabine Refuge Marsh Creation, Cycle 3	CS-34 Marcantel Supplemental Beneficial Use	ME-18 (EB) EB - Rockefeller Shoreline Protection
*CS-59 Oyster Bayou Marsh Creation and Terracing	Disposal Area	Demo
(impacted by NER RP Measure 124c)	LA-06 SP Foundation Improvements Demo ME-01	TV-13a Oaks/Avery Canal Hydrologic Restoration,
CS-63 Sabine Shellbank Stabilization	Pecan Island Freshwater Introduction	Increment 1
CS-04a-1 Cameron-Creole Structure Automation	CS-22 Clear Marais Bank Protection	ME-19 Grand-White Lakes Landbridge Protection
CS-28-4-5 Sabine Refuge Marsh Creation, Cycle 4-5	CS-47 (EB) EB - Trosclair Road Repairs	TV-13b Oaks/Avery Structures
CS-61 Brannon Ditch	LA-08 Bio-Engineered Oyster Reef Demo	ME-20 South Grand Chenier Marsh Creation
CS-65 Calcasieu Ship Channel Salinity Controls	ME-04 Freshwater Bayou Wetland Protection	TV-16 Cheniere Au Tigre Sediment Trapping
CS-11b Sweet Lake/Willow Lake Hydrologic	CS-23 Replace Sabine Refuge WCS	Demonstration
Restoration	CS-49 Cameron-Creole Freshwater Introduction	ME-21 Grand Lake Shoreline Protection
CS-29 Black Bayou Culverts Hydrologic Restoration	ME-01 Pecan Island Freshwater Introduction	TV-17 Lake Portage Land Bridge
CS-63 Sabine Shellbank Stabilization	ME-09 Cameron Prairie National Wildlife Refuge	ME-21 (EB) EB - Grand Lake Shoreline Protection
CS-66 Cameron Meadows Marsh Creation and	SP	TV-18 Four Mile Canal Terracing and Sediment
Nourishment	CS-24 Perry Ridge Shore Protection	Trapping
CS-17 Cameron Creole Plugs	CS-53 Kelso Bayou Marsh Creation	ME-22 South White Lake Shoreline Protection
CS-30 GIWW - Perry Ridge West Bank Stabilization	ME-04 Freshwater Bayou Wetland Protection	TV-56 Four-Mile Canal Storm Surge Reduction
CS-65 Calcasieu Ship Channel Salinity Controls	ME-11 Humble Canal Hydrologic Restoration	Construction
CS-BL Blind Lake	CS-25 Plowed Terraces Demonstration	ME-25 SF Marsh Creation Near Freshwater Bayou
CS-18 Sabine National Wildlife Refuge Erosion	*CS-54 Cameron-Creole Watershed Grand Bayou	TV-58 Boston Canal
Protection	MC (impacted by NER RP Measure 3c1)	ME-31 Freshwater Bayou Marsh Creation
*CS-31 Holly Beach Sand Management (impacted	ME-09 Cameron Prairie National Wildlife Refuge	TV-60 Front Ridge Chenier Terracing/Protection
by NER RP Measure 5a)	SP	TV-03 Vermilion River Cutoff Bank Protection
CS-66 Cameron Meadows Marsh Creation and	TV-65 Rainey Audubon Wildlife Sanctuary Earthen	TV-63 Cole's Bayou Restoration
Nourishment	Terraces	TV-09 Boston Canal/Vermilion Bay Bank Protection
CS-ST Sabine Terraces	ME-13 Freshwater Bayou Bank Stabilization	TV-64 Cheniere au Tigre

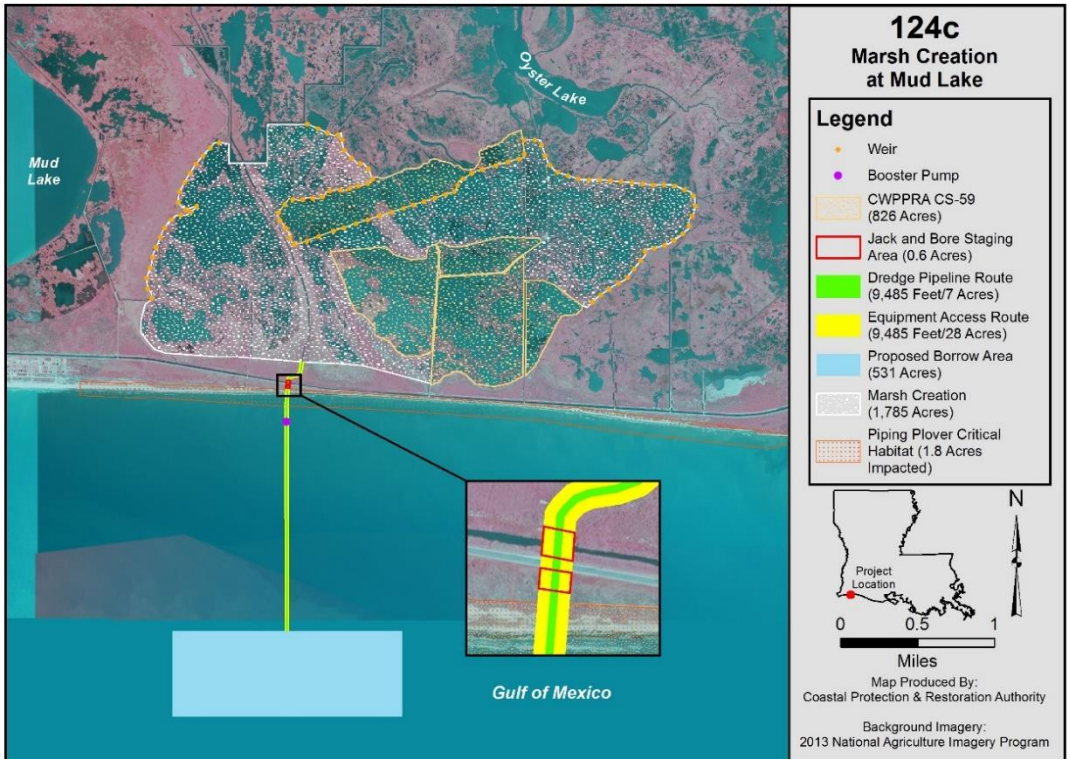

Figure 6. NER RP Measure 124c Overlap with Project CS-54 Cameron Creole Watershed Grand Bayou Marsh Creation.

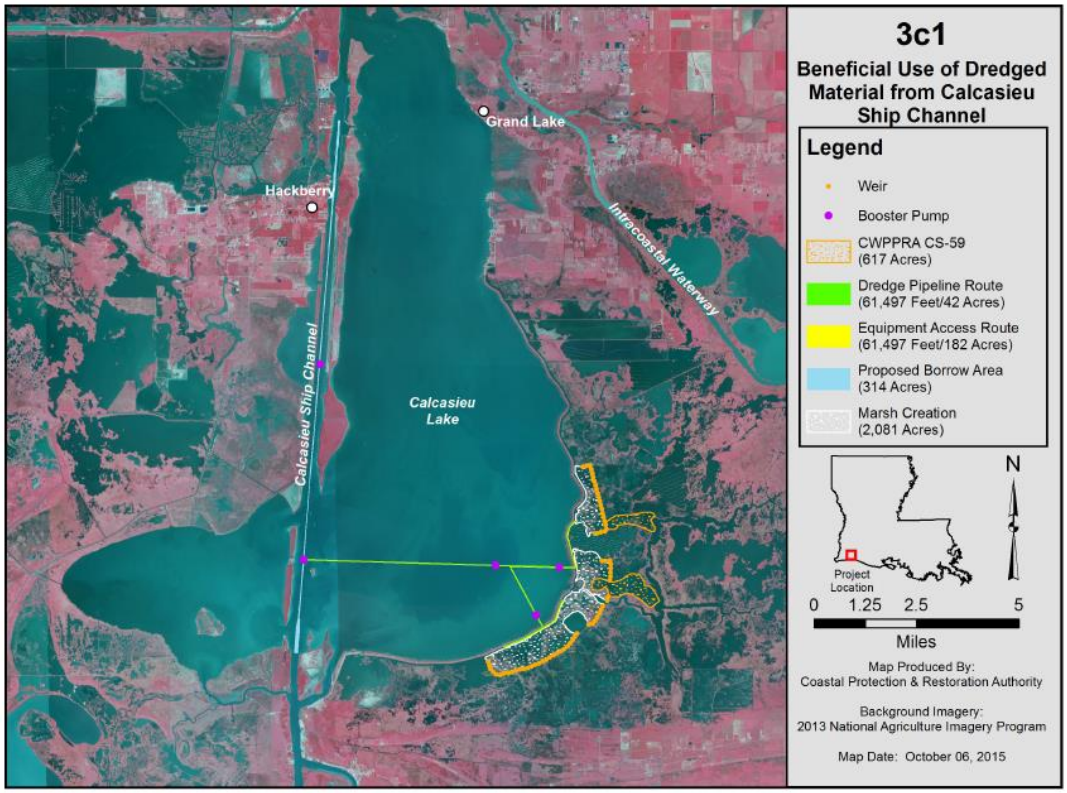

Figure 7. NER RP Measure 3c1 Overlap with Project CS-59 Oyster Bayou Restoration.

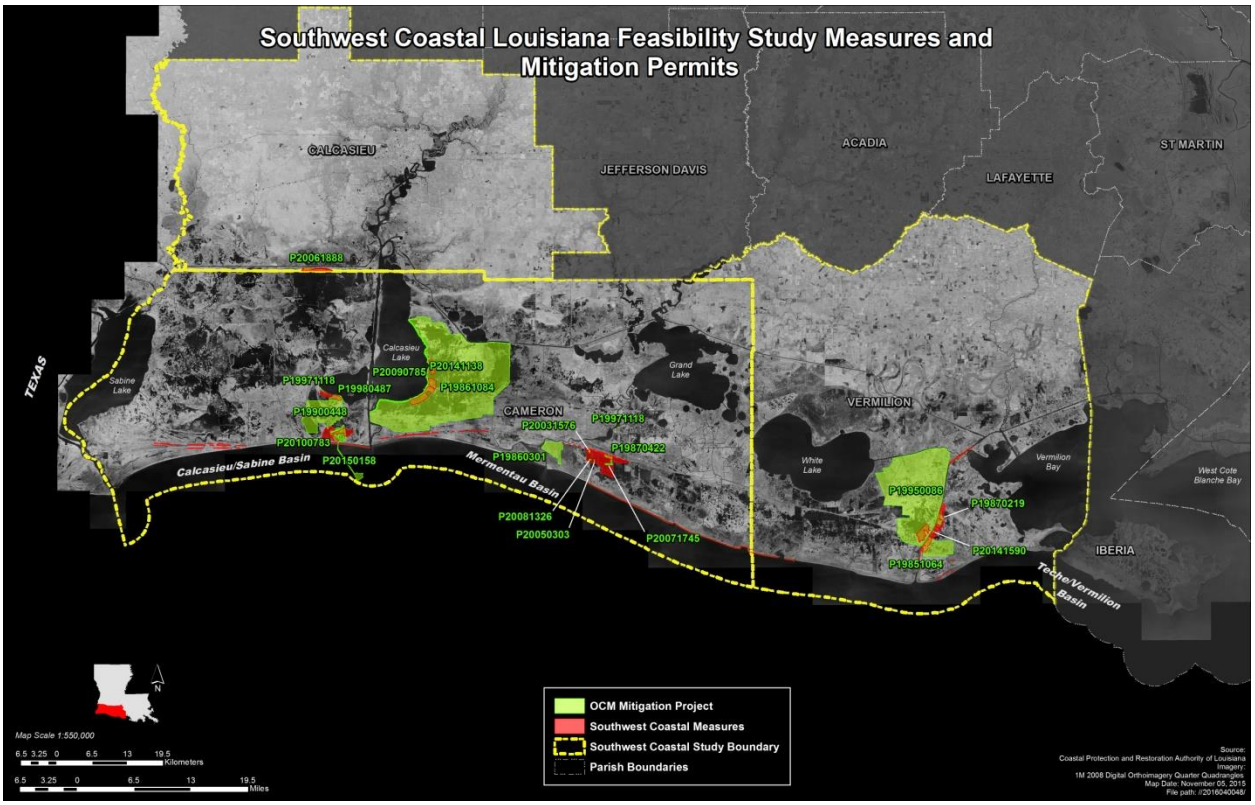

Figure 8. Permitted Mitigation Projects and Southwest Coastal Louisiana Study Measures.

Table 8: Mitigation Projects that Overlap with NER RP Features.

Permit #	Description	NER RP Feature	Permittee or Owner	Expiration Date (permit completion date + 20 years)	Mitigation Project Description
Tier I Features					
P20061888	Terraces at GIWW N of Black Lake	3a1	Gulfport Energy Corporation	11/30/2032	Proposed construction of 5,358 linear ft of terraces south of the GIWW and north of Black Lake.
P19900448	Marsh Management Plan area	124d	Apache Louisiana Minerals	11/13/2016	Install and maintain water control structures for CTU 1 and 2. In CTU 1, 64,000 linear ft of smooth cordgrass plantings. In CTU 2, 32,470 linear ft of boundary levee are to be repaired. Various water control structures are to be repaired or replaced.
P19971118	West Cove Planting Project	124d	Union Pacific Resources	7/28/2022	West Cove Planting Project; 5,000 ft of plantings of *Spartina alterniflora*.
P19950086	Marsh Management Plan area	127c3	Vermilion Corporation	4/1/2021	Eight water control structures will be installed; a riprap levee will be constructed; five double flapgated culverts and one earthen plug will be installed; two earthen plugs will be constructed.

Tier II Features					
P20141590	Spoil Placement	306a1	Hilcorp Energy Company	4/8/2040	Dredging of 15,430 cubic yards of native material to construct slip for the purpose of installing a drill rig, well protector and pilings. The dredged material will be pumped into a shallow pond adjacent to the proposed drill site using a temporary discharge pipe. An additional 301 cubic yards of material will be displaced to construct containment berms.
Tier III Features					
P20090785	Spoil disposal/levee restoration	3c1	Cameron Parish Drainage District #3	8/13/2034	Consists of five water control structures and 17.1 miles of earthen levee (CWPPRA Project CS-04A-L Phase II).
P20141138	Rip-rap Grand Bayou	3c1	CPRA	1/29/2040	Installation of 21,000 tons of riprap along the Calcasieu Lake Shoreline near the Peconi, Mangrove and Grand Bayou water control structures.
P19870422	Marsh Management Plan area	47a2	T. Bonsall	2/3/2023	Construction of a levee and multiple water control structures (South of Upper Mud Lake).
P20031576	Mitigation for P20031304	47a2	Kash Oil & Gas, Inc.	3/31/2029	Constructed 4,803 linear feet of terraces and planted with *Spartina alterniflora.*
P20081326	Mitigation for P20080132	47a2	PetroQuest Energy, L.L.C.	11/25/2033	Construct and plant 2,897 linear ft of wave dampening terraces that will capture re-suspended sediments and protect fragile shorelines by planting plugs of smooth cordgrass on both sides of constructed terraces.
P20071745	Mitigation for 20070883	47c1	Manti Operating Company	3/5/2025*	Construction of ten 500-foot terraces, eight 300-foot terraces, two 200-foot terraces and eight 400-foot terraces (6.1 acres). Plantings of *Spartina alterniflora* rows on each side of the terraces.

If project measures overlap with existing mitigation projects, the project measure would be constructed after the mitigation period of performance expires so that mitigation credits can be realized without interference. This would occur for measures 3a1, 47a1, and 47a2, which will be constructed in Tier III of the implementation plan, after the mitigation projects have concluded. All marsh restoration measures would have one future re-nourishment cycle at about year 30 following construction. The costs are included in the OMRR&R estimates and would be the responsibility of the local non-Federal Sponsor. OMRR&R plans have been developed for each restoration measure. The borrow areas and temporary access corridors for these activities would be the same as for initial construction, and the equipment used would be similar (hydraulic cutter-head dredge), although it may use a smaller dredge, since less material would be required. For shoreline protection, placement of additional rock in successive lifts would be required. This would use the same temporary access corridors as initial construction. Anticipated maintenance requirements are detailed in the attached Fact Sheets (see also Appendix K of the Integrated Final Report).

Monitoring results would be used to adjust anticipated maintenance cycles due to unanticipated changes in performance, especially within the first ten years, are determined. If a change in the anticipated maintenance cycles is warranted, modifications to this Consistency Determination would be submitted to the LDNR, Office of Coastal Management for consistency review. Coordination with LDNR and other appropriate regulatory agencies would be initiated prior to maintenance activities to ensure there were no deleterious impacts (e.g., to new nesting sites for bald eagles, etc.). See also attached Fact Sheets and Appendix K of the Integrated Final Report.

Shoreline Protection/Stabilization Measures

The five shoreline protection/stabilization measures, which span approximately 251,528 linear feet, would be located to reduce erosion of canal banks and shorelines in critical areas to protect adjacent wetlands and critical geomorphic measures. The shoreline protection/stabilization measures are anticipated to result in approximately 1,738 AAHUs and 6,135 net acres protected/stabilized. Construction of the five shoreline protection measures would require dredging floatation or access corridors to transport material to the shoreline protection site. Material dredged via mechanical dredge for access corridors for construction of the five shoreline protection features would be temporarily side-cast onto water bottoms immediately adjacent to the temporary access corridor. Following construction, the side-cast material would be returned to the temporary access corridor. Only measures associated with wetland areas capable of producing gains in excess of 100 net acres are included in the shoreline protection measures. See also attached Fact Sheets and Appendix K of the Integrated Final Report.

Chenier Reforestation

Chenier restoration consists of replanting of 435 seedlings per acre at 10 foot x 10 foot spacing, in 35 chenier locations. Approximately 1,413 net acres in Cameron and Vermilion Parishes would be reforested over the 50 year period of analysis, resulting in 538 AAHUs. Areas eligible for chenier restoration consist of areas greater than five feet in elevation and with low shoreline erosion rates, provided the existing canopy coverage is less than 50%, unless nearby development would prevent achieving study objectives. See also attached Fact Sheets and Appendix K of the Integrated Final Report.

Other Measure Recommendations

- The Calcasieu Ship Channel Salinity Barrier measure is being recommended for long-term study.
- The Cameron-Creole Spillway Salinity Control Structure measure is being recommended for long-term study.
- Two marsh restoration measures, located partially on USFWS properties, are recommended for construction by the USFWS, including: measure 124d Marsh Restoration at Mud Lake, located on Sabine National Wildlife Refuge (NWR) and measure 3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel located on the Cameron Prairie NWR (**Figure 9**). While USACE believes that these features are worthy of recommendation, USACE has determined that these features would more properly be implemented by USFWS. Therefore, USACE will not seek authorization and funding of these features. Rather USACE will recommend to USFWS that it consider seeking independent Congressional authorization and funding for implementation of these features by USFWS.

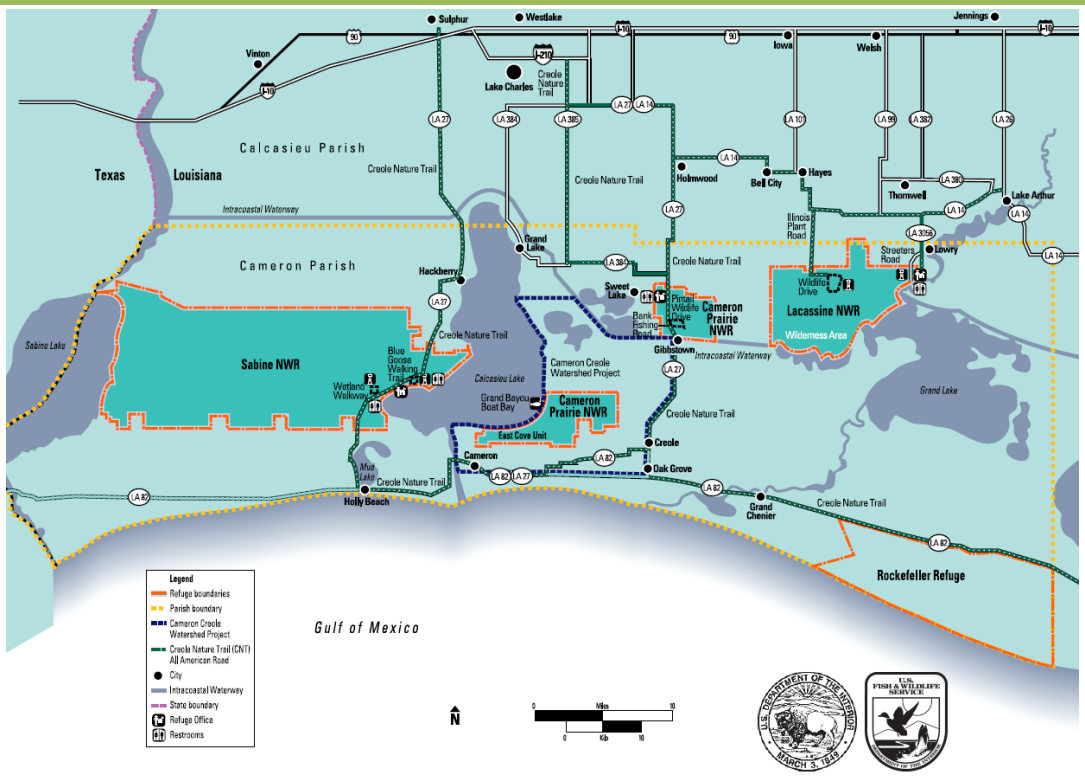

Figure 9. Sabine NWR and Cameron Prairie NWR.

NER RP Construction Tiering

NER RP measures were categorized into three tiers whereby Tier I measures would be constructed before Tier II, and Tier II measures constructed before Tier III. Tier I measures may be constructed simultaneously because they would not affect the construction of any nearby Tier I project measure. Shoreline protection measures would be constructed prior to marsh restoration to provide immediate protection of the storm-vulnerable marsh restoration measures. This approach contributes to the sustainability of the marsh restoration measures. Tier II project measures were so categorized because they utilize the same borrow or staging area, and/or construction of these measures would potentially interfere with construction of a Tier I project measure. Tier II project measures would be constructed contemporaneously as the construction of any one of these project measures would not affect any other project measure within this grouping. Tier III project measures were so categorized because they would utilize the same borrow or staging area, and/or interfered with construction of a Tier II project, and/or interfered with an existing mitigation project. Tier III project measures would be constructed contemporaneously if they would not affect construction of the other project measures within this grouping. In categorizing project measures, it was assumed that all construction funds would be available, multiple construction contracts could be let at one time, and an adequate supply of all materials to facilitate construction. More detailed design and analysis would be conducted during development of the Final EIS and during the Preconstruction Engineering and Design (PED) Phase. The construction schedule for completing all project measures is expected to last a total of about 60 months. Dredge spoil retention measures would be constructed prior to discharge of dredged material at marsh restoration sites. Timing and duration of construction for each measure is provided in **Tables 3, 4,** and **5**.

Tier I Projects:

- Holly Beach Shoreline Stabilization – Breakwaters (5a)
- Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou (6b1)
- Fortify Spoil Banks of the GIWW and Freshwater Bayou (16bSE)
- Fortify Spoil Banks of the GIWW and Freshwater Bayou (16bNE)

- Fortify Spoil Banks of the GIWW and Freshwater Bayou (16bW)
- Beneficial Use of Dredged Material from the Calcasieu Ship Channel (3a1)
- Marsh Restoration at Mud Lake (124d)[1]
- Marsh Restoration at Pecan Island (127c3)
- Chenier Ridges: Grand Chenier Ridge (416)[2]
- Restore Bill Ridge (509c)[2]
- Chenier Ridges: Cheniere au Tigre (509d)[2]
- Restore Blue Buck Ridge (510a)[2]
- Restore Hackberry Ridge (510b)[2]
- Restore Front Ridge (510d)[2]

Tier II Projects:

- Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou (6b2)
- Marsh Restoration at Mud Lake (124c)
- Rainey Marsh Restoration Southwest Portion (Christian Marsh) (306a1)

Tier III Projects:

- Beneficial Use of Dredged Material from the Calcasieu Ship Channel (3c1)[1]
- Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou (6b3)
- Marsh Restoration Using Dredged Material South of Highway 82 (47a1)
- Marsh Restoration Using Dredged Material South of Highway 82 (47a2)
- Marsh Restoration Using Dredged Material South of Highway 82 (47c1)

Recommended for Further Study:

- Calcasieu Ship Channel Salinity Control Structure
- Cameron-Creole Spillway Structure

[1]- *Recommended for USFWS independent Congressional authorization and appropriation for construction by USFWS*
[2]- *Individual features that comprise the chenier reforestation measure*

LOUISIANA COASTAL USE GUIDELINES

1. GUIDELINES APPLICABLE TO ALL USES

These and the following responses are at the feasibility level in nature and would be followed by more detailed analysis in subsequent NEPA documents and associated consistency determination(s).

Guideline 1.1 The guidelines must be read in their entirety. Any proposed use may be subject to the requirements of more than one guideline or section of guidelines and all applicable guidelines must be complied with.

Response: Acknowledged.

Guideline 1.2 Conformance with applicable water and air quality laws, standards and regulations, and with those other laws, standards and regulations which have been incorporated into the coastal resources program shall be deemed in conformance with the program except to the extent that these guidelines would impose additional requirements.

Response: Acknowledged.

Guideline 1.3 The guidelines include both general provisions applicable to all uses and specific provisions applicable only to certain types of uses. The general guidelines apply in all situations. The specific guidelines apply only to the situations they address. Specific and general guidelines should be interpreted to be consistent with each other. In the event there is an inconsistency, the specific should prevail.

Response: Acknowledged.

Guideline 1.4 These guidelines are not intended to nor shall they be interpreted so as to result in an involuntary acquisition or taking of property.

Response: Acknowledged.

Guideline 1.5 No use or activity shall be carried out or conducted in such a manner as to constitute a violation of the terms of a grant or donation of any lands or water-bottoms to the State or any subdivision thereof. Revocations of such grants and donations shall be avoided.

Response: No violations or revocations of such grants or donations are expected.

Guideline 1.6 Information regarding the following general factors shall be utilized by the permitting authority in evaluating whether the proposed use is in compliance with the guidelines.

a) type, nature and location of use.

Response: Acknowledged.

b) elevation, soil and water conditions and flood and storm hazard characteristics of site.

Response: Acknowledged.

c) techniques and materials used in construction, operations and maintenance of use.

Response: Acknowledged.

d) existing drainage patterns and water regimes of surrounding area including flow, circulation, quality, quantity and salinity; and impacts on them.

Response: Acknowledged.

e) availability of feasible alternative sites or methods – for implementing the use.

Response: Acknowledged.

f) designation of the area for certain uses as part of a local program.

Response: Acknowledged.

g) economic need for use and extent of impacts of use on economy of locality.

Response: Acknowledged.

h) extent of resulting public and private benefits.

Response: Acknowledged.

i) extent of coastal water dependency of the use.

Response: Acknowledged.

j) existence of necessary infrastructure to support the use and public costs resulting from use.

Response: Acknowledged.

k) extent of impacts on existing and traditional uses of the area and on future uses for which the area is suited.

Response: Acknowledged.

l) proximity to, and extent of impacts on important natural features such as beaches, barrier islands, tidal passes, wildlife and aquatic habitats, and forest lands.

Response: Acknowledged.

m) the extent to which regional, state and national interests are served including the national interest in resources and the siting of facilities in the coastal zones as identified in the coastal resources program.

Response: Acknowledged.

n) proximity to, and extent of impacts on, special areas, particular areas, or other areas of particular concern of the state program or local programs.

Response: Acknowledged.

o) likelihood of, and extent of impacts of, resulting secondary impacts and cumulative impacts.

Response: Acknowledged.

p) proximity to and extent of impacts on public lands or works, or historic, recreational or cultural resources.

Response: Acknowledged.

q) extent of impacts on navigation, fishing, public access, and recreational opportunities.

Response: Acknowledged.

r) extent of compatibility with natural and cultural setting.

Response: Acknowledged.

s) extent of long term benefits or adverse impacts.

Response: Acknowledged.

Guideline 1.7 It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, constructed, operated and maintained to avoid to the maximum extent practicable significant:

a) reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow.

Response: The Nonstructural NED RP would not alter freshwater flows and would have no reductions in the natural supply of sediments or nutrients to the coastal system. Rather, the Nonstructural NED RP would reduce the risk of damages resulting from hurricane and storm surge by 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. Best available practical techniques and best management practices (BMPs) would be used to avoid, minimize and reduce the potential for affecting or reducing the natural supply of sediments and nutrients into the coastal system.

The NER RP measures would restore and nourish transitional estuarine marsh, provide shoreline protection for back marsh areas, and reforest natural chenier ridges. The NER RP would use the best available practical techniques and BMPs for restoration would be used to avoid, minimize and reduce the potential for affecting or reducing the natural supply of sediments and nutrients into the coastal system.

b) adverse economic impacts on the locality of the use and affected governmental bodies.

Response: The Nonstructural NED and NER RP are not expected to have any adverse economic impacts on the locality of the use or on nearby governmental bodies. No industries, jobs, or other economic activities are likely to be adversely impacted by the proposed action.

The Nonstructural NED RP would use the best available practical techniques and BMPs to avoid, minimize and reduce the potential for adverse economic impacts of providing risk reduction of hurricane and storm surge flood damage for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. Implementing the Nonstructural NED RP would reduce adverse economic impacts by reducing administrative costs and claims to the Federal Flood Insurance Program, under the FEMA, for repetitive flood insurance claims. This estimate is based upon present information and could change during implementation of the Nonstructural NED RP.

The NER RP would use the best available practical techniques and BMPs for implementing each measure. NER RP measure sites, dredge borrow sites, and temporary access corridors would be temporarily unavailable and restricted from human uses during construction, dredging and implementation. However, any restrictions of human use would be temporary and only during dredging and construction. Following construction, the NER RP measures would be available for human uses. The NER RP would reforest cheniers which provide important stopover habitat for migrating Neotropical birds that are sought by birdwatchers. Restoring, nourishing and protecting important, essential and in some instances critical transitional, estuarine marsh habitats used by various terrestrial and aquatic organisms for shelter, nesting, feeding, roosting, cover, nursery, EFH and other life requirements would likely lead to localized increased use by these organisms as well as potential localized increase in productivity. Consequently, localized increases in estuarine aquatic organisms could be utilized for recreational and commercial fishing which could have localized positive economic effects. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction

to avoid and minimize potential adverse economic impacts on the locality of use and affected government bodies.

c) detrimental discharges of inorganic nutrient compounds into coastal waters.

Response: The Nonstructural NED RP would not discharge inorganic nutrient compounds into coastal waters because of the remoteness of identified structures from coastal waters. Rather, the Nonstructural NED RP would reduce damages resulting from hurricane and storm surge by 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. Construction methods would employ the use of the best available practical techniques and BMPs to avoid, minimize and reduce the potential for detrimental discharges of inorganic nutrient compounds into coastal waters.

Activities associated with implementing the NER RP measures includes dredging temporary access corridors, dredging and placement of borrow sediments at the nine marsh restoration measures, and placement of geotextile fabric and rock for the five shoreline protection measures could cause temporary and localized increases in turbidity and total suspended sediments, which may contain inorganic nutrient compounds. **Tables 3, 4,** and **5** provide estimated construction time frames for each NER RP measure. However, the best available practical techniques and BMPs would be used to avoid, minimize and reduce the potential for detrimental discharges of inorganic nutrient compounds into coastal waters. Coastal waters at each NER RP measure site would return to levels of inorganic nutrient compounds similar to those exhibited prior to construction. Chenier reforestation would have no such effects as these sites are located away from coastal waters.

d) alterations in the natural concentration of oxygen in coastal waters.

Response: The Nonstructural NED RP would not result in alterations in the natural concentration of oxygen in coastal waters because of the remoteness of identified structures from coastal waters. Rather, the Nonstructural NED RP would reduce damages from hurricane and storm surge by 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. In addition, the use of the best available practical techniques and BMPs to avoid, minimize and reduce the potential for alterations in the natural concentration of oxygen in coastal waters.

Activities associated with implementing the NER RP measures includes dredging and construction of temporary access corridors, dredging and placement of sediments for nine marsh restoration and nourishment measures, and construction of the five shoreline protection measures could result in a localized, but temporary, decrease in dissolved oxygen concentrations when the biological and the chemical content of the suspended material reacts with the dissolved oxygen in the water. This may result in oxygen depletion. The extent and persistence of these adverse impacts caused by discharges depend upon the relative increase in suspended particulates above the amount occurring naturally, the duration of the higher levels, the current patterns, water level, and fluctuations present when such discharges occur, the volume, rate, and duration of the discharge, particulate deposition, and the seasonal timing of the discharge. However, any such effects are expected to be minor and would occur only during actual dredging and construction activities. **Tables 3, 4,** and **5** provide estimated construction time frames for each NER RP measure. Shortly after dredging and construction is completed, dissolved gases and dissolved oxygen levels would return to levels similar to those before construction. The best available practical techniques and BMPs would be used to avoid, minimize and reduce the potential adverse alterations of dissolved gases such as dissolved oxygen in coastal waters. Chenier reforestation measures would have no effects or alterations to the natural concentration of oxygen in coastal waters due to location of these measures from coastal waters and use of the best available practical techniques and BMPs during construction activities.

e) destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and water bottoms, beaches, dunes, barrier islands, and other natural biologically valuable areas or protective coastal features.

Response: The Nonstructural NED RP would not destroy or adversely alter streams, wetlands, tidal passes, inshore waters and water bottoms, beaches, dunes, barrier islands, or other natural biologically valuable areas or protective coastal features because of the remoteness of identified structures from coastal waters. Rather, the Nonstructural NED RP would reduce damages resulting from hurricane and storm surge by 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. In addition, the use of the best available practical techniques and BMPs to avoid, minimize and reduce the potential for destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and water bottoms, beaches, dunes, barrier islands, or other natural biologically valuable areas or protective coastal features. The best available practical techniques and BMPs would be used to avoid, minimize and reduce the potential destruction or adverse alteration of biologically valuable or protective coastal features.

Water bottoms at the NER RP dredge borrow sites would temporarily be altered due to dredging. However, these areas would naturally refill due to the high energy Gulf of Mexico, navigation channel dynamics and other natural processes of sediment movement throughout the ecosystem. Shallow open water bottoms at the nine marsh restoration sites would be converted to transitional estuarine marsh habitat which is currently being eroded and lost throughout coastal Louisiana and the project area. Placement of geotextile fabric and rock for shoreline protection measures, by design, would permanently alter water bottoms in these areas to reduce wave erosion. Chenier reforestation would have no destructive or adverse alterations to the natural biologically valuable or protective coastal features. Rather, chenier reforestation would use the best available practical techniques and BMPs for reforestation which would provide ecologically important habitat to migrating neotropic birds, resident bird populations as well as other wildlife that utilize chenier forest habitats. In addition, chenier reforestation would help maintain natural chenier coastal features thereby restoring the protective nature of these features. The NER RP would use the best available practical techniques and BMPs would be used to avoid, minimize and reduce potential adverse destruction or alterations of natural biologically valuable areas or protective coastal features.

f) adverse disruption of existing social patterns.

Response: Disruptions of existing social patterns due to implementing the Nonstructural NED RP would be primarily associated with the construction activities:

1. Elevating identified structures to the 100-year base flood elevation based on year 2075 hydrology of eligible residential structures. If the required elevation is greater than 13 feet above ground level, the structure would be identified for voluntary acquisition.
2. Dry flood-proofing to the BFE generally means the use of a various techniques that make a structure waterproof and substantially impenetrable to floodwaters. For example, the walls, doors, windows, and other openings of eligible non-residential structures are made impermeable to water penetration.
3. Construction of localized storm surge risk reduction measures of less than 6 feet in height around industrial complexes and warehouses.

The voluntary nature of implementing the Nonstructural NED RP is anticipated to result in construction on a structure-by-structure basis. This would help to avoid, minimize and reduce the potential for disruption of existing social patterns. Nevertheless, construction activities could cause localized, but in most instances temporary impacts including: disruption and congestion of vehicular traffic patterns in the immediate vicinity of structures undergoing risk reduction; noise; dust; diesel and gas engine fumes emissions; vibration; emissions of construction wastes; greenhouse gas emissions; increased local electricity and fuel consumption; and local increases in the number of vehicles, construction equipment and workers in the vicinity of those structures undergoing risk reduction. However, the best available practical techniques and BMPs would be used to avoid,

minimize and reduce potential adverse disruption of social patterns. Following temporary construction of voluntary flood risk reduction measures, these areas would once again be available for social patterns similar to pre-construction social patterns.

The NER RP measure sites would temporarily and locally be unavailable for social patterns (primarily water-related activates) during construction and dredging activates. This would include: dredging activities at the borrow sites, dredging temporary access corridors and placement of dredged sediments at the nine marsh restoration sites, construction associated with the five shoreline protection sites and planting and invasive species control activities during the chenier reforestation. The NER RP would use the best available practical techniques and BMPs would be used to avoid and minimize adverse disruption of existing social patterns from implementing the NER RP measures. Following construction, these areas would once again be available for social patterns similar to pre-construction social patterns.

g) alterations of the natural temperature regime of coastal waters.

Response: Implementing the Nonstructural NED RP measures would not alter the natural temperature regime of coastal waters due to the remoteness of the Nonstructural NED RP measures from coastal waters. Rather, the Nonstructural NED RP would reduce damages resulting from hurricane and storm surge by 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. The use of the best available practical techniques and BMPs to avoid, minimize and reduce the potential for alterations of the natural temperature regime of coastal waters.

Implementing the NER RP measures would not result in long-term alterations of the natural temperature regime. However, dredging and construction of the temporary access corridors, the nine marsh restoration measures, placement of geotextile fabric and rock for the five shoreline protection measures could cause temporary increases in turbidity and total suspended sediments which could lead to temporary and localized increases in water temperatures at the dredging and construction sites. **Tables 3, 4,** and **5** provide estimated construction time frames for each NER RP measure. However, temperatures would return to pre-construction conditions following construction and dredging activities. Chenier reforestation and implementing the Nonstructural NED RP would have no effects or alterations to the natural concentration of oxygen in coastal waters. The 35 chenier restoration measures would not involve dredging or placement of materials into coastal waters. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts to the natural temperature regime of coastal waters.

h) detrimental changes in existing salinity regimes.

Response: Implementing the Nonstructural NED RP measures would not result in any detrimental changes in existing salinity regimes due to the remoteness of the Nonstructural NED RP measures from coastal waters. Rather, the Nonstructural NED RP would reduce hurricane and storm surge by 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. The use of the best available practical techniques and BMPs to avoid, minimize and reduce the potential for detrimental changes in existing salinity regimes.

The NER RP has a total of 49 ecosystem restoration measures. Dredging the temporary access corridors would not result in detrimental changes in existing salinity regimes. The nine marsh restoration measures would initially create (8,175 acres) and nourish (3,439 acres) a total of approximately 11,666 acres, resulting in an estimated 7,900 net acres and 2,700 AAHUs restored and nourished over the 50 year period of analysis. Dredged borrow sediment sources would be the Calcasieu Ship Channel and other nearby sites located immediately offshore in the Gulf of Mexico (see **Figures 3** and **4,** attached Fact Sheets and Appendix K in the Integrated Final Report).

The location and size of these marsh restoration measures is not sufficient to change existing salinity regimes. Six of the NER RP marsh restoration measures would utilize borrow material from offshore in the Gulf of Mexico. Measure 124c would restore marsh in a saline marsh zone, therefore no adverse short or long-term impacts are anticipated. Measures 47a1, 47a2, 47c1, 127c3 and 306a1 would restore marsh in a brackish marsh zone. There may be a temporary and localized increase in the salinity of the surrounding areas from the use of more dredged saline offshore waters and sediments used for marsh restoration. However, the proposed borrow area for 127c3 and 306a1 is between the mouth of Freshwater Bayou and Southwest Pass, where freshwater influences, especially in the spring, would keep the salinity lower than typical Gulf of Mexico salinity (≈35.6 ppt). Brackish and saline marsh vegetation typically overlap their respective zones throughout coastal Louisiana. Although, initial marsh re-vegetation may be more saline species, as conditions freshen to a brackish regime, the vegetation would likely transition to those species typical of brackish marsh assemblages.

The five shoreline protection measures would provide a total 251,528 linear feet of protection for 6,135 net acres of marsh with 1,738 AAHUs over the 50 year period of analysis. The locations, size and configuration of the five shoreline protection measures is not sufficient to result in any detrimental changes in existing salinity regimes.

The 35 chenier reforestation measures would not impact waters of the United States and therefore would not change existing salinity regimes.

The Calcasieu Ship Channel Salinity Barrier measure and the Cameron-Creole Spillway Salinity Control Structure measure are both being recommended for long-term study. Part of the reasoning for recommending these measures for long-term study is because of their potential for altering salinity regimes. These measures would not be constructed without the authority for additional study, NEPA analysis and associated environmental compliance coordination and permits. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts to existing salinity regimes.

i) detrimental changes in littoral and sediment transport processes.

Response: Implementing the Nonstructural NED RP measures would not result in any detrimental changes in littoral or sediment transport processes due to the remoteness of the Nonstructural NED RP measures from coastal waters. Rather, the Nonstructural NED RP would reduce damages resulting from hurricane and storm surge by: 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. In addition, the use of the best available practical techniques and BMPs to avoid, minimize and reduce the potential for detrimental changes in littoral and sediment transport processes.

The NER RP has a total of 49 ecosystem restoration measures. Dredging the temporary access corridors would not result in detrimental changes in littoral or sediment transport processes. The nine marsh restoration measures would initially restore (8,175 acres) and nourish (3,439 acres) for a total of approximately 11,666 acres, resulting in an estimated 7,900 net acres and 2,700 AAHUs restored and nourished over the 50 year period of analysis. Dredged borrow sediment sources would be taken from the Calcasieu Ship Channel and other nearby sites located immediately offshore in the Gulf of Mexico (see **Figures 3** and **4,** attached Fact Sheets and Appendix K in the Integrated Final Report). The location and size of offshore borrow sites for marsh restoration measures 124c, 47a1, 47a2, 47c1, 127c3, and 306a1 is not anticipated to affect the wave climate at the shoreline. Research conducted for the LCA – Maintain Land Bridge between Caillou Lake and Gulf of Mexico and LCA – Stabilize Shoreline at Point Au Fer Island studies using the STWAVE model indicated that no significant impacts from wave refraction would occur.

The five shoreline protection measures would provide a total 251,528 linear feet of protection for 6,135 net acres of marsh with 1,738 AAHUs over the 50 year period of analysis. The locations, size and configuration of the five shoreline protection measures is not sufficient to result in any detrimental changes in existing salinity regimes. However, often of concern with regard to potential to cause changes in littoral or sediment transport

processes is the design of offshore breakwater measures (e.g., shoreline protection measures 5a, 6b1, 6b2, and 6b3). Shoreline Measure 5a would extend from the western Calcasieu Ship Channel jetty to the existing breakwaters of the existing coastal restoration project CS-31 Holly Beach Sand Management project. The introduction of sands for the project CS-33 Cameron Parish Shoreline Restoration project increased the sediment budget for this area, so that downstream sediment starvation is not expected to be a problem. Additionally, the existing jetty and shipping channel already cause disruption to the littoral and sediment transport in this area from the east. Shoreline protection measures 6b1, 6b2, and 6b3 would be constructed offshore from the Gulf of Mexico shoreline near Rockefeller Refuge. The Refuge is characterized as fine-grained marsh sediment, with a veneer of crushed shell. The fine-grained sediment does not contribute to the littoral sediment transport.

The 35 chenier reforestation measures would not impact waters of the United States and therefore would not change existing salinity regimes.

However, the Calcasieu Ship Channel Salinity Barrier measure and the Cameron-Creole Spillway Salinity Control Structure measure are both being recommended for long-term study. Part of the reasoning for recommending these measures for long-term study is because of their potential for altering salinity regimes. These measures would not be constructed without the authority for additional study, NEPA analysis and associated environmental compliance coordination and permits. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts to littoral and sediment transport processes.

j) adverse effects of cumulative impacts.

Response: Cumulative impacts represent the effects of implementing the proposed action (both the Nonstructural NED RP and the NER RP) on significant resources when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Nonstructural NED RP Cumulative Impacts: The Nonstructural NED RP would provide reduced risk of hurricane and storm surge flood damage for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. These incremental impacts would be in addition to the direct and indirect impacts attributable to other existing, and authorized for construction, non-structural hurricane and storm surge damage risk reduction (HSDRRS) existing and authorized for construction projects throughout the Sabine, Calcasieu, Mermentau, and Teche-Vermilon basins; the State and the Nation.

The National Nonstructural Flood Proofing Committee (NNFPC) describe nonstructural flood proofing measures as permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding. Nonstructural flood proofing measures differ from structural measures in that they focus on reducing the consequences of flooding instead of focusing on reducing the probability of flooding, and include: elevation, relocation, buyout/acquisition, dry flood proofing, wet flood proofing, and berms or floodwalls. Nonphysical nonstructural measures include: flood warning systems, flood insurance, floodplain mapping, flood emergency preparedness plans, land use regulation, zoning, evacuation plans, and risk communication (source: http://www.usace.army.mil/Missions/CivilWorks/ProjectPlanning/nfpc.aspx; accessed December 3, 2015). The following selection of non-structural risk reduction projects are provided as part of the cumulative impacts analysis.

- The following selection of non-structural projects is taken from a more complete list of non-structural risk reduction projects involving the USACE is available upon request (source: personal

communication Keven Lovetro, USACE National Nonstructural Flood proofing Committee, December 7, 2015):

- Pineville, KY, permanent evacuation, raising in place, demolish and replacement, flood warning, 72 structures, estimated cost $4M, complete in early 1990's
- Harlan, KY, permanent evacuation, raising in place, demolish and replacement, flood warning, 180 structures, estimated cost $17.2M, complete in early 1990's
- Barbourville, KY, permanent evacuation, raising in place, demolish and replacement, flood warning, 51 structures, estimated cost $3.9M, complete in early 1990's
- Matewan, KY, elevation, buyouts, flood warning and preparedness, 57 structures, estimated cost $10M, Completed 1995
- South Williamson, KY, elevation, buyouts, flood warning and preparedness, 100 structures, estimated costs $15M, completed
- Williamson, Mingo County, WV, elevation, buyouts, relocation, flood warning and preparedness, 178 structures, estimated cost $24M, completed 1994
- McDowell County, WV, elevation, buyouts, flood warning and preparedness, 1000 structures, estimated cost $200M, being implemented
- Upper Mingo County, WV, elevation, buyouts, flood warning and preparedness, 125 structures, estimated costs $16M, completed 2007
- Wayne County, WV, elevation, buyouts, flood warning and preparedness, 95 structures, estimated costs $9M, completed 2006
- Grundy, VA, elevation, buyouts, relocation, flood warning and preparedness, 228 structures, estimated costs $131M, being implemented
- Hatfield Bottom, WV, elevation, buyouts, flood warning and preparedness, 75 structures, estimated cost $8M, completed 2000

- The following nonstructural projects were identified in a planning conference at Buffalo, New York in 2009 http://wleb.org/watersheds/WLEB%207%20Aug%2009/Buffalo%20District%20Planning%20Part%202.pdf; accessed December 3, 2015):
  - Johnson Creek, Arlington, Texas consists of the nonstructural acquisition and removal of 140 residential structures; vacated areas would be redeveloped for recreation (source: http://planning.usace.army.mil/toolbox/library/ChiefReports/Johnson%20Creek,%20Arlington,%20TX%2011%20Aug%2099.pdf; accessed December 3, 2015).
  - Temama, Tehama, California elevation, flood warnings/evacuation.
  - Reclamation Districts 2099, 2100 2192, Stanislaus County, California, acquisition, flowage easement, ring levee.
  - Missouri River, Pierre/Fort Pierre, South Dakota acquisition, relocation, elevation, and wet flood proofing.
  - Mill Creek, Baltimore, Maryland, acquisition is in feasibility stage.
  - Paxton Creek, Baltimore, Maryland, flood warning system.
  - Cypress Creek, Galveston, Texas, acquisition.
  - MsCIP, Mississippi, relocation, buyout, elevation, flood proofing.
  - Onion Creek, Austin, Texas, buyout.
  - Yellowstone River Glendive, Montana, relocation, acquisition
- West Shore Lake Pontchartrain, St. Charles, St. John the Baptist and St. James Parishes, Louisiana, berm around the small ring berms and elevation; signed Chiefs Report, (source: http://www.mvn.usace.army.mil/Portals/56/docs/PAO/Matt/West%20Shore%20Lake%20Pontchartrain%20Chiefs%20Report_signed_12June2015.pdf; December 3, 2015).
- Dallas Floodway Extension, Trinity River buyouts, and levee structures within floodplain, wetlands http://www.swf.usace.army.mil/Missions/WaterSustainment/DallasFloodwayExtension.aspx; accessed December 3, 2015).

- Upper Des Plaines River and Tributaries, Illinois and Wisconsin, Non-structural flood risk management measures would include elevating structures, dry flood-proofing, filling basements in combination with dry flood-proofing, wet flood proofing, constructing engineered low-level ring levees at large commercial or public building sites, and evacuating portions of floodplains.
- Red River of the North (Fargo-Moorhead Study), berm, raise existing berm, elevate, buyout, wet and dry flood proof (source: http://www.floods.org/Files/Conf2013_ppts/G1/G1_Behm.pdf; accessed December 3, 2015).
- The Green Brook Flood Control Project Middlesex, Somerset and Union Counties, New Jersey (source: http://www.nan.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/11241/Article/487324/fact-sheet-green-brook-sub-basin.aspx; accessed December 3, 2015) includes flood proofing, volunteer buyout and demolition of homes.
- Project: Tug Fork Basin, McDowell County, West Virginia Nonstructural Flood Control Project elevation, dry flood proofing, acquisition, flood warning, wet flood proofing are underway 54 acquisitions and 10 flood proofings complete (source: http://www.wvcommerce.org/App_Media/assets/download/ndrc/WV_External_Data/Adapt/McDowell202.pdf; and accessed December 3, 2015).
- The conceptual 2012 State Master Plan recommends a comprehensive nonstructural program as part of its strategy to reduce the flood risk for Louisiana citizens. Nonstructural projects include raising a building's elevation, flood proofing structures, and voluntary acquisition or relocation. These measures are key components of protecting communities through a "multiple lines of defense approach" (http://coastal.la.gov/project-content/ccrp/; accessed March 12, 2013).
- The FEMA Hazard Mitigation Assistance (HMA) grants programs (http://www.fema.gov/hazard-mitigation-assistance; accessed December 3, 2015) provide funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. Currently, FEMA administers the following HMA grant programs:
  - Hazard Mitigation Grant Program (HMGP) assists in implementing long-term hazard mitigation measures following Presidential disaster declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities.
  - Pre-Disaster Mitigation (PDM) provides funds for hazard mitigation planning and to implement mitigation projects before disasters. The program goal is to reduce overall risk to the population and structures, while at the same time, also reducing reliance on Federal funding from disaster declarations.
  - Flood Mitigation Assistance (FMA) provides annual funds so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the NFIP.

NER RP Cumulative Impacts: Over the 50-year period of analysis, the NER RP would protect, restore, and nourish a net total of 14,035 net acres of emergent marsh (including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures). At the end of the 50 year period of analysis, the marsh restoration and shoreline protection measures together would achieve a total net ecological benefit of 4,430 AAHUs; with 2,700 AAHUs from the nine marsh restoration measures, and 1,738 AAHUs from the five shoreline protection measures. Whereas the chenier restoration measures would restore a net total of 1,413 net acres with 538 AAHUs. The positive cumulative impacts of implementing the NER RP would be the additive, and in some instances the synergistic, effects of restoring and nourishing sites over the 50 year period of analysis, an estimated 7,900 net acres and 2,700 AAHUs. The five shoreline protection measures would span approximately 251,528 linear feet, and are anticipated to protect/stabilize approximately 6,135 net acres and 1,738 AAHUs. Although not impacting waters of the United States, the approximately 1,413 net acres from 35 reforestation sites in Cameron and Vermilion Parishes would be reforested over the 50 year period of analysis, resulting in 538 AAHUs.

The primary cumulative impacts of the NER RP would be related to dredging and construction of the nine marsh restoration measures and the five shoreline protection measures and the reforestation of the 35 chenier reforestation measures. Dredging and construction related impacts are generally temporary and localized and

include: increased turbidity and total suspended sediments, organic enrichment, chemical leaching, reduced dissolved oxygen, and elevated carbon dioxide levels. Following construction, these temporary and localized effects would return to pre-construction levels. The only significant long term adverse cumulative effects expected from implementing the NER RP measures would be associated with the conversion of existing fragmented marsh and shallow water bottom habitats to transitional estuarine marsh habitat and rocked shoreline protection habitats. However, conversion of fragmented marsh and shallow water bottoms to these transitional estuarine marsh habitat and shoreline protection habitat would provide greater long-term positive benefits when considered within the context of the ongoing extensive land loss throughout coastal Louisiana and the project area which is converting extensive areas of marsh to shallow open water.

Additional long term positive cumulative impacts would be related to restoring and protecting important, essential and in some instances critical habitats used by various terrestrial and aquatic organisms for shelter, nesting, feeding, roosting, cover, nursery, EFH and other life requirements; as well as local increases in productivity. The NER RP breakwater measures would provide protection to designated critical wintering habitat for piping plover which would work synergistically with other barrier shoreline restoration and protection features (e.g., State of Louisiana Caminada Headland Beach and Dune Restoration, CWPPRA projects TE-27 and TE-50 Whiskey Island restoration and other barrier restoration projects. Increased recreational and commercial fishing opportunities provided by marsh restoration measures that would provide important, critical and essential habitats as well as protection of recreational marsh lands from wave erosion effects by the shoreline protection measures. The cumulative impacts of the proposed action would be a positive increasing the visual resources, especially the viewscape, in the form of providing additional acres of marsh wetlands (and chenier ridge) in an area that is otherwise being degraded, fragmented and lost throughout the southwest coastal basin, coastal Louisiana, and the Nation. Restoration of marsh would convert existing view sheds of open water into marsh wetlands interspersed with large bodies of open water and use the basic design elements of form, line, texture, color, and repetition to create an aesthetically pleasing view shed. These NER RP impacts would be in addition to, and often synergistic with, the impacts and benefits from marsh acres restored, nourished and protected by other Federal, state, local, and private restoration efforts within or near the Southwest Coastal Louisiana Study Area, the Louisiana state coastal area, and the nation's coastal areas. Some of these other efforts include the following:

- CWPPRA Program – There are currently 149 active CWPPRA projects throughout coastal Louisiana. In September 2015, 101 projects were completed, benefiting over 97,401 acres. 21 projects are currently under active construction with 22 additional projects approved and in the engineering and design phase of development (source: https://lacoast.gov/new/About/FAQs.aspx; accessed November 23, 2015). There are 8 CWPPRA projects within Calcasieu Parish, 39 CWPPRA projects within Cameron Parish, and 12 CWPPRA projects within Vermilion Parish. **Table 9** provides a cumulative impacts comparison by listing the potential direct and indirect impacts of NER RP measures on existing coastal restoration projects, including CWPPRA projects, in Calcasieu, Cameron and Vermilion Parishes.

Table 9. Potential Direct and Indirect Impacts of Southwest Coastal Louisiana NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes (source: https://lacoast.gov/new/Projects/List.aspx; accessed November 23, 2015)

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
Calcasieu Parish Existing Coastal Restoration Projects				
CS-09	Brown Lake Hydrologic Restoration (Deauthorized)	Hydrologic Restoration	37	NER RP measures would have no potential direct or secondary impacts on this deauthorized project.
CS-22	Clear Marais Bank Protection	Shoreline Protection	1,067	No potential impacts by NER RP restoration and protection measures.
CS-24	Perry Ridge Shore Protection	Shoreline Protection	1,203	No potential impacts by NER RP restoration and protection measures.

Table 9. Potential Direct and Indirect Impacts of Southwest Coastal Louisiana NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes (source: https://lacoast.gov/new/Projects/List.aspx; accessed November 23, 2015)

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
CS-27	Black Bayou Hydrologic Restoration	Hydrologic Restoration	3,594	No potential impacts by NER RP restoration and protection measures.
CS-30	GIWW - Perry Ridge West Bank Stabilization	Shoreline Protection	83	No potential impacts by NER RP restoration and protection measures.
LA-03a	Nutria Harvest for Wetland Restoration Demonstration	Demonstration, Herbivory Control	0	No potential impacts by NER RP restoration and protection measures.
LA-03b	Coastwide Nutria Control Program	Herbivory Control	14,963	No potential impacts by NER RP restoration and protection measures.
LA-30	Coastwide Reference Monitoring System	Monitoring	--	No potential impacts by NER RP restoration and protection measures.
Cameron Parish Existing Coastal Restoration Projects				
CS-04a	Cameron-Creole Maintenance	Hydrologic Restoration	2,602	NER RP measure 3c1 could provide some indirect benefits to the CS-04a project, completed in 1997, by reducing the tidal prism in the Cameron-Creole Watershed. This would reduce the velocities through the water control structures by reducing fetch in the open water areas thereby providing some protection from wind-driven wave erosion.
CS-09	Brown Lake Hydrologic Restoration (Deauthorized)	Hydrologic Restoration	37	NER RP measures would have no potential direct or secondary impacts on this deauthorized project.
CS-11b	Sweet Lake/Willow Lake Hydrologic Restoration	Shoreline Protection	247	No potential impacts by NER RP restoration and protection measures.
CS-17	Cameron Creole Plugs	Hydrologic Restoration	865	No potential impacts by NER RP restoration and protection measures.
CS-18	Sabine National Wildlife Refuge Erosion Protection	Shoreline Protection	5,542	No potential impacts by NER RP restoration and protection measures.
CS-19	West Hackberry Vegetative Planting Demonstration	Demonstration, Sediment Trapping, Vegetative Planting	0	No potential impacts by NER RP restoration and protection measures.
CS-20	East Mud Lake Marsh Management	Marsh Management	1,520	NER RP measure 124c could provide secondary benefits to the CS-20 water control structures by reducing open water fetch and tidal prism which would reduce erosion from wind-driven waves and tidal velocities through the water control structures.
CS-21	Highway 384 Hydrologic Restoration	Hydrologic Restoration	150	No potential impacts by NER RP restoration and protection measures.
CS-23	Replace Sabine Refuge Water Control Structures at Headquarters Canal, West Cove Canal, and Hog Island Gully	Marsh Management	953	No potential impacts by NER RP restoration and protection measures.
CS-25	Plowed Terraces Demonstration	Demonstration, Sediment and Nutrient Trapping	0	No potential impacts by NER RP restoration and protection measures.
CS-26	Compost Demonstration (Deauthorized)	Demonstration	0	No potential impacts by NER RP restoration and protection measures.

Table 9. Potential Direct and Indirect Impacts of Southwest Coastal Louisiana NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes (source: https://lacoast.gov/new/Projects/List.aspx; accessed November 23, 2015)

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
CS-27	Black Bayou Hydrologic Restoration	Hydrologic Restoration	3,594	No potential impacts by NER RP restoration and protection measures.
CS-28-1	Sabine Refuge Marsh Creation, Cycle 1	Marsh Creation	214	No potential impacts by NER RP restoration and protection measures.
CS-28-2	Sabine Refuge Marsh Creation, Cycle 2	Marsh Creation	261	No potential impacts by NER RP restoration and protection measures.
CS-28-3	Sabine Refuge Marsh Creation, Cycle 3	Marsh Creation	187	No potential impacts by NER RP restoration and protection measures.
CS-28-4-5	Sabine Refuge Marsh Creation, Cycles 4 and 5	Marsh Creation	331	No potential impacts by NER RP restoration and protection measures.
CS-29	Black Bayou Culverts Hydrologic Restoration	Hydrologic Restoration	540	No potential impacts by NER RP restoration and protection measures.
CS-31	Holly Beach Sand Management	Shoreline Protection	330	NER RP Measure 5a would provide shoreline protection and stabilization that would secondarily benefit this existing project, which was completed in 2003.
CS-32	East Sabine Lake Hydrologic Restoration	Hydrologic Restoration	225	No potential impacts by NER RP restoration and protection measures.
CS-49	Cameron-Creole Freshwater Introduction	Freshwater Diversion	473	This authorized project, is scheduled to begin construction in September 2016. NER RP measure 3c1 would create marsh within and adjacent to the vegetative planting areas at the westernmost reaches of CS-49, which would increase the resiliency and habitat function of the wetlands in the area.
CS-53	Kelso Bayou Marsh Creation	Marsh Creation	274	No potential impacts by NER RP restoration and protection measures.
CS-54	Cameron-Creole Watershed Grand Bayou Marsh Creation	Marsh Creation	476	NER RP measure 3c1 would secondarily impact this project, authorized for construction in January 2015, by creating marsh adjacent to the westernmost reaches of CS-54 and providing some indirect protection from wave-induced erosion.
CS-59	Oyster Bayou Marsh Creation and Terracing	Marsh Creation, Terracing	433	NER RP 124c measure would create marsh adjacent to CS-59, scheduled to be completed in October 2016, which would increase the resiliency and habitat function of the wetlands in the area.
CS-66	Cameron Meadows Marsh Creation and Terracing	Marsh Creation, Terracing	264	No potential impacts by NER RP restoration and protection measures.
CS-78	No Name Bayou Marsh Creation	Marsh Creation	497	No potential impacts by NER RP restoration and protection measures.
LA-03a	Nutria Harvest for Wetland Restoration Demonstration	Demonstration, Herbivory Control	0	No potential impacts by NER RP restoration and protection measures.
LA-03b	Coastwide Nutria Control Program	Herbivory Control	14,963	No potential impacts by NER RP restoration and protection measures.
LA-08	Bio-Engineered Oyster Reef Demonstration	Demonstration	0	NER RP shoreline protection measure 6b1 would provide positive direct effects for the existing LA-08 oyster reef CWPPRA demonstration project by installing a lightweight aggregate core breakwater field thereby protecting LA-08 from high energy Gulf of Mexico wind-driven wave erosion
LA-30	Coastwide Reference Monitoring System	Monitoring	--	No potential impacts by NER RP restoration and protection measures.

Table 9. Potential Direct and Indirect Impacts of Southwest Coastal Louisiana NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes (source: https://lacoast.gov/new/Projects/List.aspx; accessed November 23, 2015)

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
ME-09	Cameron Prairie National Wildlife Refuge Shoreline Protection	Shoreline Protection	247	No potential impacts by NER RP restoration and protection measures.
ME-11	Humble Canal Hydrologic Restoration	Hydrologic Restoration	378	No potential impacts by NER RP restoration and protection measures.
ME-16	Freshwater Introduction South of Highway 82	Hydrologic Restoration	296	The SWC shoreline protection measures 6b2 and 6b3 would provide direct benefits to the outfall area of the ME-16 hydrologic restoration project, completed in 2006, by reducing Gulf of Mexico shoreline erosion through the installation of lightweight aggregate core breakwater fields.
ME-17	Little Pecan Bayou Hydrologic Restoration (Deauthorized)	Hydrologic Restoration	56	This hydrologic restoration project was deauthorized prior to construction, so would have no potential impacts on or by NER RP restoration and protection measures.
ME-18	Rockefeller Refuge Gulf Shoreline Stabilization	Shoreline Protection	256	The ME-18 project would be constructed from 2016 to 2018, and would consist of a lightweight aggregate core breakwater field extending from Joseph Harbor approximately 3 miles west. This would preclude the need to install the lightweight aggregate core breakwater field in this section as part of the 6b1measure, but the 6b1 measure would construct a lightweight aggregate core breakwater field from the western end of the ME-18 project to a point approximately 8 miles to the west.
ME-19	Grand-White Lakes Landbridge Protection	Shoreline Protection	213	No potential impacts by NER RP restoration and protection measures.
ME-20	South Grand Chenier Marsh Creation	Hydrologic Restoration	414	This project, which is expected to be completed in 2016, would provide indirect protection to SWC marsh restoration measure 47c3 by reducing erosion from the eastern direction in the southern area. The 3c1 measure would create marsh adjacent to the westernmost reach of the marsh restoration cells, which would provide some indirect protection from erosion.
ME-21	Grand Lake Shoreline Protection	Shoreline Protection	45	No potential impacts by NER RP restoration and protection measures.
ME-24	Southwest LA Gulf Shoreline Nourishment and Protection (Transferred)	Shoreline Protection	888	This project has not been authorized for construction. However, the NER RP shoreline protection measure 6b3 would protect ME-24 project from wind-driven wave erosion from the Gulf of Mexico once authorized and constructed.
ME-32	South Grand Chenier Marsh Creation - Baker Tract	Marsh Creation	393	No potential impacts by NER RP restoration and protection measures.
Vermilion Parish Existing Coastal Restoration Projects				
LA-03a	Nutria Harvest for Wetland Restoration Demonstration	Demonstration, Herbivory Control	0	No potential impacts by NER RP restoration and protection measures.
LA-03b	Coastwide Nutria Control Program	Herbivory Control	14,963	No potential impacts by NER RP restoration and protection measures.
LA-06	Shoreline Protection Foundation Improvements Demonstration	Demonstration, Shoreline Stabilization	0	No potential impacts by NER RP restoration and protection measures.

Table 9. Potential Direct and Indirect Impacts of Southwest Coastal Louisiana NER RP Measures on Existing Coastal Restoration Projects in Calcasieu, Cameron and Vermilion Parishes (source: https://lacoast.gov/new/Projects/List.aspx; accessed November 23, 2015)

Project Number	Project Name	Project Types	Net Acres Benefited	Southwest Coastal Louisiana NER RP Measure Impacts
LA-30	Coastwide Reference Monitoring System	Monitoring	--	No potential impacts by NER RP restoration and protection measures.
ME-04	Freshwater Bayou Wetland Protection	Hydrologic Restoration, Shoreline Protection	1,593	Although NER RP measure 127c3 is located nearby there would be no potential impacts by NER RP measures on ME-04, which was constructed in 1998.
ME-08	Dewitt-Rollover Vegetative Plantings Demonstration (Deauthorized)	Demonstration	0	No potential impacts by NER RP restoration and protection measures on this deauthorized project.
ME-12	Southwest Shore White Lake Demonstration (Deauthorized)	Demonstration	0	No potential impacts by NER RP restoration and protection measures on this deauthorized project
ME-13	Freshwater Bayou Bank Stabilization	Shoreline Protection	511	No potential impacts by NER RP restoration and protection measures.
ME-14	Pecan Island Terracing	Sediment and Nutrient Trapping	442	No potential impacts by NER RP restoration and protection measures.
ME-22	South White Lake Shoreline Protection	Shoreline Protection	844	No potential impacts by NER RP restoration and protection measures.
ME-23	South Pecan Island Freshwater Introduction (Deauthorized)	Hydrologic Restoration	98	No potential impacts by NER RP restoration and protection measures.
ME-24	Southwest LA Gulf Shoreline Nourishment and Protection (Transferred)	Shoreline Protection	888	NER RP shoreline protection measure 6b3 would provide secondary benefits for the ME-24 project by installing a lightweight aggregate core breakwater field, which would protection it from wind-driven wave erosion from the Gulf of Mexico.
ME-31	Freshwater Bayou Marsh Creation	Marsh Creation	279	No potential impacts of NER RP measure 127c3 because this project has not been authorized for construction.
TV-03	Vermilion River Cutoff Bank Protection	Shoreline Protection	65	No potential impacts by NER RP restoration and protection measures.
TV-09	Boston Canal/Vermilion Bay Bank Protection	Shoreline Protection, Vegetative Planting	378	No potential impacts by NER RP restoration and protection measures.
TV-11b	Freshwater Bayou Bank Stabilization - Belle Isle Canal to Lock (Inactive)	Shoreline Stabilization	241	NER RP 16b would construct a foreshore rock dike along a reach proposed by TV-11b, which has not been constructed. If TV-11b is constructed, the NER RP 16b reach of shoreline protection would not be required under TV-11b.
TV-12	Little Vermilion Bay Sediment Trapping	Shoreline Protection, Sediment Trapping	441	No potential impacts by NER RP restoration and protection measures.
TV-13a	Oaks/Avery Canal Hydrologic Restoration, Increment 1	Hydrologic Restoration	160	No potential impacts by NER RP restoration and protection measures.
TV-16	Cheniere Au Tigre Sediment Trapping Demonstration	Demonstration, Sediment and Nutrient Trapping	0	No potential impacts by NER RP restoration and protection measures.
TV-17	Lake Portage Land Bridge	Shoreline Protection	24	No potential impacts by NER RP restoration and protection measures.
TV-18	Four Mile Canal Terracing and Sediment Trapping	Sediment and Nutrient Trapping	167	No potential impacts by NER RP restoration and protection measures.
TV-63	Cole's Bayou Marsh Restoration	Hydrologic Restoration, Marsh Creation	398	No potential impacts by NER RP restoration and protection measures.

- Project CS-59 (Oyster Bayou Marsh Creation and Terracing) would be directly impacted by construction of marsh restoration NER RP measure 124c (**Figure 6**). Project CS-054 (Cameron-Creole Watershed Grand Bayou Marsh Creation) would be directly impacted by construction of marsh restoration NER RP measure 3c1 (**Figure 7**). Project CS-59 is on Priority Project List 20 with Phase 1 funding approval for engineering and design work to restore 609 acres and nourish about 7 acres of brackish marsh. Project CS-54 is on Project Priority List 21 with specific goals to create 510 acres of saline marsh, nourish 90 acres of existing saline marsh; create 17,500 linear feet of terraces; and, reduce wave/wake erosion. When overlap occurs, proposed NER RP measures would be constructed to avoid existing coastal restoration projects. This would generally include construction of temporary containment/exclusion dikes to contain dredged borrow sediments used for construction of the NER RP measure and also prevent dredged effluents from entering the existing project sites. Temporary containment/exclusion dikes would degrade naturally to restore connectivity with surrounding areas or would be degraded at three years after construction has been completed.
- NER RP shoreline protection measure 5a (Holly Beach Shoreline Stabilization-Breakwaters) would be located immediately offshore of the projects CS-31 (Holly Beach Sand Management) and CS 33 (Cameron Parish Shoreline) indirectly benefiting these existing projects by providing shoreline protection and stabilization from high energy Gulf wave erosion.
- Project TV-11b, a bank stabilization project, could be impacted by NER RP marsh restoration measure 3c1, but this project is presently inactive.

- Louisiana Coastal Area (LCA), Ecosystem Restoration Study (2004 USACE) recommends 15 near-tern measures aimed at addressing the critical restoration needs. The components recommended for authorization include five critical near-term ecosystem restoration measures, a demonstration program consisting of a series of demonstration projects, a beneficial use of dredged material (BUDMAT) program, and a science and technology program. The five critical near-term ecosystem restoration measures, demonstration projects, and BUDMAT projects are all subject to the approval of feasibility level of detail decision documents by the Secretary of the Army. The January 31, 2005 Chief's Report approved the Near-Term Plan substantially in accordance with the 2004 LCA Study. Title VII of the Water Resources Development Act of 2007 (WRDA 2007) (Public Law 110-114) authorized an ecosystem restoration Program for the Louisiana Coastal Area substantially in accordance with the Near-Term Plan.
    - The Chenier Plain Freshwater Management and Allocation Reassessment Study (Chenier Plain Study), recommended in the 2005 Chief's Report was one of six large-scale restoration concepts that were purported to have the ability to "significantly restore environmental conditions that existed prior to large-scale alteration of the natural ecosystem" upon construction. Guidance provided by the Director of Civil Works on December 19, 2008 states that "the coastal restoration components proposed as part of the LCA Chenier Plain study would be evaluated as part of the Southwest Coastal Louisiana feasibility study". Although several of these projects have been authorized for construction, there is presently no willing local non-Federal Sponsor. Consequently, the authorized projects without an identified local non-Federal Sponsor are not considered reasonably foreseeable and are therefore not considered part of either the No Action Alternative (future without project conditions [FWOP]) or the future with project conditions. Nevertheless, the LCA Program is mentioned here since there is some potential that a willing local non-Federal Sponsor may be determined and these projects could therefore become part of the cumulative impacts assessment under the FWOP and future with project conditions.
    - The CEMVN and its local non-Federal Sponsor, Plaquemines Parish, recently completed the 44-acre West Bay Marsh Creation Tier 1 project, part of the LCA's Beneficial Use of Dredged Material (BUDMAT) Program.
    - BUDMAT project (Environmental Assessment #535). Plaquemines Parish is also the non-Federal Sponsor for two additional LCA BUDMAT projects: Ridge Restoration at Tiger Pass, and Restoration of Cat Island. These two projects are still in the study phase.

- An ongoing effort by CPRAB is development of the 2012 Louisiana's Comprehensive Master Plan for a Sustainable Coast (source: http://issuu.com/coastalmasterplan/docs/coastal_master_plan-v2?e=3722998/2447530; accessed November 23, 2015). However, the unauthorized and unfunded conceptual projects are not reasonably foreseeable under the FWOP conditions or the future with project conditions. Nevertheless, the Louisiana State Master Plan is mentioned here since there is some potential that these projects would become funded and therefore considered as part of a cumulative impacts assessment under the FWOP and future with project conditions. The 2012 State Master Plan indicates that the CPRAB has, since 2007:
    - Built or improved 159 miles of levees
    - Benefited 19,405 acres of coastal habitat
    - Secured approximately $17 billion in state and Federal funding for protection and restoration projects
    - Identified and used dozens of different Federal, state, local and private funding sources of projects
    - Moved over 150 projects into design and construction
    - Constructed projects in 20 parishes
    - Constructed 32 miles of barrier islands/berms
    - The 2012 State Master Plan developed and evaluated a total of 397 projects, with each project having its own timeline and budget, including:
        - 248 restoration projects,
        - 33 structural risk reduction (protection) projects, and
        - 116 conceptual nonstructural flood risk reduction projects
    - The 2012 State Master Plan developed for the Southwest Coast, a total of 42 projects with 36 projects to be constructed in the 1st Implementation Period (2012 -2032) including: 5 bank stabilization, 11 hydrologic restoration, 8 marsh creation, 4 ridge restoration, 6 shoreline protection, and 1 each structural protection and multiple protection measure; a total of 6 projects would be constructed in the 2nd Implementation Period (2032-2051) including: 2 each marsh creation and shoreline protection, and 1 each ridge restoration and multiple protection measures.
    - However, the Tulane Institute on Water Resources Law & Policy 2014 Issue Paper "Turning Coastal Restoration and Protection Plans Into Realities: The Cost of Comprehensive Coastal Restoration and Protection" indicates that the 2012 State Master Plan has not come to terms with the true costs of saving coastal Louisiana and how to finance it:

      > *…the cost of implementing those measures will exceed the $50 billion figure set forth in the Plan, in all likelihood by a factor of at least two. When one includes the anticipated costs of the Urban Water Plan, federal flood protection, and other factors excluded from the 2012 Master Plan, the cost of restoring this coast and protecting its people can be expected to exceed $100 billion over 50 years.30 The reasons for this lie primarily in the 2012 Master Plan's use of 2010 dollars instead of inflation adjusted dollars and the exclusion of a range of projects and programs from the Plan's cost estimates. The use of present value dollars in the 2012 Master Plan and the Urban Water Plan was neither hidden nor inappropriate as a methodology, and no criticism of that methodology is intended. However, when looking forward to the challenge of financing everything that is planned and necessary, a more comprehensive approach must be used. The value of keeping this coast ecologically and economically in business has been repeatedly demonstrated to be immense and well in excess of the adjusted price of the 2012 Master Plan. The price of putting the pieces of coastal Louisiana and the Gulf Coast back together after Hurricanes Katrina and Rita alone approached $100 billion. Knowing what is at stake and coming to terms with the true costs of saving coastal Louisiana are prerequisites for a robust civic conversation about how best to finance it. It will require engagement at the local, state, and national levels from a broad range of public and private stakeholders, and answers will not come easily.*
- Restoration of injuries to natural resources damaged by the 2010 Deepwater Horizon oil spill:

- The Natural Resource Damage Assessment (NRDA) is a legal process under the Oil Pollution Act of 1990 (OPA) and the Louisiana Oil Spill Prevention and Response Act of 1991 (LOSPRA) whereby designated trustees represent the public to ensure that natural resources injured in an oil spill are restored (source: http://la-dwh.com/AboutNRDA.aspx; accessed November 25, 2015). Both federal and state NRDA regulations provide a step-by-step process for trustees to determine injuries, to assess damages, and to develop and implement restoration projects that compensate the public for injuries to natural resources impacted by an incident. In general, the NRDA process involves three steps: (1) pre-assessment; (2) restoration planning; and (3) restoration implementation.
- On July 11, 2011, Governor Bobby Jindal unveiled the "Louisiana Plan" which outlines 13 initial proposed early restoration projects (source: http://la-dwh.com/LouisianaPlanProjects.aspx; accessed November 25, 2015). The proposed projects come in many forms including marsh restoration, barrier island restoration, shoreline projection measures, resource-specific projects, and projects aimed at addressing impacts to our citizens' ability to use Louisiana's natural resources (**Table 5**). The projects are consistent with Louisiana's Coastal Master Plan; they are consistent with the criteria outlined in the early restoration framework agreement and applicable regulations; and they support the goal of compensating the public for natural resource injuries resulting from the Deepwater Horizon Oil Spill.

Table 5. "Louisiana Plan" proposed early restoration projects

Project Name	Approximate Cost ($)
Oyster Reestablishment Program (Louisiana Oyster Cultch Project)	$15 M
Saltwater Hatchery	$48 M
Shell Island - Larger Lobe	$110 M
Chandeleur Islands Restoration	$65 M
Biloxi Marsh Shoreline Protection Phase 2	$45 M
Lake Hermitage Additional Increment - (Lake Hermitage Marsh Creation – NRDA Early Restoration Project)	$13.9 M
Grand Liard Marsh & Ridge Restoration	$31.3 M
Cheniere Ronquille Barrier Island Restoration	$44 M
Bay Side Segmented Breakwater at Grand Isle	$3.3 M
West Grand Terre Beach	$9 M
West Grand Terre Stabilization	$3 M
Barataria Basin Barrier Shoreline Restoration - Caminada Headland	$75 M
Maintain Land bridge between Caillou Lake and Gulf of Mexico	$71 M

- On October 5, 2015, the Deepwater Horizon Natural Resource Damage Assessment Trustees released the Deepwater Horizon Oil Spill Draft Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (PDARP/PEIS) for public review and comment (source: http://la-dwh.com/PDARP_PEIS/Draft_PDARP_PEIS.aspx; accessed November 25, 2015). The Trustees identified Alternative A as their preferred alternative. Alternative A (described in Section 5.5) is an integrated restoration portfolio that emphasizes the broad ecosystem benefits that can be realized through coastal habitat restoration in combination with resource-specific restoration in the ecologically interconnected northern Gulf of Mexico ecosystem. **Table 6** is a copy of Table 5.10-1 from the PDARP/PEIS, and shows the Trustees' allocations by goal and restoration type (rows) and restoration area (columns). This table also highlights where investments have already been made through the Trustees' Early Restoration efforts (source: http://www.gulfspillrestoration.noaa.gov/wp-

content/uploads/Chapter-5_Restoring-Natural-Resources1.pdf; accessed November 25, 2015). Under the PDARP/PEIS, the State of Louisiana would receive $5 billion of the total $8.1 billion restoration funding allocation for the Early Restoration work. Due to the large proportion of the wetlands and coastal and nearshore habitat funding allocated to Louisiana, wetland projects identified in the Louisiana Master Plan were used to evaluate the potential magnitude of benefits achievable here. However, as described in Section 5.5.2 of the PDARP/PEIS, the restoration dollars could be used for a variety of restoration approaches. For illustration purposes only, the approximately $4 billion allocated to Louisiana for this restoration type could be sufficient to create 20,000 to 40,000 acres of coastal marsh in Louisiana (LA Master Plan) along hundreds of miles of shoreline, supporting the diversity of fish, birds, and animals that depend on coastal marsh.

- The EPA, reporting on the Nation, states the number of restoration projects grows yearly. Current Federal initiatives call for a wide range of restoration actions, including improving or restoring 25,000 miles of stream corridor; achieving a net increase of 100,000 acres of wetlands each year and establishing two million miles of conservation buffers (source: http://water.epa.gov/type/wetlands/restore/principles.cfm; accessed March 12, 2015).

Table 6. Settlement of NRD claims and final allocations (source: http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/Chapter-5_Restoring-Natural-Resources1.pdf; accessed November 25, 2015).

Major Restoration Categories	Unknown Conditions	Regionwide	Open Ocean	Alabama	Florida	Louisiana	Mississippi	Texas	Total Restoration Funding*
1. Restore and Conserve Habitat									
Wetlands, Coastal, and Nearshore Habitats				65,000,000	5,000,000	4,009,062,700	55,500,000	100,000,000	4,234,562,700
Habitat Projects on Federally Managed Lands				3,000,000	17,500,000	50,000,000	5,000,000		75,500,000
Early Restoration (through Phase IV)				28,110,000	15,629,367	259,625,700	80,000,000		383,365,067
2. Restore Water Quality									
Nutrient Reduction (Nonpoint Source)				5,000,000	35,000,000	20,000,000	27,500,000	22,500,000	110,000,000
Water Quality (e.g., Stormwater Treatments, Hydrologic Restoration, Reduction of Sedimentation, etc.)					300,000,000				300,000,000
3. Replenish and Protect Living Coastal and Marine Resources									
Fish and Water Column Invertebrates			380,000,000						380,000,000
Early Restoration Fish and Water Column Invertebrates			20,000,000						20,000,000
Sturgeon			15,000,000						15,000,000
Sea Turtles		60,000,000	55,000,000	5,500,000	20,000,000	10,000,000	5,000,000	7,500,000	163,000,000
Early Restoration Turtles		29,256,165						19,965,000	49,221,165
Submerged Aquatic Vegetation						22,000,000			22,000,000
Marine Mammals		19,000,000	55,000,000	5,000,000	5,000,000	50,000,000	10,000,000		144,000,000
Birds		70,400,000	70,000,000	30,000,000	40,000,000	148,500,000	25,000,000	20,000,000	403,900,000
Early Restoration Birds		1,823,100		145,000	2,835,000	71,937,300		20,603,770	97,344,170
Mesophotic and Deep Benthic Communities			273,300,000						273,300,000
Oysters		64,372,413		10,000,000	20,000,000	26,000,000	20,000,000	22,500,000	162,872,413
Early Restoration Oysters				3,329,000	5,370,596	14,874,300	13,600,000		37,173,896
4. Provide and Enhance Recreational Opportunities									
Provide and Enhance Recreational Opportunities				25,000,000	63,274,513	38,000,000	5,000,000		131,274,513
Early Restoration Recreational Opportunities			22,397,916	85,505,305	120,543,167	22,000,000	18,957,000	18,582,688	287,986,076
5. Monitoring, Adaptive Management, Administrative Oversight									
Monitoring and Adaptive Management		65,000,000	200,000,000	10,000,000	10,000,000	225,000,000	7,500,000	2,500,000	520,000,000
Administrative Oversight and Comprehensive Planning		40,000,000	150,000,000	20,000,000	20,000,000	33,000,000	22,500,000	4,000,000	289,500,000
Adaptive Management NRD Payment for Unknown Conditions	700,000,000								700,000,000
Total NRD Funding	$700,000,000	$349,851,678	$1,240,697,916	$295,589,305	$680,152,643	$5,000,000,000	$295,557,000	$238,151,458	

*The total restoration funding allocation for the Early Restoration work; each restoration type; and monitoring, adaptive management, and administrative oversight is $8.1 billion (plus up to an additional $700 million for adaptive management and unknown conditions).

- The NOAA Restoration Center has restored 2,812 projects nationwide and its programs provide funding and technical assistance for coastal habitat restoration projects throughout the United States and territories. In Louisiana, the Restoration Center is planning, implementing or has restored 100 projects including CWPPRA and community-based restoration projects (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015). In Southwest Coastal Louisiana, the NOAA Restoration Center has 20 restoration projects (**Table 7**):

Table 7. NOAA Restoration Center projects in Southwest Coastal Louisiana (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015)

Project	Program	Partner	Status	Habitat
Black Bayou Hydrologic Restoration Project	CWPPRA	LDNR	completed	*2960 acres tidal wetland habitat restored *634 acres tidal wetland habitat protected
Cameron Meadows Marsh Creation and Terracing	CWPPRA	CPRA	implementation	tidal wetland
Cameron Shoreline Vegetation Planting Phase II	Community-based	Cameron Parish, Cheniere Energy, Gulf Coast Soil & Water Conservation Service, State Farm Insurance Co., Lonnie G. Harper	completed	6.5 acres of dune habitat restored by installing a sand fence and shoreline planting

Table 7. NOAA Restoration Center projects in Southwest Coastal Louisiana (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015)

Project	Program	Partner	Status	Habitat
		and Associates, LLC, Coalition to Restore Coastal Louisiana, America's Wetlands, Restore America's Estuaries, Disney, LDNR, 143 volunteers contributed 920 hours to this project.		
Peveto Beach Sand Fencing	Community-based	Imperial Calcasieu Resource Conservation and Development Council, Inc., 48 volunteers contributed 238 hours to this project.	completed	10 acres of dune habitat restored
Peveto Sand Fencing and Vegetation Project 2	Community-based	Gulf of Mexico Foundation, Imperial Calcasieu Resource Conservation and Development Council, Inc., 12 volunteers contributed 372 hours to this project.	completed	1.72 acres of dune habitat restored
Oyster Bayou Marsh Creation	CWPPRA	Office of Coastal Protection and Restoration (LA OCPR), CPRA	implementation	tidal wetland
Bayou Verdine CERCLA –Sabine 1999 Unit Hydrologic Restoration and Marsh Creation	DARRP	Contributed to this project	completed	Create 14.7 acres of marsh in open water areas. Additionally, a 260-acre area of marsh and shallow mud flats will be restored to tidal hydrology
Cameron-Creole Watershed Mottled Duck Research and Terracing Project	Community-based	National Fish and Wildlife Foundation, Ducks Unlimited, Miami Corporation, Black Lake Land and Oil, LLC, British Petroleum (BP) America, Louisiana Department of Natural Resources	completed	Ducks Unlimited is working to construct 70,000 linear feet of earthen terraces benefiting 900 acres of fisheries habitat located in the Cameron-Creole Watershed in southwest Louisiana. 530 acres of tidal wetland habitat restored and 100 acres of tidal wetland habitat restored
Bio-Engineered Oyster Reef Demonstration	CWPPRA	CPRA, LDNR	implementation	The demonstration project consisted of an Oysterbreak, approximately 1000 feet long to provide oyster reef/shell bottom
Rockefeller Refuge Gulf Shoreline Stabilization Project	CWPPRA	LDNR	implementation	the construction of a continuous rock breakwater extending approximately

Table 7. NOAA Restoration Center projects in Southwest Coastal Louisiana (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015)

Project	Program	Partner	Status	Habitat
				50,691 feet from the west bank of Joseph Harbor to the east bank of Beach Prong to protect tidal wetlands
Pecan Island Terrace Creation Project	CWPPRA	LDNR	completed	constructed 198,400 linear feet of adjacent terrace cells; 425 acres of soft bottom mud/sand habitat restored 145 acres of tidal wetland habitat restored
Christian Marsh Terracing Project	Community-based	Coalition to Restore Coastal Louisiana, Randy Moertle and Associates, CPRA, McIlhenney Corporation, Restore America's Estuaries, Louisiana State University, Vermilion Corporation, Cargill, Incorporated, COYPU Foundation, Vermilion Soil and Water Conservation District, National Audubon Society, 87 volunteers contributed 696 hours to this project	Completed	Created over 25,000 linear feet of terraces, enhancing and protecting an additional 300 acres of adjacent marsh.
Louisiana Acadiana Bay Oyster Reef Construction and Gulf-wide Oyster Planning	Community-based	State of Louisiana, Louisiana State University Agriculture Extension Service, National Fish and Wildlife Foundation, The Nature Conservancy	Completed	installed ~670 linear feet of bioengineered oyster reef along the coastal shoreline of the Paul J. Rainey Wildlife Sanctuary in Vermilion Bay in southwest Louisiana; 0.15 acres of oyster/shell bottom habitat restored
Vermilion Bay Oyster Reef Restoration and Shoreline Protection	Community-based	LDWF, Louisiana Wetlands Association, 30 volunteers contributed 200 hours	Completed	This project implemented the first large-scale shell recycling program in Louisiana. A 600-foot oyster reef was constructed, which protected the adjacent shoreline, renewed oyster productivity in the bay, and benefited marine habitat.
Coles Bayou Marsh Restoration	CWPPRA	Office of Coastal Protection and Restoration (LA OCPR), Louisiana Coastal Protection and Restoration Authority	Planning	Objective of this project is to create and nourish brackish marsh and improve hydrology in order to increase freshwater and sediment inflow into the interior wetlands, the latter through culvert installation.

Table 7. NOAA Restoration Center projects in Southwest Coastal Louisiana (source: https://restoration.atlas.noaa.gov/src/html/index.html; accessed November 25, 2015)

Project	Program	Partner	Status	Habitat
Little Vermilion Bay Sediment Trapping Project	CWPPRA	LDNR	Completed	390 acres of tidal wetland habitat restored 51 acres of tidal wetland habitat protected
McIlhenney Planting Program- Little White Lake	Community-based	Louisiana State Agricultural Center, McIlhenney Corporation, Randy Moertle and Associates, Boy Scouts of America, Coalition to Restore Coastal Louisiana, 91 volunteers contributed 910 hours to this project.	Completed	5 acres of tidal wetland habitat restored
Four Mile Canal Terracing and Sediment Trapping	CWPPRA	LDNR	Completed	214 acres of tidal wetland habitat restored 113 acres of tidal wetland habitat protected
Rainey Wildlife Sanctuary Terrace Project	Community-based	LDNR, Coalition to Restore Coastal Louisiana, 20 volunteers contributed 400 hours to this project	Completed	640 acres of tidal wetland habitat restored
M/V Formosa Six	DARRP	LDNR, LDWF, National Fish and Wildlife Foundation, LDEQ, NRCS	Completed	142 acres of tidal wetland habitat restored

- Some other large scale ecosystem restoration projects affecting coastal waters of the United States include the following:
    - The CALFED Environmental Restoration Program, approved by the California state legislature in fall 2000, has been successfully acquiring and protecting important lands in the Delta and along its tributaries. To date, more than 130,000 acres of habitat targeted for species of import to the Delta have been enhanced, protected and restored, mostly through easements obtained by working with local land owners and communities (source: http://calwater.ca.gov/calfed/objectives/ecosystem_restoration.html#EcoHistory; accessed December 2, 2015).
    - The Chesapeake Bay Program is a unique regional partnership that has led and directed the restoration of the Chesapeake Bay since 1983. The Chesapeake Bay Program partners include the states of Maryland, Pennsylvania and Virginia; the District of Columbia; the Chesapeake Bay Commission, a tri-state legislative body; the Environmental Protection Agency, representing the federal government; and participating citizen advisory groups (source: http://www.chesapeakebay.net/about; accessed December 2, 2015)
    - The Comprehensive Everglades Restoration Program (CERP), provides a framework and guide to restore, protect and preserve the water resources of central and southern Florida, including the Everglades. It covers 16 counties over an 18,000-square-mile area and centers on an update of the Central & Southern Florida (C&SF) Project also known as the Restudy (source: http://141.232.10.32/about/about_cerp_brief.aspx; accessed December 2, 2015).

  - The Mississippi Coastal Improvements Program Comprehensive Plan (MsCIP) is a system wide approach linking structural and nonstructural hurricane and storm damage risk reduction with ecosystem restoration with the goal of providing a coastal community more resilient to hurricanes and storms (source: http://www.sam.usace.army.mil/Portals/46/docs/program_management/mscip/docs/MSCIP%20Chief%20Report.pdf; accessed December 2, 2015).
  - The Coastal Texas Protection and Restoration Project a comprehensive plan to determine the feasibility of carrying out projects for flood damage reduction, hurricane and storm damage reduction, and ecosystem restoration in the coastal areas of the State of Texas (source: http://www.swg.usace.army.mil/Portals/26/docs/PAO/0827%20Hou-Galv%20Coastal%20TX%20Public%20mtg%20August%2027%202014.pdf; accessed December 2, 2015).

- The Cameron Parish Master Plan for Coastal Restoration & Protection identifies a total of 253 priority projects including: 150 hydrologic restoration, 17 beneficial use/marsh creation, 2 oyster reef preservation projects, 9 shoreline/embankment maintenance projects, and 75 canal maintenance projects. The intent is to have the parish projects looked at in a holistic way to be considered for the 2017 State Master Plan. These conceptual projects are not authorized or funded for construction and are therefore not considered reasonably foreseeable in the FWOP or future with project conditions. They are included at the request of Cameron Parish.
- Calcasieu Parish's priority project is the Rabbit Island Project and then the entire Cameron Parish Project list at this time. Calcasieu Parish believes that protecting Cameron Parish would protect Calcasieu Parish. Calcasieu Parish anticipates updating their coastal plan which would include a priority projects list. Those projects would be viable projects for consideration of funding for protecting Lake Charles to the 500 year level of protection as deemed necessary by the Coastal Master Plan for Louisiana 2012. These conceptual projects are not authorized or funded for construction and are therefore not considered reasonably foreseeable in the FWOP or future with project conditions. They are included at the request of Cameron Parish.
- The Vermilion Parish Coastal Priority Project list identifies a total of 42 priority projects including: 10 hurricane protection projects, 17 shoreline protection and bank stabilization projects, 6 marsh creation projects, 7 hydrologic restoration projects, and 2 ridge restoration projects. These conceptual projects are not authorized or funded for construction and are therefore not considered reasonably foreseeable in the FWOP or future with project conditions. They are included at the request of Vermilion Parish.
- Other Gulf shore protection and restoration projects have been constructed along the Gulf shoreline through other funding sources. Segmented breakwaters have been constructed under at least two separate projects to the west of the proposed Holly Beach Shoreline Stabilization (5a) measure. The proposed breakwater would provide shoreline protection from the eastern end of the existing breakwaters eastward to the Calcasieu Pass jetty and compliment that existing project. The shoreline where the proposed Holly Beach measure would be built has been nourished with material dredged from the bottom of the Gulf of Mexico to help ensure that shoreline erosion did not compromise Louisiana Highways 27/82. Rock and riprap have also been placed at critical locations where shoreline erosion has threatened the highway. The proposed Holly Beach measure is compatible with and would augment these prior efforts. There have been proposals to construct shore protection measures along the Gulf where the proposed Gulf shoreline restoration [Calcasieu River to Freshwater Bayou (6b1, 6b2, and 6b3)] measures are located, but no projects have been built.

The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse cumulative impacts.

k) detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging.

Response: Implementing the Nonstructural NED RP measures would not result in any detrimental discharges of suspended solids into coastal waters. Rather, the Nonstructural NED RP would reduce damages

resulting from hurricane and storm surge by: 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. In addition, the use of the best available practical techniques and BMPs to avoid, minimize and reduce the potential for detrimental changes in littoral and sediment transport processes. The Nonstructural NED RP measures are typically far removed from coastal waters and discharges into coastal waters is not part of the planned nonstructural construction. In addition, the best available practical techniques and the best available practical techniques and BMPs would be used for all, but especially those structures located adjacent to waterways, to avoid and minimize potential detrimental discharges of suspended solids and turbidity.

Implementing the NER RP measures would have temporary and localized effects primarily due to disturbance of waterbottoms during dredging and construction activities (dredging temporary access corridors, dredging and placement operations for marsh restoration, and placement of rock and geotextile fabric for shoreline protection measures). However, these temporary and localized impacts would be minimized and reduced by the best available practical techniques and BMPs during construction. During marsh restoration, effluent from the dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. The placement of rock for the shoreline protection measures is expected to result in the disturbance of water bottom, causing a minor, temporary, and localized increase in suspended particulate/turbidity levels. Following construction activities, turbidity levels in the vicinity of measures would return to those which existed prior to construction activities. **Tables 3, 4,** and **5** provide estimated construction intervals for each NER RP measure. Reforestation of cheniers would not involve discharges of suspended solids into coastal waters. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts of discharges of suspended sediments into coastal waters.

l) reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest.

Response: Implementation of the Nonstructural NED RP measures would not reduce or block water flows or natural circulation patterns. Rather, the Nonstructural NED RP would reduce damages resulting from hurricane and storm surge by: 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. The Nonstructural NED RP measures are typically far removed from coastal waters and reductions or blockage of water flow or natural circulation patterns within an estuarine or wetland forest is not part of the planned nonstructural construction. In addition, the best available practical techniques and the best available practical techniques and BMPs would be used especially for those structures located nearby estuarine or wetland forests.

The NER RP dredging and construction of temporary access corridors, the nine marsh restoration measures and the five shoreline protection measures would have little, if any, significant reductions or blockages of water flows or natural circulation patterns within or into an estuarine or wetland forest. The higher substrate elevations resulting from marsh restoration of shallow open water and fragmented marsh areas may slightly change or modify, at a local scale, throughput (current patterns and flow) of water over the footprint of each of these measures. The five shoreline protection measures are specifically designed to reduce the erosive effects of wind-driven waves, tidal and storm surges that cause erosion of shorelines. However, overall basin current patterns and flows would be similar to that which existed prior to the widespread coastal marsh fragmentation, degradation, and loss we are currently experiencing. In addition shoreline protection measures would include fish dips which would allow tidal and other water flows to proceed unimpeded by these measures. These impacts are considered positive and would provide protection of back marsh lands in an otherwise degrading marsh area. Chenier reforestation would not involve any activities that could potentially reduce or block water flows or natural circulation patterns.

However, the Calcasieu Ship Channel Salinity Barrier measure and the Cameron-Creole Spillway Salinity Control Structure measure are both being recommended for long-term study. Part of the reasoning for recommending these measures for long-term study is because of their potential for altering salinity regimes. These measures would not be constructed without the authority for additional study, NEPA analysis and associated environmental compliance coordination and permits. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts or blockage of water flows or natural circulation patterns within the estuarine and wetland forest systems.

m) Discharges of pathogens or toxic substances into coastal waters.

Response: The Nonstructural NED RP would not discharge pathogens or toxic substances into coastal waters. Rather, the Nonstructural NED RP property owners must execute an authorization for entry which would grant USACE and the NFS authorization to enter in and upon the structure and land for purposes of investigating, inspecting, surveying, performing limited environmental testing and a hazardous, toxic, and radioactive waste (HTRW) assessment, evaluating the condition of the structure, determining elevation requirements, verifying the current elevation, performing an appraisal, and conducting other activities necessary for USACE to make a determination of structure eligibility. The property owner must submit satisfactory proof of ownership and a current Elevation Certificate. Title research and appraisals would be completed by the NFS. The property must have clear title. The property owner would be responsible to clear the title of all ownership issues and obtain any necessary subordination agreements from holders of liens, encumbrances, or third party interests at the property owner's sole expense; the failure to provide clear title shall result in a determination of ineligibility. An ASTM Phase I HTRW/Asbestos investigation (and if warranted, may be accompanied by additional HTRW investigations), inspections, surveys, and boundary monumentations would be completed. The land and the structure must be certified as "clean" by the appropriate State office before any Project funds may be expended. All asbestos must be abated and disposed of properly. Asbestos impacted by flood proofing would be removed at Project cost, while HTRW impacted by flood proofing must be remediated by the property owner prior to the initiation of the flood proofing work. After all inspections, investigations, assessments, and other activities are completed, a determination of eligibility for elevation would be made by USACE. The best available practical techniques and the best available practical techniques and BMPs would be used especially for avoiding, reducing and minimizing potential discharges of pathogens or toxic substances into coastal waters.

A Phase I environmental site assessment of the NER RP project area was conducted in accordance with applicable sections of the American Society for Testing and Materials (ASTM) Standard E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process; ASTM Standard E2247-08, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property; the U.S. Environmental Protection Agency (USEPA) 40 CFR Part 312 Standards and Practices for All Appropriate Inquiry, Final Rule; and BEM's scope of work dated 16 December 2014 to assess for the presence of HTRW within the ASTM E1527-13 recommended approximate minimum search distance of 1 mile from the NER RP restoration measures. The majority of the recognized environmental conditions and areas of environmental concern within the project area are located: 1) adjacent to Highway 82 on the east side of Grand Chenier and from the right descending bank of the Calcasieu Ship Channel east to Highway 27 and in the northern vicinity of Hackberry adjacent to Highway 27; 2) along Freshwater Bayou. However, records indicate that the majority of these sites have been cleaned, remediated, and closed. Based on the Phase I environmental site assessment, the proposed restoration activities within the NER RP project area would likely result in the "capping" of any potentially impacted areas through the placement of overlying materials that may include dredged sand and sediment, rocks, and placement of reinforced structures. This action would potentially minimize future recognized environmental conditions and environmental concerns from existing petroleum or metal-impacted sediment through the placement of the overlying dredged materials. The NER RP would utilize the best available practical techniques and BMPs during

dredging and construction to avoid and minimize potential adverse impacts or discharges of pathogens or toxic substances into coastal waters.

n) adverse alteration or destruction of archaeological, historical, or other cultural resources.

Response: The CEMVN released a 30-day public notice as part of its responsibilities under 36 CFR Part 800, the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (54 U.S.C. § 306108). USACE has determined that implementation of the Southwest Coastal Louisiana Study would result in undertakings that have the potential to cause effects on properties listed in or eligible for listing in the National Register of Historic Places (NRHP), and has elected to fulfill its Section 106 obligations through execution and implementation of two Programmatic Agreements as provided for in 36 CFR § 800.14(b). Interested persons were notified by public notice and are hereby notified that the USACE, in consultation with the Advisory Council on Historic Preservation (ACHP), the Louisiana State Historic Preservation Officer (SHPO), the Louisiana Coastal Protection and Restoration Authority Board (CPRAB), and federally-recognized Indian Tribes, has developed two Draft PAs for the SWC Study, one for the Nonstructural NED RP and one for the NER RP.

The Draft PAs contain Stipulations to include: Consultation and Coordination; Standards, Identification and Evaluation of Historic Properties; Historic Properties Affected; Resolution of Adverse Effects; Curation; Discovery of Human Remains; Unanticipated Discoveries and Effects; Dispute Resolution; Administration, Effect, and Duration; Comprehensive Review; and Amendment and Termination. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse impacts or adverse alteration or destruction of archeological, historical, or other cultural resources.

o) fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas.

Response: There would be no likely potential detrimental secondary impacts in undisturbed or biologically highly productive wetland areas associated with implementing the Nonstructural NED RP. Rather, implementing the Nonstructural NED RP would include: 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. These areas are characterized as previously disturbed residential and business areas that are not biologically productive or undisturbed wetland areas. Potential detrimental secondary impacts of implementing the Nonstructural NED RP would generally be short term and localized impacts associated with construction activities involved with elevating, dry flood proofing, and construction of flood proofing barriers or berms less than 6 foot in height. Secondary impacts in most instances would be temporary and localized and include: disruption and congestion of vehicular traffic patterns in the immediate vicinity of structures undergoing risk reduction; noise; dust; diesel and gas engine fumes emissions; vibration; emissions of construction wastes; greenhouse gas emissions; increased local electricity and fuel consumption; and local increases in the number of vehicles, construction equipment and workers in the vicinity of those structures undergoing risk reduction. However, the best available practical techniques and BMPs would be used to avoid, minimize and reduce potential adverse disruption of social patterns. Following construction, these areas would once again be available for social patterns and human habitations and uses similar to pre-construction social patterns. The Nonstructural NED RP would use the best available practical techniques and the best available practical techniques and BMPs to avoid, reduce and minimize the potential for adverse secondary impacts on undisturbed or biologically highly productive wetland areas.

Implementation of the NER RP would significantly and positively effect, increase and protect estuarine wetlands in the project area and, in turn, provide and protect important, essential and in some instances critical habitats used by various terrestrial and aquatic organisms for shelter, nesting, feeding, roosting, cover, nursery, EFH and other life requirements; as well as increase productivity. Nevertheless, potential adverse secondary impacts of implementing the NER RP could be effects on aquatic ecosystems and organisms, including

plankton, would be primarily associated with construction activities and would include increased turbidity and total suspended solids, increased water temperatures and lower dissolved oxygen. These temporary and localized effects would occur only during construction of the nine marsh restoration measures and five shoreline protection measures. Potential temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction.

During marsh restoration, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. Following construction plankton conditions would return to those observed prior to construction. The restored and protected marsh would provide increased estuarine habitat suitable for re-colonization. The 35 chenier reforestation measures would have no impacts on plankton as they are removed from water areas. Adverse secondary effects on benthos would primarily be associated with construction activities and include smothering and permanent loss of sessile and slower moving benthic organisms during placement of borrow sediments for marsh restoration as well as during placement of geotextile fabric and rock for shoreline protection. More mobile benthic organisms could move out of the immediate construction areas. Following construction activities, marsh bottoms would be rapidly recolonized by benthic organisms within 1-3 years (Wilber et al. 2008). Rocks for shoreline protection measures would provide substrate and micro habitats suitable for some smaller organisms and benthos. Other impacts would include temporary and localized increases in turbidity and total suspended solids, increased water temperatures and decreased dissolved oxygen that would occur only during construction of the nine marsh restoration measures and five shoreline protection measures. These temporary and localized impacts can inhibit photosynthesis and affect respiration of benthic organisms by silt deposition on respiratory structures. However, these temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During construction of marsh restoration measures, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. It is not anticipated that the 35 chenier reforestation measures would have any impacts on benthos.

Sessile and slow-moving nekton would be smothered and permanently lost by placement of borrow sediments during dredging and marsh restoration as well as during placement of geotextile fabric and rock for shoreline protection. However, most nekton are mobile and would be displaced from nine marsh restoration measures and five shoreline protection measures. Much of the marsh restoration sites would be temporarily unavailable for nekton or other aquatic organisms during construction and until containment/exclusion dikes degrade naturally or as part of project construction at three years following construction, after which nekton would have access to the newly restored marsh. The open water areas where shoreline protection sites would be constructed would be permanently unavailable for use by nekton. However, gaps in the shoreline protection would allow aquatic organism access to back marsh areas. Construction activities would be temporary and localized increases in turbidity and total suspended solids, increased water temperatures and decreased dissolved oxygen that would occur only during construction of the nine marsh restoration measures and five shoreline protection measures. These temporary and localized impacts can inhibit predator-prey interactions and affect respiration of nekton by silt deposition on respiratory structures. However these temporary impacts would not likely impact most nekton, which are generally mobile enough to avoid areas during construction. In addition, these temporary and localized impacts would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During construction of marsh restoration measures, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. It is not anticipated that the 35 chenier reforestation measures would have any impacts on benthos. Sediments in marsh restoration areas would differentially settle following construction into higher and lower lying lands enabling reestablishment of natural water connections for access of aquatic organisms from nearby and adjacent waters. Marsh restoration measures would also provide essential fish habitat for Federally-managed species. Rock placed for shoreline protection would provide a variety of micro-habitats and substrates for various prey species that could be utilized by nekton. It is not anticipated that the 35 Chenier reforestation measures would have any impacts on nekton.

Secondary effects on the aquatic food web would be temporary and localized increases in turbidity and total suspended solids, increased water temperatures and decreased dissolved oxygen that would occur only during construction of the nine marsh restoration measures and five shoreline protection measures. Although these temporary and localized impacts can disrupt and inhibit predator-prey interactions, they would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. During construction of marsh restoration measures, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. The aquatic food web would benefit from both short and long term changes to the marsh restoration disposal areas, including additions in energy to basal elements of the food web, habitat preservation, and increased habitat complexity. Nutrients and detritus released during the discharge of dredged sediments into marsh restoration areas would be added to the existing food web. It is not anticipated that the 35 chenier reforestation measures would have any impacts on aquatic food web.

Some existing vegetated shallows would be significantly and permanently impacted by marsh restoration and nourishment of nine marsh restoration measures and five shoreline protection measures around Calcasieu Lake. Permanent impacts to state waterbottoms through the conversion to marsh or the placement of rock include 14,346 acres from the nine marsh restoration measures and 278.4 acres from the five shoreline protection measures. This would result in the vegetation being covered by fill material. Not all of these shallow-water areas are vegetated (range of 0 to 40% coverage). In addition, proposed measures would encourage the growth of submerged aquatic vegetation such as through the reduction in water fetch and wave energy by shoreline protection measures.

As demonstrated through Wetland Value Assessments, the proposed action would improve the quality of wetlands. Compared to the No Action Alternative and future without project conditions, implementing the NER RP would result in an overall net gain marsh acres and AAHUs. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential adverse secondary impacts in undisturbed or biologically highly productive wetland areas.

p) adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands.

Response: The CEMVN has determined that the proposed action "may affect but will not likely adversely affect" the piping plover or it's critical habitat, red knot, Sprague's pipit, West Indian manatee, Gulf sturgeon, loggerhead and Kemps Ridley sea turtles; would have no effect on the Red-cockaded woodpecker, green, leatherback, and hawksbill sea turtles or loggerhead critical habitat and would not adversely impact other species of concern that could potentially be found in the project area. No unique or valuable habitats would be adversely affected. The Migratory Bird Treaty Act (MBTA) and the Migratory Bird Conservation Act (MBCA) protect migratory birds and their habitat. Many important habitats in the project area provide migratory bird shelter, nesting, feeding and roosting habitat. All construction activities shall observe a buffer of 1,000 feet for any colonial-nesting waterbird colonies (e.g., egrets, herons, ibis, pelicans, etc.), 1,300 feet for any shorebird nesting colonies (e.g., terns, gulls, plovers, skimmers, etc.), and 2,000 feet for any brown pelican nesting colonies near the project measure. Based upon a field survey conducted in June 2015 for active colonial-nesting waterbird colonies, one active colonial-nesting waterbird colony was observed within 1,000 feet of the proposed construction limits of NER RP marsh restoration measure 3a1 within the Calcasieu restoration area. Additionally, a shorebird nesting colony was recorded within 1,300 feet of the proposed construction limits of breakwater measure 6b2 within the Rockefeller restoration area. USFWS and USACE biologists would survey the area before construction to confirm active rookery locations. If colonial-nesting waterbird colonies exist within 1,000 feet, if shorebird colonies exist within 1,300 feet, or if brown pelican nesting colonies exist within 2,000 feet of the proposed action, this could be a project constraint. USFWS guidelines would be followed to avoid adverse impacts to these species.

Temporary and localized increases in turbidity and total suspended solids, increased water temperatures and decreased dissolved oxygen would occur only during dredging and construction of the nine marsh restoration

measures and the five shoreline protection measures. Although these temporary and localized impacts can disrupt and preclude wildlife from using the marsh restoration and shoreline protection areas, they would be minimized and controlled by utilizing the best available practical techniques and BMPs during construction. Also during construction of marsh restoration measures, effluent from dredge discharge pipe would be directed to adjacent fragmented marsh for nourishment. However, these temporary and localized adverse effects would be offset by the proposed action restoration and protection of estuarine marsh habitats which can provide an array of foraging, breeding, and cover habitat for a variety of birds, mammals, reptiles and other wildlife species.

Two marsh restoration measures, located partially on USFWS properties, are recommended for construction by the USFWS. Measure 124d Marsh Restoration at Mud Lake would be located on Sabine NWR. Measure 3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel would be located on the Cameron Prairie NWR (**Figure 9**). NER RP measure 124d would initially restore (159 acres), nourish (448 acres) a total of 607 acres that would provide over the 50 year period of analysis 168 net acres and 4 AAHUs which would synergistically benefit the Sabine NWR. NER RP Measure 3c1 would initially create (1,347 acres) and nourish (734 acres) a total of 2,081 acres that would provide over the 50 year period of analysis 1,324 net acres and 607 AAHU which would synergistically benefit the Cameron Prairie NWR. The implementation of three of the five shoreline protection measures (6b1, 6b2, and 6b3) would have a significant and long-term positive effect on wetlands in the Rockefeller State Wildlife Refuge and Game Preserve (Rockefeller Refuge). The installation of a field of light-weight aggregate core rock breakwaters offshore of the Gulf of Mexico shoreline of the Rockefeller Refuge would decrease the wave energy reaching the shoreline, which would reduce background erosion rates, protecting existing saline wetlands. The other NER RP measures would not impact other parks, national historic monuments, national seashores, wilderness areas, research sites, and similar preserves.

Many of the NER RP measures would be constructed in the immediate vicinity of other existing coastal restoration projects, including CWPPRA projects (**Figure 5**). However, NER RP measure 124c—Marsh Restoration at Mud Lake) and 3c1—Beneficial Use of Dredged Material from Calcasieu Ship Channel) would directly overlap projects CS-59—Oyster Bayou Marsh Creation and Terracing (**Figure 6**) and CS-54—Cameron-Creole Watershed Grand Bayou Marsh Creation (**Figure 7**), respectively. Figure 124c would overlap CS-59 by 821 acres. Measure 3c1 would overlap CS-54 by 65 acres. When overlap occurs, NER RP measures would be constructed to avoid the existing projects. This would generally include construction of temporary containment/exclusion dikes that would not only contain dredged borrow effluent sediments until it has dewatered and consolidated, but would also function to exclude any dredged effluents from entering existing project sites. These temporary containment/exclusion dikes would either naturally degrade to restore connectivity with surrounding areas, or they do not naturally degraded, they would be degraded three years after construction has been completed if to allow hydrologic connectivity to the surrounding area.

In addition to directly impacting the above cited projects, existing mitigation projects also located within areas proposed for restoration under the NER RP would be directly impacted. Mitigation projects are designed and constructed to offset anticipated losses from permitted activities. **Figure 8** and **Table 6** contains information about mitigation projects that occur within the project area. In most instances, these mitigation projects were developed to provide a sustainable buffer from wave action and storm surge generated by tropical storms and hurricanes. When overlap occurs, proposed NER RP measures would not be constructed until the mitigation projects satisfy their 20-year permitted obligations.

Actions to Minimize Impacts: Dredged sediments would be placed for the nine marsh restoration sites to achieve a post-construction target elevation following dewatering that would be suitable for natural colonization by marsh vegetation. During construction, effluent from dewatering would be discharged into adjacent wetlands via spill box weirs. Temporary earthen containment/exclusion dikes would be constructed from in-situ material located within the marsh restoration/nourishment area using a mechanical (clamshell or bucket) dredge. Temporary access for the mechanical dredge would be via the pipeline corridor. The borrow area used for construction of the earthen containment dike would be refilled during the placement of dredged material. One foot of freeboard would be maintained at all times during dredge discharge operations. Containment/exclusion

dikes would be breached in multiple places at three years post construction if necessary to restore connectivity and fish access if natural degradation is not sufficient. Breach locations would correspond to weir locations. The Nonstructural NED RP and NER RP would utilize the best available practical techniques and BMPs during construction to avoid and minimize potential adverse impacts special aquatic sites and to surrounding aquatic and terrestrial environment.

q) adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern.

Response: See above response to "p) adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands." No other public parks, shoreline access points, public works, or designated recreation areas would be adversely altered by either the Nonstructural NED RP or NER RP. The Nonstructural NED RP and NER RP would utilize the best available practical techniques and BMPs during construction to avoid and minimize potential adverse impacts on public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern

r) adverse disruptions of coastal wildlife and fishery migratory patterns.

Response: The Nonstructural NED RP measures include: elevating eligible residential structures; dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. The Nonstructural NED RP measures are located in previously disturbed residential and business areas far removed from coastal wildlife and fish. Hence, the Nonstructural NED RP would not adversely disrupt coastal wildlife or fishery migratory patterns. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid and minimize potential adverse impacts on coastal wildlife and fishery migratory patterns.

Over the 50-year period of analysis, the NER RP would protect, restore, and nourish a total of 14,035 net acres of emergent marsh (including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures). At the end of the 50 year period of analysis, the marsh restoration (2,700 AAHUs) and shoreline protection measures (1,738 AAHUs) together would achieve a total net ecological benefit of 4,430 AAHUs. Whereas the chenier reforestation measures would restore a net total of 1,413 net acres with 538 AAHUs. The implementation and operation of the NER RP measures would not disrupt coastal wildlife or fishery migratory patterns in the long term. However, during construction and dredging operations of the access corridors, the borrow sites, the nine marsh restoration sites, the five shoreline protection sites and the 35 chenier reforestation sites would temporarily be unavailable for use by fish and wildlife. Following construction, these areas would return to availability for use by fish and wildlife. By design, the five shoreline protection measures would no longer be available to fish. Shoreline protection measures would, however, include fish dips which would allow tidal and other water flows, fish and other aquatic organisms to proceed unimpeded by these measures into back marsh areas. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid and minimize potential adverse impacts on coastal wildlife and fishery migratory patterns.

s) land loss, erosion and subsidence.

Response: The Nonstructural NED RP measures, by design, would reduce damages resulting from hurricane and storm surge by elevating eligible residential structures; dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. The Nonstructural NED RP measures are located in previously disturbed residential and business areas and would not cause significant land loss, erosion or subsidence. The Nonstructural NED RP

would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding land loss, erosion and subsidence.

The NER RP measures would not cause land loss, erosion, or subsidence. Rather, The NER RP nine mash restoration measures would introduce borrow sediments from the Calcasieu Ship Channel and the Gulf of Mexico designated borrow sites for the purpose of marsh restoration. At the end of the 50 year period of analysis, the nine marsh restoration measures reducing local land loss by restoring (creating and nourishing) a total of 7,900 net acres with 2,700 AAHUs. The NER RP five shoreline protection measures would provide 251,528 linear feet of shoreline protection that over the 50 year period of analysis would protect 6,135 net acres with 1,738 AAHUs. The chenier restoration measures analysis, would restore a net total of 1,413 net acres with 538 AAHUs. The NER RP would utilize the best available practical techniques and BMPs for ecosystem restoration and shoreline protection to avoid, minimize and reduce potential adverse impacts regarding land loss, erosion and subsidence.

t) increases in the potential for flood, hurricane or other storm damage, or increases in the likelihood that damage will occur from such hazards.

Response: The Nonstructural NED RP would not increase the potential for flood, hurricane, or other storm damage, or increase the likelihood of damage from such hazards. Rather, the Nonstructural NED RP would reduce flood risk for residential and non-residential structures that have first floor elevations at or below the 0-25-year floodplain, based on hydrologic conditions predicted to occur in 2025 (the beginning of the 50 year period of analysis). The Nonstructural NED RP would provide reduced risk of damages resulting from hurricane and storm surge flood for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding potential for flood, hurricane or other storm damage, or increases in the likelihood that damage would occur from such hazards.

The NER RP would not increase the potential for flood, hurricane, or other storm damage, or increase the likelihood of damage from such hazards. Rather, over the 50-year period of analysis the NER RP would restore, nourish and protect a net total of 14,035 net acres of transitional estuarine marsh, including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures. At the end of the 50 year period of analysis, the marsh restoration (2,700 AAHUs) and shoreline protection measures (1,738 AAHUs) together would achieve a total net ecological benefit of 4,430 AAHUs. Whereas the chenier restoration measures analysis, would restore a net total of 1,413 net acres with 538 AAHUs. In addition, the nine marsh restoration measures and the five shoreline protection measures would provide an unquantified roughness factor that would help reduce, to some undetermined extent, the adverse effects of flood, hurricane and other storm damages. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding potential for flood, hurricane or other storm damage, or increases in the likelihood that damage would occur from such hazards.

u) reductions in the long-term biological productivity of the coastal ecosystem.

Response: The Nonstructural NED RP measures are located in previously disturbed residential and business areas and would not reduce long-term biological productivity of the coastal ecosystem. Rather, the Nonstructural NED RP would reduce flood risk for residential and non-residential structures that have first floor elevations at or below the 0-25-year floodplain, based on hydrologic conditions predicted to occur in 2025 (the beginning of the 50 year period of analysis). The Nonstructural NED RP would provide reduced risk of damages resulting from hurricane and storm surge flood for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. The Nonstructural NED RP would utilize the best available practical

techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding potential for reductions in the long-term biological productivity of the coastal ecosystem.

The NER RP would not reduce long-term biological productivity of the coastal ecosystem. Rather over the 50-year period of analysis the NER RP would restore, nourish and protect a net total of 14,035 net acres of transitional estuarine marsh, including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures. At the end of the 50 year period of analysis, the marsh restoration (2,700 AAHUs) and shoreline protection measures (1,738 AAHUs) together would achieve a total net ecological benefit of 4,430 AAHUs. Whereas the chenier restoration measures analysis, would restore a net total of 1,413 net acres with 538 AAHUs. The NER RP, as determined by the Wetland Value Assessment and quantified AAHUs, would improve the biological productivity of the ecosystem in the project area. There would be an overall net gain of AAHUs (see **Tables 4**, **5**, and **6**). The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding potential for reductions in the long-term biological productivity of the coastal ecosystem.

Guideline 1.8 In those guidelines in which the modifier "maximum extent practicable" is used, the proposed use is in compliance with the guideline if the standard modified by the term is complied with. If the modified standard is not complied with, the use will be in compliance with the guideline if the permitting authority finds, after a systematic consideration of all pertinent information regarding the use, the site and the impacts of the use as set forth in guideline 1.6, and a balancing of their relative significance, that the benefits resulting from the proposed use would clearly outweigh the adverse impacts resulting from non compliance with the modified standard and there are no feasible and practical alternative locations, methods and practices for the use that are in compliance with the modified standard and: a) significant public benefits will result from the use, or; b) the use would serve important regional, state or national interests, including the national interest in resources and the siting of facilities in the coastal zone identified in the coastal resources program, or; the use is coastal water dependent. The systematic consideration process shall also result in a determination of those conditions necessary for the use to be in compliance with the guideline. Those conditions shall assure that the use is carried out utilizing those locations, methods and practices which maximize conformance to the modified standard; are technically, economically, environmentally, socially and legally feasible and practical and minimize or offset those adverse impacts listed in guideline 1.7 and in the guideline at issue.

Response: Acknowledged.

Guideline 1.9 Uses shall to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.

Response: The Nonstructural NED RP measures are located in previously disturbed residential and business areas and would only be unavailable for multiple concurrent uses during flood risk reduction construction activities. Following construction, areas subjected to construction impacts would be restored at least to their natural pre-construction condition using the best available restoration techniques, the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts to multiple concurrent uses Natural waterways would not be closed.

During dredging and construction activities, the NER RP nine marsh restoration and five shoreline protection measure sites, temporary access corridors and borrow sites would not be available for multiple concurrent uses. However, following dredging and construction activities and over the 50-year period of analysis, the NER RP measures would be available for, and provide even greater opportunities for multiple concurrent uses. The NER RP would restore, nourish and protect a net total of 14,035 net acres of transitional estuarine marsh, including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures. At the end of the 50 year period of analysis, the marsh restoration (2,700 AAHUs) and

shoreline protection measures (1,738 AAHUs) together would achieve a total net ecological benefit of 4,430 AAHUs. Whereas the chenier restoration measures analysis, would restore a net total of 1,413 net acres with 538 AAHUs. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding potential for multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.

Guideline 1.10 These guidelines are not intended to be, nor shall they be, interpreted to allow expansion of governmental authority beyond that established by La. R.S. 49: 213.1 through 213.21, as amended; nor shall these guidelines be interpreted so as to require permits for specific uses legally commenced or established prior to the effective date of the coastal use permit program nor to normal maintenance or repair of such uses.

Response: Acknowledged.

1. GUIDELINES FOR LEVEES

Guideline 2.1 The leveeing of unmodified or biologically productive wetlands shall be avoided to the maximum extent practicable.

Response: Implementation of the Nonstructural NED RP and the NER RP would not involve the construction of levees. However, the Nonstructural NED RP includes construction of localized hurricane and storm surge risk reduction measures less than 6 feet in height around industrial complexes and warehouses that are eligible for the Project. These measures are intended to reduce the frequency of flooding but not eliminate floodplain management and flood insurance requirements. These risk reduction measures can be constructed of earth, concrete, masonry, or steel and placed around a single structure or a contiguous group of structures. Some local governments may have adopted floodplain management rules that exceed the minimum requirements of the NFIP, and may limit the ability of certain flood-proofing measures to be constructed if the effects of the localized storm surge risk reduction measures create the potential for drainage problems by displacing flood storage. The use of berms is for individual structures only and would not levee unmodified or biologically productive wetlands. The Nonstructural NED RP would provide reduced risk of hurricane and storm surge flood damage for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses.

The NER RP would construct temporary containment/exclusion dikes at the nine marsh restoration sites to temporarily contain dredged sediments for marsh restoration and prevent dredged effluent from adversely impacting adjacent existing coastal restoration projects and other areas not designed to be restored or nourished. However, following de-watering and consolidation the temporary containment/exclusion dikes are expected to naturally degrade or they would be degraded at three years post-construction to allow for tidal exchange and aquatic organism access. The NER RP would also construct 251,528 linear feet of shoreline protection that could would reduce wave induced shoreline erosion to 6,135 net acres. The Nonstructural NED and NER RPs would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding potential for leveeing of unmodified or biologically productive wetlands shall be avoided to the maximum extent practicable.

Guideline 2.2 Levees shall be planned and sited to avoid segmentation of wetland areas and systems to the maximum extent practicable.

Response: Implementation of the Nonstructural NED RP and the NER RP would not involve the construction of levees. However, the Nonstructural NED RP includes construction of localized storm surge risk reduction measures less than 6 feet in height around industrial complexes and warehouses that are eligible for the Project. However, this proposed action would not involve the construction of levees. The use of berms is for individual structures only and have been planned and sited to avoid segmentation of wetland areas and systems to the maximum extent practicable. The Nonstructural NED RP would utilize the best available

practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding the potential to segment wetland areas and systems.

The NER RP would construct temporary containment/exclusion dikes at the nine marsh restoration sites to temporarily contain dredged sediments for marsh restoration and prevent dredged effluent from adversely impacting adjacent existing coastal restoration projects and other areas not designed to be restored or nourished. However, following de-watering and consolidation the temporary containment/exclusion dikes are expected to naturally degrade or they would be degraded at three years post-construction to allow for tidal exchange and aquatic organism access. The NER RP would also construct 251,528 linear feet of shoreline protection that could would reduce wave induced shoreline erosion to 6,135 net acres. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding potential to segment wetland areas and systems.

Guideline 2.3 Levees constructed for the purpose of developing or otherwise changing the use of a wetland area shall be avoided to the maximum extent practicable.

Response: Implementation of the Nonstructural NED RP and the NER RP would not involve the construction of levees. However, the Nonstructural NED RP include construction of localized storm surge risk reduction measures less than 6 feet in height around industrial complexes and warehouses that are eligible for the Project. The proposed action would not involve the construction of levees. The use of berms is for individual structures and would not be constructed for the purpose of developing or otherwise changing the use of a wetland area. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding the potential of developing or otherwise changing the use of a wetland area.

The NER RP would construct temporary containment/exclusion dikes at the nine marsh restoration sites to temporarily contain dredged sediments for marsh restoration and prevent dredged effluent from adversely impacting adjacent existing coastal restoration projects and other areas not designed to be restored or nourished. However, following de-watering and consolidation the temporary containment/exclusion dikes are expected to naturally degrade or they would be degraded at three years post-construction to allow for tidal exchange and aquatic organism access. The NER RP would also construct 251,528 linear feet of shoreline protection that could would reduce wave induced shoreline erosion to 6,135 net acres. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts regarding the potential of developing or otherwise changing the use of a wetland area.

Guideline 2.4 Hurricane and flood protection levees shall be located at the non-wetland/wetland interface or landward to the maximum extent practicable.

Response: Implementation of the Nonstructural NED RP and the NER RP would not involve the construction of levees. However, the Nonstructural NED RP include construction of localized storm surge risk reduction measures less than 6 feet in height around industrial complexes and warehouses that are eligible for the Project. The proposed action would not involve the construction of levees. The use of berms is for individual structures would typically be constructed landward of wetland areas; or, if necessary at the non-wetland/wetland interface. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to wetland areas.

By design, the NER RP would construct temporary containment/exclusion dikes at the nine marsh restoration sites to temporarily contain dredged sediments for marsh restoration and prevent dredged effluent from adversely impacting adjacent existing coastal restoration projects and other areas not designed to be restored or nourished. However, following de-watering and consolidation the temporary containment/exclusion dikes are expected to naturally degrade or they would be degraded at three years post-construction to allow for tidal exchange and aquatic organism access. By design, the NER RP would also construct 251,528 linear feet of shoreline protection that could would reduce wave induced shoreline erosion

to 6,135 net acres. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to wetland areas.

Guideline 2.5 Impoundment levees shall only be constructed in wetland areas as part of approved water or marsh management projects or to prevent release of pollutants.

Response: Implementation of the Nonstructural NED RP and the NER RP would not involve the construction of permanent impoundment levees or water or marsh management projects. However, the Non-structural NED RP include construction of localized storm surge risk reduction measures less than 6 feet in height around industrial complexes and warehouses that are eligible for the Project. The use of berms is for individual structures would typically be constructed landward of wetland areas; or, if necessary at the non-wetland/wetland interface. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to wetland areas and prevent the release of pollutants.

By design, the NER RP would construct temporary containment/exclusion dikes at the nine marsh restoration sites to temporarily contain dredged sediments for marsh restoration and prevent dredged effluent from adversely impacting adjacent existing coastal restoration projects and other areas not designed to be restored or nourished. However, following de-watering and consolidation the temporary containment/exclusion dikes are expected to naturally degrade or they would be degraded at three years post-construction to allow for tidal exchange and aquatic organism access. By design, the NER RP would also construct 251,528 linear feet of shoreline protection that could would reduce wave induced shoreline erosion to 6,135 net acres. However, the five shoreline protection measures would not function as impoundment levees. Rather, shoreline protection measures would reduce wave induced erosion to marsh. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to wetland areas and prevent the release of pollutants.

Guideline 2.6 Hurricane or flood protection levee systems shall be designed, built and thereafter operated and maintained utilizing best practical techniques to minimize disruptions of existing hydrologic patterns, and the interchange of water, beneficial nutrients and aquatic organisms between enclosed wetlands and those outside the levee system.

Response: Implementation of the Nonstructural NED RP and the NER RP would not involve the construction of hurricane or flood protection levee systems. However, by design the Nonstructural NED RP includes construction of localized storm surge risk reduction measures less than 6 feet in height around industrial complexes and warehouses that are eligible for the Project. The use of berms is for individual structures only and would be designed, built and thereafter operated and maintained utilizing best practical techniques to minimize disruptions of existing hydrologic patterns, and the interchange of water, beneficial nutrients and aquatic organisms between enclosed wetlands and those outside the proposed berm system. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to minimize disruptions of existing hydrologic patterns, the interchange of water, beneficial nutrients and aquatic organisms and wetlands.

By design, the NER RP would construct temporary containment/exclusion dikes at the nine marsh restoration sites to temporarily contain dredged sediments for marsh restoration and prevent dredged effluent from adversely impacting adjacent existing coastal restoration projects and other areas not designed to be restored or nourished. However, following de-watering and consolidation the temporary containment/exclusion dikes are expected to naturally degrade or they would be degraded at three years post-construction to allow for tidal exchange and aquatic organism access. By design, the NER RP would also construct 251,528 linear feet of shoreline protection that could would reduce wave induced shoreline erosion to 6,135 net acres. However, the five shoreline protection measures would not function as hurricane or flood protection levee systems. Rather, shoreline protection measures would reduce wave induced erosion to marsh. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid and minimize potential

adverse impacts and to minimize disruptions of existing hydrologic patterns, the interchange of water, beneficial nutrients and aquatic organisms and wetlands.

2. GUIDELINES FOR LINEAR FACILITIES

Guidelines 3.1 through 3.16: **Guideline 3.1 Linear use alignments shall be planned to avoid adverse impacts on areas of high biological productivity or irreplaceable resource areas.**

Response: By design, the Nonstructural NED RP includes construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. The use of berms is for individual structures only and have been planned to avoid adverse impacts on areas of high biological productivity or irreplaceable resource areas. These berms would be constructed in previously disturbed areas characterized as residential or businesses and would not adversely impact areas of high biological productivity or irreplaceable resource areas. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to avoid adverse impacts of high biological productivity or irreplaceable resource areas.

By design, the NER RP nine marsh restoration measures would include construction of temporary containment/exclusion dikes to contain dredged sediment and allow them to dewater and consolidate into marsh habitat. Following de-watering and consolidation, the temporary containment/exclusion dikes are expected to naturally degrade or would be degraded, if necessary, three years following construction to allow for tidal exchange and aquatic organism access. These temporary containment/exclusion dikes would not adversely impact areas of high biological productivity or irreplaceable resource areas. Rather, the nine marsh restoration measures would restore a net total of 7,900 net acres with 2,700 AAHUs. By design, the five shoreline protection/stabilization measures are designed to be linear facilities that would provide a total 251,528 linear feet of shoreline stabilization and protection of approximately 6,135 net acres and 1,738 AAHUs of marsh wetlands that are typically high in biological productivity in an area that is presently experiencing significant rates of land loss. The 35 chenier reforestation sites in Cameron and Vermilion Parishes would provide approximately 1,413 net acres over the 50 year period of analysis resulting in 538 AAHUs. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to avoid adverse impacts of high biological productivity or irreplaceable resource areas.

Guideline 3.2 Linear facilities involving the use of dredging or filling shall be avoided in wetland and estuarine areas to the maximum extent practicable.

Response: By design, the Nonstructural NED RP would not include dredging or filling in wetlands or estuarine areas. However, the Nonstructural NED RP includes construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. The use of berms is for individual structures only and would be constructed in previously disturbed areas characterized as residential or businesses and are designed to avoid adverse impacts on wetlands and estuarine areas. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to avoid adverse impacts to wetlands and estuarine areas to the maximum extent practicable.

By design, the NER RP nine marsh restoration measures include the construction of temporary containment/exclusion dikes. Following de-watering and consolidation, the temporary containment/exclusion dikes are expected to naturally degrade or they would be degraded at three years following construction, if necessary, to allow for tidal exchange and aquatic organism access. By design the linear shoreline protection/stabilization measures are specifically designed to provide 251,528 linear feet of shoreline protection and stabilization for approximately 6,135 net acres and 1,738 AAHUs. Although not impacting wetlands or estuarine areas, the 35 chenier reforestation sites in Cameron and Vermilion Parishes would reforest approximately 1,413 net acres over the 50 year period of analysis, resulting in 538 AAHUs. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize

and reduce potential adverse impacts to avoid adverse impacts to wetlands and estuarine areas to the maximum extent practicable.

Guideline 3.3 Linear facilities involving dredging shall be of the minimum practical size and length.

Response: Acknowledged.

Guideline 3.4 To the maximum extent practicable, pipelines shall be installed through the "push ditch" method and the ditch backfilled.

Response: The NED and NER RP would not entail installation of any permanent pipelines. However, for NER RP marsh restoration measure 124c, the temporary dredge pipeline would be bored under Louisiana Highway 82. Following dredging and construction, the temporary pipeline boring would be refilled and the area restored to pre-construction conditions. All of the NER RP marsh restoration measures would involve the temporary use of hydraulic dredge pipelines to move sediments dredged from identified borrow sites to the identified nine marsh restoration sites. The dredge pipelines would be located along identified pipeline corridors that would be returned to pre-construction conditions following completion of marsh restoration activities. For the NER RP five shoreline protection measures, identified temporary access corridors would be dredged and then backfilled following completion of construction activities for the five shoreline protection measures. The Nonstructural NED RP and the NER RP would utilize the best available practical techniques and BMPs during construction to avoid and minimize potential adverse impacts to the surrounding aquatic and terrestrial environment.

Guideline 3.5 Existing corridors, rights of way, canals, and streams shall be utilized to the maximum extent practicable for linear facilities.

Response: Acknowledged. The Nonstructural NED RP measures of elevating, dry flood proofing, and construction of flood proofing barriers or berms of less than 6 feet in height would be constructed on previously disturbed residential and business areas. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts.

By design, dredging and construction of the NER RP measures would utilize, to the maximum extent practicable, existing corridors, rights of way, canals, and streams in construction of the nine marsh restoration measures, the five shoreline protection measures and the 35 chenier reforestation measures. Designated access routes (see Fact Sheets) would be repeatedly reused to the maximum extent practicable. During subsequent renourishment of the nine marsh restoration sites and maintenance of the shoreline protection measures, the initial access corridors would be re-utilized to the maximum extent practicable. The NER RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts.

Guideline 3.6 Linear facilities and alignments shall be, to the maximum extent practicable, designed and constructed to permit multiple uses consistent with the nature of the facility.

Response: By design, the only permanent linear measures of the Nonstructural NED RP would be construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. During construction, the berm measures would be temporarily unavailable for multiple uses. Following construction, the berms would permit multiple uses consistent with the design purpose and nature of the berms and permit multiple uses.

By design, the NER RP nine marsh restoration measures include the construction of temporary containment/exclusion dikes. Following de-watering and consolidation, the temporary containment/exclusion dikes are expected to naturally degrade or they would be degraded at three years following construction, if necessary, to allow for tidal exchange and aquatic organism access. By design, the five linear shoreline protection/stabilization measures are specifically designed to provide 251,528 linear feet of shoreline protection

and stabilization for approximately 6,135 net acres and 1,738 AAHUs. These linear NER RP measures would be unavailable for multiple uses during dredging and construction activities. Following dredging and construction, these areas would permit multiple uses consistent with their design purpose and nature. Although not impacting wetlands or estuarine areas, the 35 chenier reforestation sites in Cameron and Vermilion Parishes would reforest approximately 1,413 net acres over the 50 year period of analysis, resulting in 538 AAHUs. The Nonstructural NED RP would utilize the best available practical techniques and BMPs during construction to avoid, minimize and reduce potential adverse impacts to avoid adverse impacts to wetlands and estuarine areas to the maximum extent practicable and permit multiple uses.

Guideline 3.7 Linear facilities involving dredging shall not traverse or adversely affect any barrier island.

Response: The Nonstructural NED RP and NER RP measures would not occur on or near any barrier islands. However, the NER RP marsh restoration measures 47a1, 47a2, 47c1, 124c, 127c3, and 306a1 would involve dredging borrow from the Gulf of Mexico and transporting, via dredge pipeline, to inland marsh restoration sites. Dredge pipelines used for restoration of measures 127c3 and 306a1 would generally follow existing canals and waterways. However, the dredge pipelines used for restoring measures 47a1, 47a2, 47c1, and 124c would cross barrier beach shoreline.

- Dredged material for construction of marsh restoration NER RP measure 47a1 material would be transported from the designated Gulf borrow site directly to the disposal site via hydraulic dredge pipeline, for a distance of approximately 6.7 miles (see Fact Sheet for Measure 47a1). Access for the pipeline would require a temporary designated access corridor approximately 30 feet wide, and would be placed along existing open-water canals to the extent practicable. Navigation traffic is not anticipated to be impacted. Any changes in beach topography resulting from placement of the dredge pipeline would be restored at least to their natural condition following construction, which would use the best available restoration techniques which improve the traversed area's ability to serve as a shoreline following pipeline removal.
- The following is applicable to NER RP measures 47a1, 47a2, and 47c1. The pipeline corridor is approximately 35,519 feet long (24 acres), and would require no dredging. Any changes in beach topography resulting from placement of the pipeline would be restored at least to their natural condition following construction, which would use the best available restoration techniques which improve the traversed area's ability to serve as a shoreline following pipeline removal. Piping plover critical habitat includes intertidal sand beaches (including sand flats) or mud flats (between the mean lower low water line and annual high tide) with no or very sparse emergent vegetation for feeding. Per USFWS protocol, the shoreline to vegetation line was digitized as a polygon, then buffered (on the water side) by 56 meters (184 feet) to approximate the mean lower-low water (MLLW) line. If necessary, a 100-foot wide bird abatement corridor across the beach would be maintained during construction to deter foraging, sheltering, and roosting of all potential migratory bird species. All construction activities shall observe a buffer zone of 1,000 feet for any colonial-nesting waterbird colonies (e.g., egrets, herons, ibis, pelicans, etc.), 1,300 feet for any shorebird nesting colonies (e.g., terns, gulls, plovers, skimmers, etc.), and 2,000 feet for any brown pelican nesting colonies near the project measure. USFWS and USACE biologists would survey the area before construction to confirm active nesting bird locations. A nesting bird abatement plan would be developed if one of the aforementioned nesting colonies falls within its respective buffer zone. Additionally, USFWS guidelines would be followed to avoid adverse impacts to the nesting colonies. Approximately 0.14 acres (200 feet long by 30 feet wide) of critical habitat is expected to be impacted temporarily by this measure. Conservation Measures would include: 1) Pipeline alignment and associated construction activities may be modified to reduce impacts to foraging, sheltering, and roosting. 2) Avoid impacts to the primary constituent elements (PCEs) of piping plover Critical Habitat to the maximum extent practicable; and 3) Evaluate the project area prior to design and construction for the presence of piping plover PCEs as a basis for minimizing potential impacts.
- Dredged material for construction of marsh restoration measure 47a2 would be transported from the designated Gulf borrow site directly to the disposal site via hydraulic dredge pipeline, for a distance of approximately 5.9 miles (see Fact Sheet for Measure 47a2). Access for the pipeline would require a

temporary designated access corridor approximately 30 feet wide, and would be placed along existing open-water canals to the extent practicable. Navigation traffic is not anticipated to be impacted. The pipeline corridor is approximately 30,898 feet long (21 acres), and would require no dredging. Any changes in beach topography resulting from placement of the pipeline would be restored at least to their natural condition following construction, which would use the best available restoration techniques which improve the traversed area's ability to serve as a shoreline following pipeline removal. Approximately 0.14 acres (200 feet long by 30 feet wide) of critical habitat for piping plover is expected to be impacted temporarily by this measure. See above description regarding beach topography, critical habitat, buffer zone and nesting bird abatement program and conservation measures.

- Dredged material for construction of marsh restoration measure 47c1 would be transported from the designated Gulf borrow site directly to the disposal site via hydraulic dredge pipeline, transported directly to the site via pipeline, for a distance of approximately 5.7 miles. Access for the pipeline would require a corridor approximately 30 feet wide, and would be placed along existing open-water canals to the extent practicable. Navigation traffic is not anticipated to be impacted. The pipeline corridor is approximately 29,858 feet long (21 acres), and would require no dredging. Any changes in beach topography resulting from placement of the pipeline would be restored at least to their natural condition following construction, which would use the best available restoration techniques which improve the traversed area's ability to serve as a shoreline following pipeline removal. See above description regarding beach topography, critical habitat, buffer zone and nesting bird abatement program and conservation measures.
- Dredged material for construction measure 124c would be transported directly to the site via pipeline, for a distance of approximately 1.8 miles. The pipeline access corridor would be approximately 30 feet wide, and would follow existing waterways to the extent possible. Navigation traffic is not anticipated to be impacted. The pipeline corridor is approximately 9,485 feet long (7.0 acres), and would require no dredging. The pipeline would cross approximately 500 feet (0.34 acres) of beach. The pipeline would be bored under Louisiana Highway 82. If necessary, a 100-foot wide bird abatement corridor across the beach would be maintained during construction to deter foraging, sheltering, and roosting of all potential migratory bird species. All construction activities shall observe a buffer zone of 1,000 feet for any colonial-nesting waterbird colonies (e.g., egrets, herons, ibis, pelicans, etc.), 1,300 feet for any shorebird nesting colonies (e.g., terns, gulls, plovers, skimmers, etc.), and 2,000 feet for any brown pelican nesting colonies near the project measure. USFWS and USACE biologists would survey the area before construction to confirm active nesting bird locations. A nesting bird abatement plan would be developed if one of the aforementioned nesting colonies falls within its respective buffer zone. Additionally, USFWS guidelines would be followed to avoid adverse impacts to the nesting colonies. Approximately 1.8 acres of critical habitat is expected to be temporarily impacted temporarily during construction of measure 124c. The best available practical techniques and BMPs would be used during construction to avoid and minimize potential adverse impacts to the barrier beach. See above description regarding beach topography, critical habitat, buffer zone and nesting bird abatement program and conservation measures.

NER RP shoreline protection measures 5a, 6b1, 6b2, and 6b3 located immediately offshore of the Gulf of Mexico barrier beach would provide a total of 180,545 linear feet of Gulf shoreline protection and stabilization to 4,847 net acres of back barrier marsh and 1,459 AAHUs over the 50 year period of analysis. The NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid, minimize and reduce potential adverse impacts to barrier islands or other barrier features.

Guideline 3.8 Linear facilities involving dredging shall not traverse beaches, tidal passes, protective reefs or other natural gulf shoreline unless no other alternative exists. If a beach, tidal pass, reef or other natural gulf shoreline must be traversed for a non navigation canal, they shall be restored at least to their natural condition immediately upon completion of construction. Tidal passes shall not be permanently widened or deepened except when necessary to conduct the use. The best available restoration techniques which improve the traversed area's ability to serve as a shoreline shall be used.

Response: See response to Guideline 3.7 above. The Nonstructural NED RP would not involve dredging or traversing beaches, tidal passes, protective reefs or other natural gulf shoreline features. The NER

RP impacts to barrier beaches described above for Guideline 3.7, are anticipated. The NER RP would not impact any other beaches, tidal passes, protective reefs or natural gulf shorelines. As described in response to Guideline 3.7 above, any dredging and construction impacts would be restored at least to their natural pre-construction condition, and this action would use the best available restoration techniques. The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts to natural beaches, tidal passes, protective reefs or other natural gulf shorelines.

Guideline 3.9 Linear facilities shall be planned, designed, located and built using the best practical techniques to minimize disruption of natural hydrologic and sediment transport patterns, sheet flow, and water quality, and to minimize adverse impacts on wetlands.

Response: Acknowledged. See also above responses to linear facilities guidelines, especially for 1.7(h) and 1.7(i). The Nonstructural NED RP would provide reduced risk of hurricane and storm surge flood damage for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. The Nonstructural NED RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts to minimize disruption of natural hydrologic and sediment transport patterns, sheet flow, and water quality, and to minimize adverse impacts on wetlands.

The NER RP would protect, restore, and nourish a net total of 14,035 net acres of transitional estuarine marsh (including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures). At the end of the 50 year period of analysis, the marsh restoration and shoreline protection measures together would achieve a total net ecological benefit of 4,430 AAHUs; with 2,700 AAHUs from the nine marsh restoration measures, and 1,738 AAHUs from the five shoreline protection measures. The chenier restoration measures would reforest, in Cameron and Vermilion Parishes, a net total of 1,413 net acres with 538 AAHUs. The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts to minimize disruption of natural hydrologic and sediment transport patterns, sheet flow, and water quality, and to minimize adverse impacts on wetlands.

Guideline 3.10 Linear facilities shall be planned, designed, and built using the best practical techniques to prevent bank slumping and erosion, saltwater intrusion, and to minimize the potential for inland movement of storm generated surges. Consideration shall be given to the use of locks in navigation canals and channels which connect more saline areas with fresher areas.

Response: Acknowledged**.** See also above responses to linear facilities guidelines, especially for 1.7(h). By design, the Nonstructural NED RP would provide reduced risk of hurricane and storm surge flood damage for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. The Nonstructural NED RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts and to prevent bank slumping and erosion, saltwater intrusion, and to minimize the potential for inland movement of storm generated surges.

By design, the NER RP would protect, restore, and nourish a net total of 14,035 net acres of transitional estuarine marsh (including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures). At the end of the 50 year period of analysis, the marsh restoration and shoreline protection measures together would achieve a total net ecological benefit of 4,430 AAHUs; with 2,700 AAHUs from the nine marsh restoration measures, and 1,738 AAHUs from the five shoreline protection measures. The chenier restoration measures would reforest, in Cameron and Vermilion Parishes, a net total of 1,413 net acres with 538 AAHUs. The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts and to prevent bank slumping and erosion, saltwater intrusion, and to minimize the potential for inland movement of storm generated surges.

Guideline 3.11 All non-navigation canals, channels and ditches which connect more saline areas with fresher areas shall be plugged at all waterway crossings and at intervals between crossings in order to compartmentalize them. The plugs shall be properly maintained.

Response: The Nonstructural NED RP and NER RP would not construct any permanent channels or canals that would adversely affect salinity patterns. By design, however, the NER RP would construct temporary access corridors for dredge pipeline to construct the nine marsh restoration measures. In addition, construction of the five shoreline protection measures would require dredging floatation access for construction equipment and material barges.

- Measure 5a flotation access channels are anticipated for access to the site for construction equipment and material barges. Flotation access along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 479 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge would be sidecast adjacent to the channel, and returned after construction. Approximately 462 acres are anticipated to be impacted by material removed from the access channels.
- Measure 6b1 flotation access channels are anticipated for access to the site for construction equipment and material barges. Flotation access along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 725 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge (clamshell or bucket) would be sidecast adjacent to the channel, and returned after construction. Approximately 711 acres are anticipated to be impacted by material removed from the access channels.
- Measure 6b2 flotation access channels are anticipated for access to the site for construction equipment and material barges. Flotation access along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 507 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge (clamshell or bucket) would be sidecast adjacent to the channel, and returned after construction. Approximately 497 acres are anticipated to be impacted by material removed from the access channels.
- Measure 6b3 flotation dredging is anticipated for access to the site for construction equipment and material barges. Flotation excavation along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 372 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge (clamshell or bucket) would be sidecast adjacent to the channel, and returned after construction. Approximately 289 acres are anticipated to be impacted by material removed from the access channels.

The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts and to ensure, if necessary, that connections between more saline areas with fresher areas shall be plugged and properly maintained, to the maximum extent practicable.

Guideline 3.12 The multiple use of existing canals, directional drilling and other practical techniques shall be utilized to the maximum extent practicable to minimize the number and size of access canals,

to minimize changes of natural systems and to minimize adverse impacts on natural areas and wildlife and fisheries habitat.

Response: The Nonstructural NED RP would not entail using canals, directional drilling or access canals. Rather, the Nonstructural NED RP would include: 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. These areas are characterized as previously disturbed residential and business areas that are not natural areas or wildlife and fishery habitats. The Nonstructural NED RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts by the multiple by using existing canals, directional drilling and other practical techniques to the maximum extent practicable to minimize the number and size of access canals, to minimize changes of natural systems and to minimize adverse impacts on natural areas and wildlife and fisheries habitat.

Construction of the NER RP marsh restoration measures 47a1, 47a2, 47c1 would, by design, entail the use of the same access routes and natural canals for routing dredge pipelines from the borrow sites to the marsh restoration sites. Any areas subjected to construction impacts would be restored at least to their natural pre-construction condition, and this action would use the best available restoration techniques and BMPs to avoid changes of natural systems and adverse impacts on wildlife and fisheries habitat. In some instances, directing the dredge pipeline along the retention/exclusion dike borrow canal would allow the pipeline to avoid impacts to existing ridges and other significant landscape features. Where such features would need to be crossed, the best available practical techniques and BMPs for marsh buggy use would be applied (LDNR & LDWF 2000) and the area would be restored to pre-construction condition. Although it is anticipated that a marsh buggy would be used to place the dredge pipeline across the barrier beach for construction of marsh restoration measures 47a1, 47a2, 47c1, and 124c, the use of alternative techniques would also be considered to further avoid and minimize adverse impacts to natural areas and wildlife and fisheries habitat. The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts by the multiple by using existing canals, directional drilling and other practical techniques to the maximum extent practicable to minimize the number and size of access canals, to minimize changes of natural systems and to minimize adverse impacts on natural areas and wildlife and fisheries habitat.

Guideline 3.13 All pipelines shall be constructed in accordance with parts 191, 192, and 195 of Title 49 of the Code of Federal Regulations, as amended, and in conformance with the Commissioner of Conservation's Pipeline Safety Rules and Regulations and those safety requirements established by La. R. S. 45:408, whichever would require higher standards.

Response: Acknowledged**.** The Nonstructural NED RP and NER RP would not entail using permanent pipelines. Rather, the nonstructural NED RP would include: 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. These areas are characterized as previously disturbed residential and business areas that are not natural areas or wildlife and fishery habitats. The Nonstructural NED RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts and insure safety requirements are at the highest standards consistent with existing laws, rules, and regulations.

The NER RP would, by design, temporarily use dredge pipelines to move sediments from designated borrow sites to the designated nine marsh restoration sites. For NER RP marsh restoration measure 124c, the temporary dredge pipeline would be bored under Louisiana Highway 82. Following dredging and construction, the temporary pipeline boring would be refilled and the area restored to pre-construction conditions. All of the NER RP marsh restoration measures would involve the temporary use of hydraulic dredge pipelines to move sediments dredged from identified borrow sites to the identified nine marsh restoration sites. The dredge pipelines would be located along identified pipeline corridors that would be returned to pre-construction

conditions following completion of marsh restoration activities. The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts and insure safety requirements are at the highest standards consistent with existing laws, rules, and regulations.

Guideline 3.14 Areas dredged for linear facilities shall be backfilled or otherwise restored to the preexisting conditions upon cessation of use for navigation purposes to the maximum extent practicable.

Response: Acknowledged. The Nonstructural NED RP would not entail dredging for linear facilities. By design, however, the NER RP would construct temporary access corridors for dredge pipeline to construct the nine marsh restoration measures. In addition, construction of the five shoreline protection measures would require dredging floatation access for construction equipment and material barges.

- Measure 5a flotation access channels are anticipated for access to the site for construction equipment and material barges. Flotation access along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 479 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge would be sidecast adjacent to the channel, and returned after construction. Approximately 462 acres are anticipated to be impacted by material removed from the access channels.
- Measure 6b1 flotation access channels are anticipated for access to the site for construction equipment and material barges. Flotation access along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 725 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge (clamshell or bucket) would be sidecast adjacent to the channel, and returned after construction. Approximately 711 acres are anticipated to be impacted by material removed from the access channels.
- Measure 6b2 flotation access channels are anticipated for access to the site for construction equipment and material barges. Flotation access along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 507 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge (clamshell or bucket) would be sidecast adjacent to the channel, and returned after construction. Approximately 497 acres are anticipated to be impacted by material removed from the access channels.
- Measure 6b3 flotation dredging is anticipated for access to the site for construction equipment and material barges. Flotation excavation along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 372 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge (clamshell or bucket) would be sidecast adjacent to the channel, and returned after construction. Approximately 289 acres are anticipated to be impacted by material removed from the access channels.

The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts by backfilling or otherwise restoring work sites to the pre-existing conditions upon cessation of dredging and construction to the maximum extent practicable.

Guideline 3.15 The best practical techniques for site restoration and re-vegetation shall be utilized for all linear facilities.

Response: Acknowledged. The Nonstructural NED RP and the NER RP would utilize the best available practical techniques and BMPs during dredging and construction to avoid, minimize and reduce potential adverse impacts and restore and re-vegetate for all linear project measures (e.g., berms of less than 6 foot elevation and temporary containment/exclusion dikes). Marsh restoration sites are anticipated to naturally revegetate. Shoreline protection measures, by design, would not revegetate. Any areas subjected to dredging or construction impacts would be restored based upon their design intent, at least to their natural pre-construction condition, and this action would utilize the best available practical techniques for site restoration and re-vegetation and BMPs to avoid, minimize and reduce potential adverse impacts.

Guideline 3.16 Confined and dead end canals shall be avoided to the maximum extent practicable. Approved canals must be designed and constructed using the best practical techniques to avoid water stagnation and eutrophication.

Response: Acknowledged. The Nonstructural NED RP would not entail design or use of confined or dead end canals. By design, however, the NER RP would construct temporary access corridors for dredge pipelines to construct the nine marsh restoration measures. In addition, construction of the five shoreline protection measures would require dredging floatation access for construction equipment and material barges.

- Measure 5a flotation access channels are anticipated for access to the site for construction equipment and material barges. Flotation access along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 479 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge would be sidecast adjacent to the channel, and returned after construction. Approximately 462 acres are anticipated to be impacted by material removed from the access channels.
- Measure 6b1 flotation access channels are anticipated for access to the site for construction equipment and material barges. Flotation access along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 725 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge (clamshell or bucket) would be sidecast adjacent to the channel, and returned after construction. Approximately 711 acres are anticipated to be impacted by material removed from the access channels.
- Measure 6b2 flotation access channels are anticipated for access to the site for construction equipment and material barges. Flotation access along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 507 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge (clamshell or bucket) would be sidecast adjacent to the channel, and returned after construction. Approximately 497 acres are anticipated to be impacted by material removed from the access channels.
- Measure 6b3 flotation dredging is anticipated for access to the site for construction equipment and material barges. Flotation excavation along the alignment would be limited to an 80-foot bottom width channel not to exceed an elevation of -7.0 feet (NAVD88), with a top width of 130 feet and 3:1 side slopes. Floatation access channels would be dredged perpendicular to the shoreline out to

the -7.0 foot (NAVD88) contour every 2,500 feet. Approximately 372 acres are anticipated to be dredged for the access channels. Material removed from the access channel via mechanical dredge (clamshell or bucket) would be sidecast adjacent to the channel, and returned after construction. Approximately 289 acres are anticipated to be impacted by material removed from the access channels.

The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts by avoiding dredging confined or dead end canals, to the maximum extent practicable, and designing and constructing temporary floatation access canals using the best practical techniques to avoid water stagnation and eutrophication.

3. GUIDELINES FOR DREDGED MATERIAL DEPOSITION

Guideline 4.1 Spoil shall be deposited utilizing the best practical techniques to avoid disruption of water movement, flow, circulation and quality.

Response: The Nonstructural NED RP would not utilize or deposit dredged spoil. However the NER RP nine marsh restoration measures, by design, would require dredging a total of approximately 62,428,722 cy of borrow to initially create and restore a total of 11,666 acres of transitional estuarine marsh habitat. For all nine mash restoration measures, dredged sediments would be deposited utilizing the best practical techniques to avoid disruption of water movement, flow, circulation and quality. Temporary floatation and access corridors would be dredged for not only the nine marsh restoration measures but also the five shoreline protection measures (see response to Guideline 3.16, above). Dredged material would be initially side cast and then, following completion of dredging and construction activities, the side cast material would be returned to the temporary floatation and access corridor. Dredging and construction could cause temporary and localized disruption of water movement, flows, circulation and quality. These temporary and localized impacts could include increased turbidity and total suspended sediments, organic enrichment, chemical leaching, reduced dissolved oxygen, and elevated carbon dioxide levels, among others. Construction of temporary containment/exclusion dikes for the nine marsh restoration measures would prevent dredged effluent from entering nearby areas such as existing coastal restoration projects restoration projects. The NER RP would utilize the best available practical techniques for dredged material deposition and BMPs to avoid, minimize and reduce potential adverse impacts and avoid disruption of water movement, flow, circulation and quality.

Guideline 4.2 Spoil shall be used beneficially to the maximum extent practicable to improve productivity or create new habitat, reduce or compensate for environmental damage done by dredging activities, or prevent environmental damage. Otherwise, existing spoil disposal areas or upland disposal shall be utilized to the maximum extent practicable rather than creating new disposal areas.

Response: The Nonstructural NED RP would not utilize dredged spoil. Construction of the NER RP nine marsh restoration measures, by design, would require dredging a total of approximately 62,428,722 cy of borrow to initially create and restore a total of 11,666 acres of transitional estuarine marsh habitat. This action would help reduce and compensate for the widespread coastal land loss, due to both natural and human causes, currently being experienced in the Southwest Coastal Louisiana project area and throughout coastal Louisiana. No environmental damage is anticipated from proposed dredging activities. Upland disposal is not anticipated. The NER RP would utilize the best available practical techniques for dredged material deposition and BMPs to avoid, minimize and reduce potential adverse impacts.

Guideline 4.3 Spoil shall not be disposed of in a manner which could result in the impounding or draining of wetlands or the creation of development sites unless the spoil deposition is part of an approved levee or land surface alteration project.

Response: The Nonstructural NED RP would not utilize dredged spoil. Construction of the NER RP nine marsh restoration measures, by design, would require dredging a total of approximately 62,428,722 cy of borrow to initially create and restore a total of 11,666 acres of transitional estuarine marsh habitat. Permanent

impounding or draining of wetlands or the creation of development sites is not anticipated. For marsh restoration measures, temporary earthen containment/exclusion dikes would be constructed from in-situ material located within the marsh restoration/nourishment area using a mechanical dredge. The in-situ borrow area used for construction of the earthen containment/exclusion dikes would be refilled during placement of dredged material for construction of the nine marsh restoration measures. The temporary containment/exclusion dikes would naturally degrade or would be breached in multiple places at three years following construction, if necessary, to restore fish access if natural degradation is not sufficient. Breach locations would correspond to weir locations. Any areas subjected to construction impacts would be restored at least to their natural pre-construction condition, and this action would use the best available restoration techniques. The NER RP would utilize the best available practical techniques for dredged material deposition and BMPs to avoid, minimize and reduce potential adverse impacts and prevent impounding or draining of existing wetlands.

Guideline 4.4 Spoil shall not be disposed of on marsh, known oyster or clam reefs or in areas of submersed vegetation to the maximum extent practicable.

Response: The Nonstructural NED RP would not utilize dredged spoil. Construction of the NER RP nine marsh restoration measures, by design, would require dredging a total of approximately 62,428,722 cy of borrow to initially create and restore a total of 11,666 acres of transitional estuarine marsh habitat. Dredged sediments would be used to restore existing fragmented and degraded marsh and shallow open water areas to create new transitional estuarine marsh. Dredged material would not be disposed of on known oyster or clam reefs or in areas of submersed vegetation, to the maximum extent practicable. Coordination with the Louisiana Department of Wildlife and Fisheries has been initiated for determining potential impacts to oyster and clam resources managed by LDWF. At the time of construction, additional coordination with LDWF would be conducted to ensure no new oyster or clam reefs have developed in the project measure area. Although the temporary access corridor for measure 3c1crosses the Calcasieu Lake Public Oyster Area, no dredging is anticipated to be required. The dredge pipeline temporary access corridors would follow the previously approved temporary access corridor used for repairing the Cameron-Creole Watershed levee after Hurricane Rita. The NER RP would utilize the best available practical techniques for dredged material deposition and BMPs to avoid, minimize and reduce potential adverse impacts.

Guideline 4.5 Spoil shall not be disposed of in such a manner as to create a hindrance to navigation or fishing, or hinder timber growth.

Response: The Nonstructural NED RP would not utilize dredged spoil. Construction of the NER RP nine marsh restoration measures, by design, would require dredging a total of approximately 62,428,722 cy of borrow to initially create and restore a total of 11,666 acres of transitional estuarine marsh habitat. The placement of dredged material for purposes of marsh restoration and the dredging of temporary floatation and access corridors would not create a hindrance to navigation or fishing, or hinder timber growth. The NER RP would utilize the best available practical techniques for dredged material deposition and BMPs to avoid, minimize and reduce potential adverse impacts and not create a hindrance to navigation, fishing or hinder timber growth.

Guideline 4.6 Spoil disposal areas shall be designed and constructed and maintained using the best practical techniques to retain the spoil at the site, reduce turbidity, and reduce shoreline erosion when appropriate.

Response: The Nonstructural NED RP would not utilize dredged spoil. Construction of the NER RP nine marsh restoration measures, by design, would require dredging a total of approximately 62,428,722 cy of borrow to initially create and restore a total of 11,666 acres of transitional estuarine marsh habitat. Best management practices would be employed to retain dredged material and minimize turbidity resulting from dredging activities. Outflow weir locations are indicated on the Fact Sheet maps. Turbidity control measures are not anticipated to be required, since the outflow weirs are located to direct dredged effluent outflow into

existing fragmented marsh areas to be entrained and nourish these fragmented and degrading marshes. Any areas subjected to construction impacts would be restored at least to their natural pre-construction condition, and this action would use the best available restoration techniques. For temporary access corridor dredging and refilling, if needed, the use of a mechanical dredge (e.g., clam-shell dredge) rather that a hydraulic dredge would reduce the resuspension of sediments. No additional turbidity reduction measures are anticipated to be required for this activity. By design, the five shoreline protection measures would provide 251,528 linear feet of shoreline protection and stabilization resulting over the 50 year period of analysis protection of 6,135 net acres and 1,738 AAHUs. The NER RP would utilize the best available practical techniques for dredged material deposition and BMPs to avoid, minimize and reduce potential adverse impacts and retain spoil at the site, reduce turbidity, and reduce shoreline erosion.

Guideline 4.7 The alienation of state owned property shall not result from spoil deposition activities without the consent of the Department of Natural Resources.

Response: The Nonstructural NED RP and the NER RP would not result in the alienation of state owned property.

4. GUIDELINES FOR SHORELINE MODIFICATION

Guideline 5.1 Nonstructural methods of shoreline protection shall be utilized to the maximum extent practicable.

Response: Acknowledged. The Nonstructural NED RP would not involve shoreline modification. The NER RP five shoreline protection measures, by design, would utilize non-structural methods of shoreline protection and stabilization to the maximum extent practicable. Approximately 3,595,330 tons of rock, 1,958,625 square yards of geotextile fabric, and 1,115,190 tons of lightweight aggregate would be used to create 251,528 linear feet of shoreline protection/stabilization that would benefit a total of 6,135 net acres and 1,738 AAHUs over the 50 year period of analysis. For shoreline protection measure 16b, a foreshore rock dike would be constructed at the -2.0 foot NAVD88 contour, and would not be connected to the shoreline. For shoreline protection measures 5a, 6b1, 6b2, and 6b3, offshore breakwaters would be constructed, which would not be connected to the shoreline. The NER RP would utilize the best available practical techniques for shoreline modification and BMPs to avoid, minimize and reduce potential adverse impacts.

Guideline 5.2 Shoreline modification structures shall be designed and built using best practical techniques to minimize adverse environmental impacts.

Response: Acknowledged. The Nonstructural NED RP would not involve shoreline modification. The NER RP, by design, would utilize non-structural methods of shoreline protection to the maximum extent practicable. Approximately 3,595,330 tons of rock, 1,958,625 square yards of geotextile fabric, and 1,115,190 tons of lightweight aggregate would be used to create 251,528 linear feet of shoreline protection that would benefit a total of 6,135 net acres and 1,738 AAHUs over the 50 year period of analysis. Shoreline protection structures would be designed and built using best practical techniques to minimize adverse environmental impacts. Temporary construction and floatation access for the shoreline protection measures (measures 16b, 5a, 6b1, 6b2, and 6b3) would be from offshore to avoid impacts to existing beach and wetland habitat. Side cast spoil from dredging the floatation and access corridor would be returned following completion of construction. The NER RP would utilize the best available practical techniques for shoreline modification and BMPs to avoid, minimize and reduce potential adverse impacts and minimize adverse environmental impacts.

Guideline 5.3 Shoreline modification structures shall be lighted or marked in accordance with U.S. Coast Guard regulations, not interfere with navigation, and should foster fishing, other recreational opportunities, and public access.

Response: Acknowledged. The Nonstructural NED RP would not involve shoreline modification. There are no NER RP shoreline modification structures which would require lighting or marking in accordance

with U.S. Coast Guard regulations. Signage would be included if and where necessary to alert boaters to the presence of measures, such as breakwaters. The proposed shoreline modification measures would not interfere with navigation, and would foster fishing, other recreational opportunities, and public access to the maximum extent practicable. The NER RP would utilize the best available practical techniques for shoreline modification and BMPs to avoid, minimize and reduce potential adverse impacts and not interfere with navigation, foster fishing and other recreational opportunities, and public access.

Guideline 5.4 Shoreline modification structures shall be built using best practical materials and techniques to avoid the introduction of pollutants and toxic substances into coastal waters.

Response: Acknowledged. The Nonstructural NED RP would not involve shoreline modification. The NER RP five shoreline protection measures, by design, shall be designed and built using best practical materials and techniques to avoid the introduction of pollutants and toxic substances into coastal waters. Approximately 3,595,330 tons of rock, 1,958,625 square yards of geotextile fabric, and 1,115,190 tons of lightweight aggregate would be used to create 251,528 linear feet of shoreline protection that would benefit a total of 6,135 net acres and 1,738 AAHUs over the 50 year period of analysis. The NER RP would be constructed using the best available practical techniques for shoreline modification and BMPs to avoid, minimize and reduce potential introduction of pollutants and toxic substances into coastal waters.

Guideline 5.5 Piers and docks and other harbor structures shall be designed and built using best practical techniques to avoid obstruction of water circulation.

Response: The Nonstructural NED RP and NER RP do not propose any piers, docks, or other harbor structures that would obstruct water circulation. The NER RP five shoreline protection measures, by design, shall be designed and built using best practical materials and techniques to avoid the introduction of pollutants and toxic substances into coastal waters. Approximately 3,595,330 tons of rock, 1,958,625 square yards of geotextile fabric, and 1,115,190 tons of lightweight aggregate would be used to create 251,528 linear feet of shoreline protection that would benefit a total of 6,135 net acres and 1,738 AAHUs over the 50 year period of analysis. The NER RP would be designed and built using the best available practical techniques for shoreline modification and BMPs to avoid, minimize and reduce the potential obstruction of water circulation.

Guideline 5.6 Marinas, and similar commercial and recreational developments shall to the maximum extent practicable not be located so as to result in adverse impacts on open productive oyster beds, or submersed grass beds.

Response: The Nonstructural NED RP and NER RP do not propose any marinas, or commercial or recreational developments. For NER RP measure 306a1, the dredge pipeline temporary access corridor for marsh restoration would cross the Calcasieu Lake Public Oyster Area. However, no dredging is anticipated to be required for this temporary dredge pipeline access. Rather, the dredge pipeline temporary access corridors would follow the previously approved temporary access corridor used for repairing the Cameron-Creole Watershed levee after Hurricane Rita. The Nonstructural NED RP and NER RP would utilize the best available practical techniques for dredging and construction and BMPs to avoid, minimize and reduce potential adverse impacts to open productive oyster beds and submersed grass beds.

Guideline 5.7 Neglected or abandoned shoreline modification structures, piers, docks, mooring and other harbor structures shall be removed at the owner's expense, when appropriate.

Response: The Nonstructural NED RP would not create or remove neglected or abandoned shoreline modification structures, piers, docks, mooring and other harbor structures. It is not anticipated that dredging and construction of the NER RP measures would require neglected or abandoned shoreline modification structures, piers, docks, mooring and other harbor structures to be removed. However, if such need should arise, the removal of any such structures would be at the owner's expense, if and when appropriate. The Nonstructural NED RP and NER RP would utilize the best available practical techniques for shoreline modification and BMPs to avoid, minimize and reduce potential adverse impacts and to remove neglected or

abandoned shoreline modification structures, piers, docks, mooring and other harbor structures at the owner's expense, when appropriate.

Guideline 5.8 Shoreline stabilization structures shall not be built for the purpose of creating fill areas for development unless part of an approved surface alteration use.

Response: The Nonstructural NED RP and the NER RP would not construct or operate any shoreline stabilization structures for the purpose of creating fill areas for development. The NER RP nine marsh restoration measures, by design, would utilize in=situ material to create temporary containment/exclusion dikes used to temporarily contain dredged sediments used to initially create 8,175 acres and nourish 3,430 for a total 11,666 acres restored resulting in 7,900 net acres over the 50 year period of analysis. The NER RP five shoreline protection measures would place 251,528 linear feet of shoreline protection that would protection 6,135 net acres over the 50 years of analysis. The NER RP would utilize the best available practical techniques for shoreline modification and BMPs to avoid, minimize and reduce potential adverse impacts to create marsh restoration and shoreline protection measures.

Guideline 5.9 Jetties, groins, breakwaters and similar structures shall be planned, designed and constructed so as to avoid to the maximum extent practicable downstream land loss and erosion.

Response: The Nonstructural NED RP would not plan, design, construct or otherwise implement any jetties, groins, breakwaters or similar structures. However, the NER RP includes four shoreline protection/stabilization measures using breakwaters that would prevent land loss and shoreline erosion.

- Measure 6b1 is 58,293 feet of Gulf shoreline protection consisting of a reef breakwater with a lightweight aggregate core; located approximately 150 feet offshore consisting of geotextile fabric and stone built to an 18-foot crest width.
- Measure 6b2 is 42,883 feet of Gulf shoreline protection consisting of a reef breakwater with a lightweight aggregate core; located approximately 150 feet offshore using geotextile fabric and stone built to an 18-foot crest width.
- Measure 6b3 is 33,355 feet of Gulf shoreline protection consisting of a reef breakwater with a lightweight aggregate core; located approximately 150 feet offshore using geotextile fabric and stone built to an 18-foot crest width.

No sediment starvation is expected to occur with the Gulf shoreline breakwater fields. Shoreline protection measures 6b1, 6b2, and 6b3 are located along the Gulf of Mexico shoreline of Rockefeller Refuge, which is a shell veneer covering marsh sediments. There is little long-shore movement of sediment in this type of system. Shoreline protection measure 5a would connect with the existing breakwater field west of Holly Beach, providing continuous protection to the shoreline from that existing breakwater field to the western Calcasieu Ship Channel jetty. The introduction of sands for the CS-33 project increased the sediment budget for this area, so that downstream sediment starvation is not expected to be a problem. The NER RP would utilize the best available practical techniques for ecosystem restoration and BMPs to avoid, minimize and reduce potential adverse impacts to avoid, to the maximum extent practicable downstream land loss and erosion.

5. GUIDELINES FOR SURFACE ALTERATIONS

Guideline 6.1 Industrial, commercial, urban, residential, and recreational uses are necessary to provide adequate economic growth and development. To this end, such uses will be encouraged in those areas of the coastal zone that are suitable for development. Those uses shall be consistent with the other guidelines and shall, to the maximum extent practicable, take place only:

a) on lands five feet or more above sea level or within fast lands; or

b) on lands which have foundation conditions sufficiently stable to support the use, and where flood and storm hazards are minimal or where protection from these hazards can be reasonably well achieved, and where the public safety would not be unreasonably endangered; and

1) the land is already in high intensity of development use, or

2) there is adequate supporting infrastructure, or
3) the vicinity has a tradition of use for similar habitation or development

Response: The Nonstructural NED RP would include: 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. These areas are characterized as previously disturbed residential and business areas that are not biologically productive or wetland areas. The Nonstructural NED RP would use the best available practical techniques and BMPs to avoid, minimize and reduce the potential for adverse economic or development impacts by providing risk reduction of hurricane and storm surge flood damage for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. Implementing the Nonstructural NED RP would reduce adverse economic impacts by reducing administrative costs and claims to the Federal Flood Insurance Program, under the FEMA, for repetitive flood insurance claims. This estimate is based upon present information and could change during implementation of the Nonstructural NED RP. The construction of the non-structural risk reduction measures would include encouragement of industrial, commercial, urban, residential, and recreational uses which provide adequate economic growth and development. Those uses would be consistent with the other guidelines.

The NER RP nine marsh restoration measures and five shoreline protection measures would restore, nourish and protect a total of 14,035 net acres (4,430 AAHUs) of transitional estuarine marsh over the 50 year period of analysis. The 35 chenier reforestation measures would reforest approximately 1,413 net acres (538 AAHUs) in Cameron and Vermilion Parishes over the 50 year period of analysis. These areas would be available for recreational uses and commercial and recreational fishing. The NER RP would utilize the best available practical techniques for ecosystem restoration and BMPs to avoid, minimize and reduce potential adverse impacts would be utilized.

Guideline 6.2 Public and private works projects such as levees, drainage improvements, roads, airports, ports, and public utilities are necessary to protect and support needed development and shall be encouraged. Such projects shall, to the maximum extent practicable, take place only when:
a) they protect or serve those areas suitable for development pursuant to Guideline 6.1; and b) they are consistent with the other guidelines; and c) they are consistent with all relevant adopted state, local and regional plans.

Response: The Nonstructural NED RP would, to the maximum extent practicable, protect and severe those areas suitable for development by implementing hurricane and storm surge risk reduction measures to a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. This action would support existing development and shall, to the maximum extent practicable, take place only when they protect or serve those areas suitable for development pursuant to Guideline 6.1; and are consistent with the other guidelines; and are consistent with all relevant adopted state, local and regional plans. The Nonstructural NED RP would utilize the best available practical techniques for hurricane and storm surge risk reduction and BMPs to avoid, minimize and reduce potential adverse impacts and protect and support needed development.

The NER RP measures, by design, would not support or encourage development. Rather, the NER RP measures would protect, restore, and nourish a net total of 14,035 net acres of emergent marsh (including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures). At the end of the 50 year period of analysis, the marsh restoration and shoreline protection measures together would achieve a total net ecological benefit of 4,430 AAHUs; with 2,700 AAHUs from the nine marsh restoration measures, and 1,738 AAHUs from the five shoreline protection measures. Whereas the chenier restoration measures would restore a net total of 1,413 net acres with 538 AAHUs. The NER RP would utilize the best available practical techniques for ecosystem restoration and BMPs to avoid, minimize and reduce potential adverse impacts.

Guideline 6.3 BLANK (Deleted by Louisiana Department of Natural Resources)

Guideline 6.4 To the maximum extent practicable wetland areas shall not be drained or filled. Any approved drain or fill project shall be designed and constructed using best practical techniques to minimize present and future property damage and adverse environmental impacts.

Response: The Nonstructural NED RP would not drain or fill any wetlands. The Nonstructural NED RP measures are located on previously disturbed residential and business properties.

Permanent impounding or draining of wetlands or the creation of development sites is not proposed for the NER RP. Rather, the NER RP would protect, restore, and nourish a net total of 14,035 net acres of emergent marsh, including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures. Approximately 1,413 net acres from the 35 reforestation sites in Cameron and Vermilion Parishes would be reforested over the 50 year period of analysis. For marsh restoration measures, temporary earthen containment/exclusion dikes would be constructed from in-situ material located within the marsh restoration/nourishment area using a mechanical dredge. The borrow area used for construction of the earthen containment dike would refill during the placement of dredged material. Containment/exclusion dikes would be breached in multiple places at three years following construction, if necessary, to restore fish access if natural degradation is not sufficient. Breach locations would correspond to weir locations. Any areas subjected to construction impacts would be restored at least to their natural pre-construction condition, and this action would use the best available restoration techniques. The introduction of sediments using a hydraulic dredge to create a marsh platform would increase the acreage of wetlands in the project area, converting open water to transitional estuarine wetland habitat. The NER RP would utilize the best available practical techniques for ecosystem restoration and BMPs to avoid, minimize and reduce potential adverse impacts to minimize present and future property damage and adverse environmental impacts.

Guideline 6.5 Coastal water dependent uses shall be given special consideration in permitting because of their reduced choice of alternatives.

Response: Acknowledged. The Nonstructural NED RP does not include coastal water dependent uses. The NER RP would protect, restore, and nourish a total of 14,035 net acres of emergent marsh (including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures). Once constructed, the nine marsh restoration and five shoreline protection measures would enhance both the human and natural coastal water dependent uses. The approximately 35 reforestation sites in Cameron and Vermilion Parishes would reforest about 1,413 net acres over the 50 year period of analysis, resulting in 538 AAHUs. The NER RP would utilize the best available practical techniques for ecosystem restoration and BMPs to avoid, minimize and reduce potential adverse impacts.

Guideline 6.6 Areas modified by surface alteration activities shall, to the maximum extent practicable, be re-vegetated, refilled, cleaned and restored to their predevelopment condition upon termination of the use.

Response: The Nonstructural NED RP, by design, would include: 1) elevating eligible residential structures; 2) dry flood proofing of eligible non-residential structures, excluding large warehouses and industrial complexes; and 3) construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses. These areas are characterized as previously disturbed residential and business areas that are not biologically productive or wetland areas. Construction debris from elevated structures and flood proofed structures would be removed and the site cleaned and restored to pre-construction conditions or better upon completion of construction activities. By design, the less than 6 foot in height flood proofing barriers or berms would remain around non-residential structures, primarily industrial complexes and warehouses. Any construction debris would be removed and the site cleaned and restored to pre-construction conditions or better upon completion of construction activities. The Nonstructural NED RP would utilize the best available practical techniques for nonstructural hurricane

and storm damage risk reduction and BMPs to avoid, minimize and reduce potential adverse impacts and return the area to preconstruction conditions.

The NER RP 35 chenier reforestation measures would not involve surface alterations. The NER RP nine marsh restoration measures would, to the maximum extent practicable, be constructed to insure the restoration sites would naturally revegetate. The five shoreline protection measures, by design, would remain unvegetated and function to reduce wave induced shoreline erosion. Any areas subjected to dredging and construction impacts would be restored at least to their natural pre-construction condition, and this action would use the best available restoration techniques. The NER RP would utilize the best available practical techniques for ecosystem restoration and BMPs to avoid, minimize and reduce potential adverse impacts.

Guideline 6.7 Site clearing shall to the maximum extent practicable be limited to those areas immediately required for physical development.

Response: The Nonstructural NED RP measures include elevating structures and dry flood proofing structures would generally not involve site clearing. However, construction of the less than 6 foot in height flood proofing barriers or berms could involve site clearing. Site clearing, to the maximum extent practicable, would be limited to those areas immediately required for elevating, flood proofing, building berms, or other similar project related construction of the Nonstructural NED RP structures. Any areas subjected to construction impacts would be restored at least to their natural pre-construction condition, and this action would use the best available restoration techniques. The Nonstructural NED RP would use the best available practical techniques for nonstructural hurricane and storm surge damage reduction and BMPs to avoid, minimize and reduce potential adverse impacts and shall, to the maximum extent practicable limit site clearing to those areas immediately required for physical development.

Site clearing is not part of implementing the NER RP nine marsh restoration measures and five shoreline protection measures that, by design, would involve dredge disposal and construction for marsh restoration, and placement of geotextile fabric and stone for shoreline protection. However, the NER RP 35 chenier reforestation measures would include control of invasive plant species. Prior to planting, an application of 64 ounces of Clearcast® would be sprayed over the top of hardwoods to control invasive species, primarily Chinese tallow (*Triadica sebifera*), if needed. The NER RP would use the best available practical techniques for ecosystem restoration and BMPs to avoid, minimize and reduce potential adverse impacts and shall, to the maximum extent practicable limit site clearing to those areas immediately required for physical development.

Guideline 6.8 Surface alterations shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Alterations in wildlife preserves and management areas shall be conducted in strict accord with the requirements of the wildlife management body.

Response: The Nonstructural NED RP surface alterations related primarily to construction of the less than 6 foot in height flood proofing barriers or berms, could involve site clearing. However, the Nonstructural NED RP would not involve surface alterations near any critical wildlife or vegetation areas. The Nonstructural NED RP would use the best available practical techniques for nonstructural hurricane and storm surge risk reduction and BMPs to avoid, minimize and reduce potential adverse impacts to wildlife preserves and management areas in strict accord with the requirements of the wildlife management body.

Surface alterations of the NER RP 35 chenier reforestation measures would be minimal and involve planting trees and controlling invasive species (primarily tallow trees). Whereas, the NER RP nine marsh restoration measures and the five shoreline protection measures would, by design, require surface alterations that could, and in some instances are necessarily located near critical wildlife areas and vegetation areas. Two marsh restoration measures, located partially on USFWS properties, are recommended for construction by the USFWS. Measure 124d Marsh Restoration at Mud Lake would be located on Sabine NWR. NER RP measure 3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel would be located on the Cameron Prairie NWR. In addition, project CS-59 (Oyster Bayou Marsh Creation and Terracing) would be directly impacted by

construction of NER RP marsh restoration measure 124c. Project CS-054 (Cameron-Creole Watershed Grand Bayou Marsh Creation) would be directly impacted by construction of NER RP marsh restoration measure 3c1. When overlap occurs, proposed NER RP measures would be constructed to avoid existing coastal restoration projects by construction of temporary containment/exclusion dikes that would contain dredged borrow sediments used for construction of the NER RP measure and also prevent dredged effluents from entering the existing coastal restoration project sites. Temporary containment/exclusion dikes would degrade naturally to restore connectivity with surrounding areas or would be degraded at three years after construction has been completed. In addition, existing mitigation projects are also located within areas proposed for restoration under the NER RP. Mitigation projects are designed and constructed to offset anticipated losses from permitted activities. **Figure 8** and **Table 4** contains information about mitigation projects that occur within the project area. In most instances, mitigation projects were developed to provide a sustainable buffer from wave action and storm surge generated by tropical storms and hurricanes. When overlap occurs, proposed NER RP measures would not be constructed until the mitigation projects satisfy their 20-year permitted obligations.

NER RP alterations in wildlife refuges/preserves or management areas would be conducted in strict accord with the requirements of the wildlife management body. Coordination with the USFWS, CWPPRA and the LDWF has been initiated for potential impacts to resources managed by the USFWS and LDWF (e.g., oysters, bald eagles, sandhill cranes, state and national wildlife refuges, etc.). Any areas subjected to construction impacts would be restored at least to their natural pre-construction condition, and this action would use the best available restoration techniques. The NER RP would use the best available practical techniques for ecosystem restoration and BMPs to avoid, minimize and reduce potential adverse impacts, to the maximum extent practicable, for critical wildlife areas and vegetation areas, wildlife preserves and management areas.

Guideline 6.9 Surface alterations which have high adverse impacts on natural functions shall not occur, to the maximum extent practicable, on barrier islands and beaches, isolated cheniers, isolated natural ridges or levees,' or in wildlife and aquatic species breeding or spawning areas, or in important migratory routes.

Response: The Nonstructural NED RP measures of elevating and dry flood proofing would not entail surface alterations. However, it is not anticipated that any Nonstructural NED RP or NER RP measures would adversely impact natural functions. Construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses, would entail surface alterations. However, these surface alterations would be on previously disturbed lands characterized as residential and business lands and would not adversely impact natural functions and would not occur on barrier islands and beaches, isolated cheniers, isolated natural ridges or levees,' or in wildlife and aquatic species breeding or spawning areas, or in important migratory routes. The Nonstructural NED RP would use the best available practical techniques for hurricane and storm damage risk reduction and BMPs to avoid, minimize and reduce potential adverse impacts, to the maximum extent practicable, to barrier islands and beaches, isolated cheniers, isolated natural ridges and levees, wildlife and aquatic species breeding and spawning areas and important migratory routes.

Surface alterations by the NER RP nine marsh restoration measures and five shoreline protection measures, by design, are significant surface alteration features. The nine marsh restoration measures would entail using over 62,000,000 cy of borrow material to initially create about 8,175 acres and nourish about 3,439 acres for a total of 11,666 acres of transitional estuarine marsh. Whereas, the five shoreline protection measures would result in surface alterations by placing over 1.9 million square yards of geotextile fabric, over 1.1 million tons of lightweight aggregate, and over 3.5 million tons of rock that would provide over 251,000 linear feet of shoreline protection/stabilization. Over the 50-year period of analysis, the NER RP marsh and shoreline protection measures would protect, restore, and nourish a net total of 14,035 net acres of emergent marsh (including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures). At the end of the 50 year period of analysis, the marsh restoration and shoreline protection measures together would achieve a total net ecological benefit of 4,430 AAHUs; with 2,700 AAHUs from the nine marsh

restoration measures, and 1,738 AAHUs from the five shoreline protection measures. The NER RP nine marsh restoration measures and five shoreline protection measures would, by design, involve surface alterations that would help restore and protect barrier shorelines, beaches, cheniers, wildlife, and aquatic species breeding and spawning areas, and important bird migratory routes.

The 35 NER RP chenier reforestation measures would involve minimal surface alterations of planting trees and destroying invasive plant species (primarily tallow trees). The 35 chenier reforestation measures would restore a net total of 1,413 net acres with 538 AAHUs and provide important stopover habitat for Neotropical migratory birds. Highway 82 would provide vehicular access to the chenier reforestation measures. Fence posts would be installed in concrete with a small tractor using an auger bit and portable cement mixer. For planting seedlings, an ATV with a trailer would be used to deliver seedlings to the planting sites, which would be planted by hand using a spade or similar tool. In those more remote locations not accessible via Highway 82, the equipment would be delivered to the sites via large airboat or barge. Additional temporary access corridors from waterways are indicated on the Fact Sheet maps. Since the goal of the chenier reforestation measure is 50% canopy coverage, the identified plots would need to be planted in their entirety. Coordination with the Louisiana Department of Transportation and Development would be initiated to ensure that the planting plan would maintain a safe distance from existing roadways to avoid future impacts to them. Also, see response for 1.7(h). The NER RP would use the best available practical techniques for hurricane and storm damage risk reduction and BMPs to avoid, minimize and reduce potential adverse impacts, to the maximum extent practicable, to barrier islands and beaches, isolated cheniers, isolated natural ridges and levees, wildlife and aquatic species breeding and spawning areas and important migratory routes.

Guideline 6.10 The creation of low dissolved oxygen conditions in the water or traps for heavy metals shall be avoided to the maximum extent practicable.

Response: The Nonstructural NED RP measures of elevating; dry flood proofing; and construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses would not entail creation of low dissolved oxygen conditions. The Nonstructural NED RP would use the best available practical techniques for hurricane and storm damage risk reduction and BMPs to avoid, minimize and reduce potential adverse impacts and the creation of low dissolved oxygen conditions or traps for heavy metals, to the maximum extent practicable.

Construction activities, hydraulic dredging and placement of sediments and other fill materials for implementation of the NER RP marsh restoration and shoreline protection measures could result in localized and temporary increases in turbidity and total suspended sediments and other particulates in the water column. The suspended sediments and particulates may react with dissolved oxygen in the water, resulting in reduction of dissolved oxygen and release of ammonia in receiving area waters. There could also be reduction in pH toward more acidic conditions, organic enrichment, chemical leaching, and elevated carbon dioxide levels. The introduction of organic material to the water column as a result of discharge can lead to temporary and localized, but minor, high biochemical oxygen demand (BOD) which in turn can lead to temporary and localized, but minor, reduced dissolved oxygen thereby potentially affecting the survival of many aquatic organisms. Decomposition of organic material within the nine marsh restoration measures following discharges of dredged sediments may result in temporary and localized, but minor, reduction in dissolved oxygen and a release of ammonia. Following completion of construction activities, dissolved gas levels in the vicinity of these measures would return to that which existed prior to construction activities. Tidal currents present in the project measure areas would serve to disperse and thereby dilute these localized and temporary changes. Following construction, levels of turbidity and total suspended sediments and particulates would return to pre-construction conditions resulting in levels of dissolved oxygen and other constituents in the area returning to those observed prior to construction. The creation of low dissolved oxygen conditions would be avoided to the maximum extent practicable. Any effects are expected to be minor and would occur only during actual dredging activities. Dissolved oxygen levels would return to ambient levels following construction operations. The NER RP would use the best available practical techniques for marsh restoration and shoreline protection and BMPs to avoid,

minimize and reduce potential adverse impacts and the creation of low dissolved oxygen conditions or traps for heavy metals, to the maximum extent practicable.

Guideline 6.11 Surface mining and shell dredging shall be carried out utilizing the best practical techniques to minimize adverse environmental impacts.

Response: Surface mining and shell dredging are not part of either the Nonstructural NED RP or the NER RP.

Guideline 6.12 The creation of underwater obstructions which adversely affect fishing or navigation shall be avoided to the maximum extent practicable.

Response: The Nonstructural NED RP measures of elevating; dry flood proofing; and construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses would not entail creation of underwater obstructions.

The NER RP nine marsh restoration measures and five shoreline protection measures would, by design, help restore and protect transitional estuarine marsh which would positively affect fishing by restoring transitional estuarine marsh which would provide essential fish habitat. Over the 50-year period of analysis, the NER RP would protect, restore, and nourish a net total of 14,035 net acres of emergent marsh (including 7,900 net acres from the nine marsh restoration measures and 6,135 net acres from the five shoreline protection measures). At the end of the 50 year period of analysis, the marsh restoration and shoreline protection measures together would achieve a total net ecological benefit of 4,430 AAHUs; with 2,700 AAHUs from the nine marsh restoration measures, and 1,738 AAHUs from the five shoreline protection measures. The chenier restoration measures would restore a net total of 1,413 net acres with 538 AAHUs and provide important stopover habitat for migratory Neotropical birds. Shoreline protection measures 5a, 6b1, 6b2, and 6b3 include construction of offshore breakwaters, not connected to the shoreline, which would act as underwater obstructions. However, the breakwaters would be constructed such that adverse effects on fishing and/or navigation would be avoided to the maximum extent practicable. Breakwater crests would be above mean water level (elevations of 3.0 to 3.5 feet NAVD88), so would be visible under normal conditions. Additionally, signage would be included, if and where necessary, to alert boaters to their presence. The NER RP would use the best available practical techniques for marsh restoration and shoreline protection and BMPs to avoid, minimize and reduce potential adverse impacts and the creation of underwater obstructions which may adversely affect fishing or navigation shall be avoided to the maximum extent practicable.

Guideline 6.13 Surface alteration sites and facilities shall be designed, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment and minimize other adverse impacts.

Response: Surface alterations for the Nonstructural NED RP measures would be primarily related to flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses; and acquisition. These Nonstructural NED RP measures would be designed, constructed and operated using the best practical techniques and BMPs to prevent the release of pollutants or toxic substances into the environment and avoid, minimize and reduce other adverse impacts.

Surface alterations by the NER RP 35 chenier reforestation measures would be minimal and primarily involve planting trees and controlling invasive plant species (primarily tallow trees). Whereas, the NER RP nine marsh restoration measures and five shoreline protection measures, by design, are significant surface alteration measures. The nine marsh restoration measures would entail using over 62,000,000 cy of borrow material to initially create about 8,175 acres and nourish about 3,439 acres for a total of 11,666 acres of transitional estuarine marsh. Over the 50 year period of analysis, this would result in surface alterations of about 7,900 net acres and 2,700 AAHUs of transitional estuarine marsh. Whereas, the five shoreline protection measures would result in surface alterations by placing over 1.9 million square yards of geotextile fabric, over 1.1 million tons of lightweight aggregate, and over 3.5 million tons of rock that would provide over 251,000 linear feet of shoreline

protection/stabilization. NER RP measures would be designed, constructed and operated using the best practical techniques and BMPs to prevent the release of pollutants or toxic substances into the environment and avoid, minimize and reduce other adverse impacts.

Guideline 6.14 To the maximum extent practicable only material that is free of contaminants and compatible with the environmental setting shall be used as fill.

Response: To the maximum extent practicable only material that is free of contaminants and compatible with the environmental setting shall be used as fill.

6. GUIDELINES FOR HYDROLOGIC AND SEDIMENT TRANSPORT MODIFICATIONS:

Guideline 7.1 The controlled diversion of sediment laden waters to initiate new cycles of marsh building and sediment nourishment shall be encouraged and utilized whenever such diversion will enhance the viability and productivity of the outfall area. Such diversions shall incorporate a plan for monitoring and reduction and/or amelioration of the effects of pollutants present in the freshwater source.

Response: The restoration measures do not contain any diversions of freshwater or sediments.

Guideline 7.2 Sediment deposition systems may be used to offset land loss, to create or restore wetland areas or enhance building characteristics of a development site. Such systems shall only be utilized as part of an approved plan. Sediment from these systems shall only be discharged in the area that the proposed use is to be accomplished.

Response: The Nonstructural NED RP measures would not involve sediment deposition systems to offset land loss, to create or restore wetland areas or enhance building characteristics for a building site. Rather, by design, the Nonstructural NED RP measures of elevating; dry flood proofing; and construction of flood proofing barriers or berms less than 6 feet in height around non-residential structures, primarily industrial complexes and warehouses floodway would provide nonstructural hurricane and storm surge damage risk reduction for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. The Nonstructural NED RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts.

The NER RP 35 chenier reforestation measures and five shoreline protection measures would not involve sediment deposition systems. Whereas, the NER RP nine marsh restoration measures would utilize a hydraulic dredge to dispose of over 62,000,000 cy of borrow material to initially create about 8,175 acres and nourish about 3,439 acres for a total of 11,666 acres of transitional estuarine marsh. Over the 50 year period of analysis, this sediment deposition would result in about 7,900 net acres and 2,700 AAHUs of transitional estuarine marsh. Temporary containment/exclusion dikes would be constructed to contain dredged sediments and allow them to dewater and consolidate into marsh. Dewatering of the sediment slurry would take place through weirs in the containment dikes to direct water into adjacent marshes, to maximize retention of sediment in the system. The containment/exclusion dikes would prevent dredge slurry from entering into adjacent areas not intended to receive sediment nourishment. Containment/exclusion dikes would naturally degrade or would be degraded at multiple sites three years following construction to allow hydrologic exchange with adjacent areas. The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts

Guideline 7.3 Undesirable deposition of sediments in sensitive habitat or navigation areas shall be avoided through the use of the best preventive techniques.

Response: The Nonstructural NED RP measures would not involve sediment deposition in sensitive habitat or navigation areas. Rather, by design, the Nonstructural NED RP measures of elevating; dry flood proofing; and construction of flood proofing barriers or berms less than 6 feet in height around non-residential

structures, primarily industrial complexes and warehouses would provide nonstructural hurricane and storm surge damage risk reduction for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. The Nonstructural NED RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts to sensitive habitat and navigation areas.

The NER RP 35 chenier reforestation measures would not would involve sediment deposition in sensitive habitat or navigation areas. Whereas, the NER RP nine marsh restoration measures, by design, would utilize a hydraulic dredge to dispose of over 62,000,000 cy of borrow material to initially create about 8,175 acres and nourish about 3,439 acres for a total of 11,666 acres of transitional estuarine marsh adjacent and within fragmented sensitive transitional estuarine marsh and navigational areas. Over the 50 year period of analysis, this sediment deposition would result in about 7,900 net acres and 2,700 AAHUs of transitional estuarine marsh in a coastal ecosystem that is experiencing widespread coastal wetland loss. Temporary containment/exclusion dikes would be constructed to contain dredged sediments and allow them to dewater and consolidate into marsh. Dewatering of the sediment slurry would take place through weirs in the containment dikes to direct water into adjacent marshes, to maximize retention of sediment in the system. The containment/exclusion dikes would prevent dredge slurry from entering into adjacent sensitive areas and navigation channels not intended to receive sediment nourishment. Containment/exclusion dikes would naturally degrade or would be degraded at multiple sites three years following construction to allow hydrologic exchange with adjacent areas. Whereas, the five shoreline protection measures would result in material depositions and surface alterations by placing over 1.9 million square yards of geotextile fabric, over 1.1 million tons of lightweight aggregate, and over 3.5 million tons of rock that would provide over 251,000 linear feet of shoreline protection/stabilization within and adjacent to sensitive transitional estuarine marsh and navigation areas and benefit a total of 6,135 net acres and 1,738 AAHUs over the 50 year period of analysis The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts to sensitive habitat and navigation areas. Areas subjected to construction impacts would be restored at least to their natural pre-construction condition, and this action would use the best available restoration techniques and BMPs.

Guideline 7.4 The diversion of freshwater through siphons and controlled conduits and channels, and overland flow to offset saltwater intrusion and to introduce nutrients into wetlands shall be encouraged and utilized whenever such diversion will enhance the viability and productivity of the outfall area. Such diversions shall incorporate a plan for monitoring and reduction and/or amelioration of the effects of pollutants present in the freshwater source.

Response: The Nonstructural NED RP and NER RP do not include diversions of any type.

Guideline 7.5 Water or marsh management plans shall result in an overall benefit to the productivity of the area.

Response: The Nonstructural NED RP does not entail water or marsh management plans or any actions that could affect productivity in the area. Rather the Nonstructural NED RP would provide nonstructural hurricane and storm surge damage risk reduction for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses.

However, the NER RP nine marsh restoration measures, five shoreline protection measures and 35 chenier reforestation measures would result in net positive benefits to the productivity of the area. The NER RP nine marsh restoration measures would initially create about 8,175 acres and nourish about 3,439 acres for a total of 11,666 acres of transitional estuarine marsh. Over the 50 year period of analysis, this would result in about 7,900 net acres and 2,700 AAHUs of transitional estuarine marsh thereby increasing local productivity in a coastal ecosystem that is experiencing widespread coastal wetland loss. The NER RP five shoreline protection measures would place 251,528 linear feet of shoreline protection that would benefit 6,135 net acres and 1,738 AAHUs over the 50 years of analysis. The 35 chenier reforestation measures would reforest

approximately 1,413 net acres and 538 AAHUs in Cameron and Vermilion Parishes over the 50 year period of analysis. The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts to productivity of the areas.

Guideline 7.6 Water control structures shall be assessed separately based on their individual merits and impacts and in relation to their overall water or marsh management plan of which they are a part.

Response: The Nonstructural NED RP does not include water control structures. However, the Calcasieu Ship Channel Salinity Barrier measure and the Cameron-Creole Spillway Salinity Control Structure measure are both being recommended for individual long-term study.

Guideline 7.7 Weirs and similar water control structures shall be designed and built using the best practical techniques to prevent "cut arounds," permit tidal exchange in tidal areas, and minimize obstruction of the migration of aquatic organisms.

Response: The Nonstructural NED RP does not include water control structures. However, the Calcasieu Ship Channel Salinity Barrier measure and the Cameron-Creole Spillway Salinity Control Structure measures are both being recommended for long-term study. The NER RP nine marsh restoration measures would include the use of temporary weirs in the containment/exclusion dikes to move dredge effluent to adjacent areas for marsh nourishment. These weirs would be temporary and would be designed and built using the best practical techniques to prevent “cut arounds,” permit tidal exchange in tidal areas (after a three-year settlement period), and minimize obstruction of the migration of aquatic organisms. The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts to prevent "cut arounds," permit tidal exchange in tidal areas, and minimize obstruction of the migration of aquatic organisms, sensitive habitat and navigation areas.

Guideline 7.8 Impoundments which prevent normal tidal exchange and/or the migration of aquatic organisms shall not be constructed in brackish and saline areas to the maximum extent practicable.

Response: The Nonstructural NED RP measures would not involve impoundments which prevent normal tidal exchange or the migration of aquatic organisms in brackish or saline areas. The NER RP 35 chenier reforestation measures and the NER RP five shoreline protection measures would not involve impoundments, not prevent normal tidal exchange and not prevent the migration of aquatic organisms in brackish or saline areas. Rather, the NER RP five shoreline protection measures would, by design, result in reducing wave induced shoreline erosion by depositing material and altering surfaces with placement over 1.9 million square yards of geotextile fabric, over 1.1 million tons of lightweight aggregate, and over 3.5 million tons of rock that would provide over 251,000 linear feet of shoreline protection/stabilization within transitional estuarine marsh and benefit a total of 6,135 net acres and 1,738 AAHUs over the 50 year period of analysis.

The NER RP nine marsh restoration measures, by design, would entail the use of impoundments, in this case temporary containment/exclusion dikes, for up to three years to contain to contain over 62,000,000 cy of dredged borrow sediments to allow for dewaterment, settlement and consolidation of the sediment slurry into substrate suitable for colonization by marsh plants. Dewatering of the sediment slurry would take place through weirs in the containment dikes to direct water into adjacent degraded and fragmented marshes, to maximize retention of sediment in the system. The containment/exclusion dikes would prevent dredge slurry from entering into adjacent areas not intended to receive sediment nourishment. Containment/exclusion dikes would naturally degrade or would be degraded at multiple sites three years following construction to allow hydrologic exchange with adjacent areas until it dewaters and consolidates for marsh restoration. This action would initially create about 8,175 acres and nourish about 3,439 acres for a total of 11,666 acres of transitional estuarine marsh restored. Over the 50 year period of analysis, this sediment deposition would result in about 7,900 net acres and 2,700 AAHUs of transitional estuarine marsh. The containment/exclusion dikes would naturally degrade to allow hydrologic connectivity or would be degraded at three years following construction. There would be no permanent impoundments that would prevent normal tidal exchange or the migration of aquatic organisms

in brackish or saline waters. The NER RP would utilize the best available practical techniques and BMPs to avoid, minimize and reduce potential adverse impacts.

Guideline 7.9 Withdrawal of surface and ground water shall not result in saltwater intrusion or land subsidence to the maximum extent practicable.

Response: The proposed action would not entail withdrawal of surface or ground waters. Therefore, this guideline is not applicable to the Nonstructural NED RP or NER RP.

GUIDELINES FOR DISPOSAL OF WASTES:

Response: The proposed action would not involve the disposal of wastes. Therefore, these guidelines are not applicable to the Nonstructural NED RP or the NER RP.

7. GUIDELINES FOR USES THAT RESULT IN THE ALTERATION OF WATERS DRAINING INTO COASTAL WATERS:

Response: The proposed action would not involve the alteration of waters draining into coastal waters. Therefore, these guidelines are not applicable to the Nonstructural NED RP or the NER RP.

8. GUIDELINES FOR OIL, GAS, AND OTHER MINERAL ACTIVITIES:

Response: The proposed action would not involve oil, gas or other mineral activities. During PED Phase, the inventory of wells within the measure areas would be examined. Inactive wells would be capped in place. Active wells would have access maintained either through a flotation channel or via boardwalk, in coordination with the landowner and well owner.

OTHER STATE POLICIES INCORPORATED INTO THE PROGRAM

Section 213.8A of Act 361 directs the Secretary of Department of Transportation and Development (DOTD), in developing the Louisiana Coastal resources Program (LCRP), to include all applicable legal and management provisions that affect the coastal zone or are necessary to achieve the purposes of Act 361 or to implement the guidelines effectively. It states:

> *The Secretary shall develop the overall state coastal management program consisting of all applicable constitutional provisions, laws and regulations of this state which affect the coastal zone in accordance with the provisions of this Part and shall include within the program such other applicable constitutional or statutory provisions, or other regulatory or management programs or activities as may be necessary to achieve the purposes of this Part or necessary to implement the guidelines hereinafter set forth.*
>
> *The constitutional provisions and other statutory provisions, regulations, and management and regulatory programs incorporated into the LCRP are identified and described in Appendix 1. A description of how these other authorities are integrated into the LCRP and coordinated during program implementation is presented in Chapter IV. Since all of these policies are incorporated into the LCRP, Federal agencies must ensure that their proposed actions are consistent with these policies as well as the coastal use guidelines (CZMA, Section 307).*

CONSISTENCY DETERMINATION

The Southwest Coastal Louisiana Nonstructural NED RP measures would provide nonstructural hurricane and storm surge damage risk reduction for a total of 3,961 impacted structures consisting of 3,462 eligible residential structures; 342 eligible commercial structures and public buildings; and 157 eligible industrial complexes and warehouses. The NER RP measures would create, nourish, reforest and protect 15,448 net acres and 4,776 AAHUs over the 50 year period of analysis in the 4,700 square mile study area located in Calcasieu, Cameron, and Vermilion Parishes in southwest Louisiana. Based on this evaluation of the proposed action to the Coastal Use Guidelines, the U. S. Army Corps of Engineers, Mississippi Valley Division, New Orleans

District, has determined that what has been proposed is consistent, to the maximum extent practicable, with the State of Louisiana's Coastal Resources Program.

Questions regarding this determination should be addressed to Dr. William Klein Jr.; U.S. Army Corps of Engineers; Regional Planning and Environment Division South; New Orleans Environmental Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267. Dr. Klein may be contacted at (504) 862-2540, if questions arise. Please review the enclosed documents and provide comments within 45 days of the date

Joan M. Exnicios
Chief, Environmental Planning Branch

SOUTHWEST COASTAL LOUISIANA
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex C

Louisiana State Department of Wildlife and Fisheries Scoping Letter

BOBBY JINDAL
GOVERNOR

State of Louisiana

ROBERT J. BARHAM
SECRETARY

DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF SECRETARY

14 April 2009

Ms. Sandra Stiles
U.S. Army Corps of Engineers, CEMVNPM–RS,
P.O. Box 60267,
New Orleans, LA 70160–0267,

RE: Notice of Intent to Prepare a Draft Environmental Impact Statement for the Southwest Coastal Louisiana Feasibility Study

Dear Ms. Stiles

The Louisiana Department of Wildlife and Fisheries is the state agency with responsibility for protecting and enhancing the wildlife and aquatic resources of the state and their dependent habitats. The department also manages over 240, 000 acres is in the southwest portion of the state through the Rockefeller, White Lake, State Wildlife, and Marsh Island refuges. As such, we urge the US Army Corps of Engineers (USACE) and the Office of Coastal Protection and Restoration (OCPR) to minimize enclosure of additional wetlands behind hurricane protection levees.

The EIS shall thoroughly consider and evaluate the potential impacts of hurricane protection features on existing and planned coastal restoration projects. Coordination is required with Louisiana Coastal Area (LCA) Program managers, Coastal Wetlands Planning, Protection and Restoration Act agencies, Coastal Impact Assistance Program (CIAP) representatives and others to insure that ongoing coastal restoration projects are not compromised by the hurricane protection features.

The EIS shall undertake a comprehensive alternatives analysis. Before identifying a preferred hurricane protection alternative the alternatives analysis should evaluate and consider direct and indirect wetland impacts and impacts to rare, threatened and endangered species, natural communities, colonial nesting waterbirds, publicly owned and/or managed lands, and authorized wetland mitigation banks.

The EIS shall develop a comprehensive mitigation plan designed to off-set all impacts to fish and wildlife resources. The mitigation plan shall be developed in coordination with, and be approved by, the resource and regulatory agencies.

LDWF staff attended public scoping meetings in Abbeville and Cameron regarding this project. The general public at those meetings expressed concern about storm drainage issues in the western coastal parishes, saltwater intrusion into the Mermentau basin, and the desire for hurricane protection levees in

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the areas surrounding western Vermilion Bay. We understand that the USACE and the OCPR have retained Dr. Ehab Meselhe to model hydrologic processes in these areas. This is a positive development as historical changes in hydrology in the region coupled with rising sea levels are the major environmental drivers in the system. We urge that the findings of these models be in such a form to be comprehensible to the general public so that the potential consequences of different courses of action are clearly defined. In addition, we urge that the environmental modeling include storm surge and exchange through Atchafalaya, and East and West Cote Blanche Bays to the east of Marsh Island. This is clearly an important physical driver in the Vermilion Bay system.

Further, we urge the USACE and the OCPR to include some consideration of logistical issues that arise with installation/construction of additional culverts, water control structures, gates, etc. We believe a regional approach to water management is the most productive way to reconcile all the needs of the residents of the area.

Thank you for the opportunity to comment on this project.

Sincerely,

J. Heather Warner-Finley
Research and Assessment Division

SOUTHWEST COASTAL LOUISIANA
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex D
National Marine Fisheries Service Scoping Letter
Planning Aid Letter
Comment Letter on Revised Integrated Draft Report & EIS
USACE Comment Response Letter

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NEW ORLEANS DISTRICT
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JAN 28 2016

Regional Planning and Environment
Division South
Environmental Planning Branch

Ms Virginia M. Fay
Assistant Regional Administrator
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

Dear Ms Fay:

Thank you for your April 29, 2015, comment letter on the March 2015 revised Integrated Draft Feasibility Report and Environmental Impact Statement. Please note the following changes to be reported in the Final Integrated Feasibility Report and Environmental Impact Statement (Final Integrated Report & EIS):

The National Economic Development (NED) Recommended Plan (RP) is the Nonstructural 0-25-Year Floodplain Plan – Modified Plan 8, which proposes implementing nonstructural measures across the 4,700 square mile study area to reduce coastal storm damages to 3,462 residential structures, 342 commercial structures and public buildings, and 157 warehouses. This will be achieved by elevating residential structures, dry flood proofing non-residential structures, and constructing localized storm surge risk reduction measures around warehouses and industrial facilities. Residential structures will be elevated to the base flood elevation (BFE) predicted to occur in the year 2075. Non-residential structures will have flood proofing measures applied generally up to 3 feet (ft) above ground level. Localized storm surge risk reduction measures will be less than 6 ft in height. Acquisition and relocation will be offered to owners whose structure requires raising more than 13 ft above ground level. The NED RP is 100% voluntary.

The National Ecosystem Restoration (NER) Recommended Plan (RP) is "Small Integrated Restoration", also known as NER Plan CM-4, consists of 49 ecosystem restoration features recommended for construction (9 marsh restoration features; 35 chenier reforestation features; and 5 shoreline protection features). The NER RP is the least-cost, cost-effective, comprehensive ecosystem restoration plan that addresses land loss and ecosystem degradation. The NER RP contains features to restore 15,448 acres of wetlands; restore and protect 335 acres of designated critical habitat (for threatened piping plover and red knot); enhance plant productivity; and reinforce and protect critical landscape features. The Calcasieu Ship Channel Salinity Barrier and the Cameron-Creole Watershed Spillway are recommended as additional long-range studies. Two marsh restoration measures, located partially on U.S. Fish and Wildlife

Service (USFWS) properties are recommended for construction by the USFWS. Measure 124d Marsh Restoration at Mud Lake would be located on Sabine National Wildlife Refuge (NWR). Measure 3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel would be located on the Cameron Prairie NWR.

Responses to General Comments

Marsh Restoration Features. Consistent with your suggestions regarding dredge pipeline right-of-ways, the Final Integrated Report and EIS includes description that the Corps would utilize the best available practical techniques and best management practices (BMPs) during construction to avoid, minimize and reduce potential adverse impacts to marsh and temporary construction-related impacts, such as placement of dredge pipelines and staging areas would be restored to pre-existing conditions, to the maximum extent practicable, prior to completion of construction activities.

Responses to Specific Comments

The Essential Fish Habitat section has been updated to reflect the list attached to your April 29, 2015, comment letter.

Regarding your EFH Conservation Recommendation, the Final Integrated Report and EIS contains the following language in section 3.3.6 Fisheries and Aquatic Resources:

> *The best available practical techniques and BMPs would be utilized during construction to avoid, minimize and reduce potential adverse impacts to all terrestrial and aquatic organisms, including fishery and aquatic organisms. Temporary construction related impacts, such as placement of dredge pipelines and staging areas would be restored to pre-existing conditions, to the maximum extent practicable, prior to completion of construction activities.*

Details describing best available practical techniques and BMP's regarding pipelines, borrow areas and staging areas are also included in the Biological Assessment and the "Protected Marine Species Entrapment Prevention Measures" and "Marsh Buggy" BMPs" developed for ecosystem restoration projects.

The U.S. Army Corps of Engineers is committed to working cooperatively with the NMFS, USFWS and other natural resource agencies. For further information please contact William P. Klein, Jr. at (504) 862-2540 or via e-mail at william.p.klein.jr@usace.army.mil

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

April 29, 2015 F/SER46/LA:jk
225/389-0508

Ms. Joan Exnicios, Chief
Environmental Planning and Compliance Branch
New Orleans District, U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Exnicios:

The NOAA's National Marine Fisheries Service (NMFS) has reviewed the Southwest Coastal Louisiana Revised Integrated Draft Feasibility Report and Draft Environmental Impact Statement (EIS). The draft EIS evaluates alternatives which provide storm damage reduction and ecosystem restoration measures within the 4,700 square mile study area in Louisiana's Chenier plain, encompassing Cameron, Calcasieu, and Vermilion Parishes.

As described in the draft EIS and Feasibility Report, the Tentatively Selected Plan (TSP) is a combination of non-structural storm surge protection measures and an array of different types of ecosystem restoration features. The TSP for the non-structural storm surge protection features include: (1) elevation of residential structures, (2) dry-flood proofing non-residential structures, (3) construction of barriers or berms around non-residential structures, (4) floodplain management plans, (5) more stringent local floodplain regulations, and (6) more restrictive parish and municipal building codes, land use and zoning regulations, and other developmental controls. The TSP for the ecosystem restoration features includes one hydrology/salinity control measure, nine marsh creation measures, five shoreline protection measures, and eight chenier restoration measures.

The NMFS has the following general and specific comments to make regarding information provided in the draft EIS:

General Comments

Marsh Restoration Features. While the majority of the pipeline routes from borrow to marsh creation areas are in open water, some are proposed to pass through marsh. The NMFS is concerned marsh in pipeline rights-of-way (ROWs) and staging areas could be adversely impacted by construction related activities. While NMFS understands such adverse impacts would be offset by the creation of marsh, we believe efforts are warranted to ensure the ROWs and staging areas impacted by construction are restored to pre-existing elevations. In general, such efforts include requiring contractors to pump dredged material into the ROW and staging areas as pipelines are removed, and armoring of ROWs with rip-rap where they intersect with open water areas. The NMFS recommends the Feasibility Report and final EIS include these potential construction-related adverse impacts, as well as a description of measures to be taken to ensure wetlands impacted by construction of marsh creation features are restored to the maximum extent practicable.

Specific Comments

Section 1.4.8 Essential Fish Habitat
Page 1-19 and Appendix A. The Essential Fish Habitat section of the draft EIS incorrectly lists some federally managed species potentially found in the project area. The species and life stages should up updated to reflect the attached list.

The NMFS has a "findings" with the New Orleans District (NOD) on the fulfillment of coordination requirements under provisions of the Magnuson-Stevens Fishery Conservation and Management Act. In those findings, the NOD and NMFS agreed to complete EFH coordination requirements for federal civil works projects through our review and comment on National Environmental Policy Act documents prepared for those projects. Therefore, NMFS recommends the following to ensure the conservation of EFH and associated fishery resources:

EFH Conservation Recommendation

The final EIS and Record of Decision for this project should include measures to ensure pipeline ROW and staging areas are restored to pre-existing conditions, to the maximum extent practicable, prior to completion of construction activities.

Consistent with Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act and NMFS' implementing regulation at 50 CFR 600.920(k), your office is required to provide a written response to our EFH conservation recommendation within 30 days of receipt. Your response must include a description of measures to be required to avoid, mitigate, or offset the adverse impacts of the proposed activity. If your response is inconsistent with our EFH conservation recommendation, you must provide a substantive discussion justifying the reasons for not implementing the recommendation. If it is not possible to provide a substantive response within 30 days, the USACE should provide an interim response to NMFS, to be followed by the detailed response. The detailed response should be provided in a manner to ensure it is received by NMFS at least 10 days prior to the signing of a Record of Decision for this action.

The NMFS is committed to working cooperatively with the USACE, the State and other natural resource agencies to facilitate planning on this effort. We appreciate the opportunity to provide these comments for consideration in finalizing the Feasibility Report and EIS.

Sincerely,

Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

Enclosure

2

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

November 22, 2013 F/SER46/RS:jk
225/389-0508

Colonel Richard L. Hansen
District Engineer, New Orleans District
Department of the Army, Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-2067

Dear Colonel Hansen:

NOAA's National Marine Fisheries Service (NMFS) is submitting this letter due to recent information provided by the U.S. Army Corps of Engineers' (USACE) Project Delivery Team (PDT) for the Southwest Coastal Louisiana (SWCLA) Feasibility Study, which has transitioned to the SMART (smart, measurable, attainable, risk-informed, and timely) planning process. Based on information provided in PDT meetings, NMFS is concerned insufficient information may be used to assess project effects and select alternatives, and the level of analysis for some measures may not be commensurate with the scale and scope of potential impacts. Some project measures under consideration have the possibility to directly affect wetland health, commercially and recreationally important fisheries resources and user groups, and essential fish habitat (EFH). The NMFS is providing this letter to identify potential concerns regarding sufficiency of the alternatives analysis and the assessment of potential environmental effects which may result from many of the alternatives currently under evaluation.

The study area covers over 4,700 square miles in Louisiana's Chenier plain and encompasses Cameron, Calcasieu, and Vermilion Parishes. The study area includes a wide variety of fishery habitat types ranging from saline to fresh marsh and open water. The study goals are extremely broad in scope, including both National Economic Development (NED) and National Environmental Restoration (NER) objectives. Specific study objectives are to: (1) provide hurricane and storm damage risk reduction, (2) reduce flooding induced by storm surge, and (3) provide ecosystem restoration to achieve ecosystem sustainability. Ecosystem restoration objectives are further defined as: (1) manage tidal flows to improve drainage and prevent salinity from exceeding two parts per thousand (ppt) for fresh marsh and six ppt for intermediate marsh, (2) increase wetland productivity in fresh and intermediate marshes to maintain function by reducing the time water levels exceed marsh surfaces, (3) reduce shoreline erosion and stabilize canal banks to protect adjacent wetlands, and (4) restore critical geomorphologic features, such as marshes and cheniers to maintain their function as wildlife habitat and as protective barriers to inland areas.

To date, the identification, screening and analysis of potential NER measures has relied largely on outputs from predictive models previously developed in conjunction with the Louisiana State Master Plan (SMP). The outputs from the SMP models were used to: (1) screen potential NER measures for further analysis, (2) drive the formulation of alternative arrays, and (3) inform the upcoming selection of a tentatively selected plan (TSP). The SMP model outputs will be used to drive TSP formulation and more detailed future analysis of environmental effects of various measures. We are unaware of any plans by the USACE to utilize additional methods to evaluate the performance of project components prior to the selection of a TSP. Although the SMP model may prove to be a valuable tool for large-scale planning efforts, NMFS cautions the model has not been reviewed by independent scientists or certified by the USACE. It is our understanding the USACE's policies require the use of certified models for all planning studies to ensure the models are technically and theoretically sound, compliant with policy, computationally accurate, and based on reasonable assumptions. Planning models are defined as any models and analytical tools which are used to: (1) define water resources problems and opportunities, (2) formulate potential alternatives to address the problems and take advantage of the opportunities, (3) evaluate potential effects of alternatives, and (4) support decision making. To the contrary, we are unaware of supporting information which would indicate the SMP modeling framework reliably predicts short or long term changes in hydrology, habitat type, vegetative cover, and other information needed to complete a variety of other impact analyses. Therefore, NMFS recommends the USACE either independently assess and certify the SMP models or use a previously USACE certified model for the SWCLA study.

The study currently features seven project alternatives. Hydrology and salinity control measures are included in all but the "No Action Alternative". However, the USACE has not provided data supporting the assumption that hydrologic and salinity control measures are actually effective at reducing wetlands loss rates or are critical components of sustainable ecosystem restoration in the Chenier Plain. Contrarily, there are a large number of studies which demonstrate the installation and operation of water control structures associated with hydrologic and salinity control measures do adversely impact marine fishery productivity. Other studies of areas impacted by the installation of water control structures suggest such actions could also adversely impact wetland health and sustainability. Because such hydrologic control measures are combined with other components which may be more effective in providing ecosystem restoration, their inclusion in every future with project alternative could result in the selection of a TSP which may adversely impact marine fishery production and wetland sustainability while providing limited environmental benefits. The NMFS recommends the USACE conduct further detailed analyses of all hydrological and salinity control measures prior to finalization of the TSP. The analyses should assess site specific hydrology effects of proposed measures, as well as anticipated wetland responses to verify assessed project benefits.

Further, NMFS is concerned there is not sufficient data to fully assess many of the proposed measures. Based on information provided by the PDT, there does not appear to be adequate detail regarding design and future operation of the majority of the hydrologic and salinity control measures. The NMFS believes these measures, designed to affect thousands of acres of aquatic habitats, cannot be assessed for either environmental benefits or impacts without hydraulic and

hydrology information, such as current and future hydroperiod (timing, depth and duration of flooding), salinity, and velocity projections at water control structures. The NMFS recommends more in-depth hydrology and salinity modeling be used to evaluate the proposed structures' impacts on the environment.

The NMFS is also concerned potential environmental impacts may not be revealed through the proposed assessment methods. For example, the Wetland Value Assessment (WVA) model was developed to evaluate and compare relatively small scale coastal restoration projects, rather than support large scale civil works alternatives analyses and impact assessments. Therefore, we believe it is inappropriate to utilize WVA models to determine the effects of basin-wide salinity reductions and reduced water exchange on marine fishery production. Any reduction in fisheries production could have secondary socioeconomic effects, which are also not being quantified to assist in the selection of a TSP. We believe these concerns should be incorporated into the decision-making process regarding the selection of the TSP, as well as addressed in any environmental impact statement (EIS) for the SWCLA project.

Some measures potentially to be included in the TSP, such a flood protection levees and ridge construction on marsh, could result in the destruction of wetlands. While it is possible for some environmental restoration measures to serve as compensatory mitigation for adverse impacts, it does not obviate the need for an evaluation of less damaging alternatives required by the Clean Water Act. The mitigation sequence established by the Clean Water Act Section 404(b)(1) Guidelines states impacts must be avoided, then minimized to the maximum extent practicable prior to the consideration of compensatory mitigation. The SWCLA study, on its current path, does not evaluate potential less damaging alternatives as required by the Clean Water Act.

The NMFS believes these and other issues potentially affecting NOAA trust resources should be thoroughly evaluated prior to selection of the TSP. To be in compliance with the National Environmental Policy Act (NEPA), evaluations of direct, indirect and cumulative impacts would be necessary for incorporation into a draft EIS for the project. Lacking such information in an EIS, NMFS does not believe it would be possible to move TSP directly into Pre-construction Engineering and Design (PED) without additional NEPA evaluations.

We do note the NED and some NER measures (i.e., marsh creation and shoreline protection) may be adequately evaluated as envisioned in the current study plan. As such, it may be appropriate to split off such measures, potentially allowing for full environmental compliance to be achieved within the SMART study schedule and furthering those critical measures to PED. The USACE could then reserve the more complex hydrology and salinity control measures for additional analyses. Due to the scope and diversity of measures under consideration, a Programmatic EIS may also be an alternative means to further the study objectives in this important region, while providing opportunity for more detailed evaluations in the future.

NMFS has findings with the USACE New Orleans District (NOD) describing procedures for EFH consultation during the NOD's review of planning and operations activities subject to compliance with provisions of the Magnuson-Stevens Fishery Conservation and Management

Act and NEPA. Under those procedures, the NOD must produce documents containing: (1) a description of the proposed action, (2) an analysis of individual and cumulative effects on EFH, Federally managed fisheries, including major prey species, (3) the NOD's views regarding effects, and (4) proposed mitigation, if applicable. These documents constitute the basis of an EFH assessment. This finding indicates the document required pursuant to NEPA will incorporate all the necessary requirements of an EFH assessment. Based on information provided to us to-date, NMFS does not believe sufficient analyses will be included in an EIS to adequately fulfill the requirements of an EFH assessment.

There is a potential for various project components to impact other NOAA trust resources managed through our Protected Resources Division. As such, we suggest your staff initiate coordination with Mr. David Bernhart by electronic mail at David.Bernhart@noaa.gov or by telephone at (727) 824-5312.

We look forward to receiving your response regarding these concerns in an effort to proceed with completion of this important study effort. If you wish to discuss this project further or have questions concerning our recommendations, please contact Lisa Abernathy at (225) 389-0508, extension 209.

Sincerely,

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

c:
NOD, Exnicios, Klein
FWS, Walther, Paille
EPA, Ettinger
LDWF, Balkum
LA DNR, Haydel
F/SER3, Bernhart
F/SER4, Dale, Rolfes
F/SER46, Swafford
Files

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

October 9, 2009 F/SER46/RH:jk
225/389-0508

Colonel Alvin B. Lee, Commander
New Orleans District
Department of the Army, Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Lee:

NOAA's National Marine Fisheries Service (NMFS) has received your letter dated September 29, 2009, stating the intent of the New Orleans District (NOD) to prepare an environmental impact statement (EIS) for the Southwest Coastal Louisiana Protection and Restoration Feasibility Study. The purpose of the study is to determine the feasibility of providing coastal protection and restoration measures to the parishes of Calcasieu, Cameron and Vermilion, and to recommend an implementation plan.

In your letter, you requested NMFS participate as a cooperating agency in the preparation of the EIS for this study. As per provisions of the National Environmental Policy Act, NMFS accepts the NOD's invitation to become a cooperating agency on the EIS for this project. It should be noted that, due to staffing and travel constraints, our participation in the preparation of the EIS for this project may be limited to our review and comment on the draft EIS, participation on teleconferences, and occasional travel to meetings and field inspections. NMFS staff are unable to take an active role in drafting sections of the EIS.

We appreciate your invitation to serve as a cooperating agency on the EIS for this project. Ms. Rachel Sweeney of our Baton Rouge office should be the point of contact for this effort as she has already been coordinating with NOD staff on project issues and alternatives.

Sincerely,

for Miles M. Croom
Assistant Regional Administrator
Habitat Conservation Division

c:
FWS, Lafayette, Soileau
EPA, Ettinger
LA OCPR, Johnson
F/SER46, Swafford
F/SER4, Dale
Files

Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

April 7, 2009 F/SER46/RH:jk
225/389-0508

Ms. Sandra Stiles
Environmental Planning and Compliance Branch
Planning, Programs, and Management Division
New Orleans District, Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160

Dear Ms. Stiles:

NOAA's National Marine Fisheries Service (NMFS) has received the Public Scoping Announcement and the Notice of Intent to prepare a Draft Environmental Impact Statement (DEIS) for the **Southwest Coastal Louisiana Feasibility Study for Calcasieu, Cameron and Vermilion Parishes, Louisiana.** The Committee on Transportation and Infrastructure, U.S. House of Representatives, Resolution Docket 2747, Southwest Coastal Louisiana, LA authorized the Secretary of the Army to survey the coast of Louisiana in Cameron, Calcasieu and Vermilion Parishes in reference to the advisability of providing hurricane protection and storm damage reduction, including the feasibility of constructing an armored 12-ft high levee along the Gulf Intracoastal Waterway.

According to the document, alternatives being considered include multi-parish levee alignments, ring levees, ridges and breakwaters to provide multiple lines of defense. Coastal restoration measures, including creation of barrier islands, large-scale marsh creation, salinity control, and hydrologic restoration also are being considered. Non-structural measures to be evaluated include raising structures in-place, property buy-outs, relocating communities and hardening infrastructure.

NMFS understands the desires of the affected public for storm surge risk reduction and is supportive of many of the alternatives being evaluated under this study. NMFS recommends the DEIS include and evaluate potential project impacts to the below identified resources and issues. This should include alternatives to avoid, minimize, and mitigate environmental impacts.

Essential Fish Habitat

This study will evaluate and may propose actions in areas identified as essential fish habitat (EFH) for a variety of federally managed species (see attached table for species, life stages and subcategories of EFH). Detailed information on federally managed fisheries and their EFH is provided in the 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico prepared by the Gulf of Mexico Fishery Management Council (GMFMC). The generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The DEIS should include an EFH Assessment that includes: (1) a description of the proposed action; (2) an analysis of the effects, including

cumulative effects of the action, on various categories of EFH, the managed species, and associated life history stage; (3) the federal agency's views regarding the effects of the action on EFH; and, (4) proposed mitigation. While some alternatives may include wetland restoration components, all adverse impacts to various categories of EFH should be identified in the DEIS and a mitigation plan should be developed to fully offset those impacts.

Marine Fishery Resources

Wetlands in the project area consist of fresh, intermediate, brackish, and saline marsh. In addition to being designated as EFH for the species identified in the attached table, these wetlands provide nursery, foraging, and predator refugia habitats that support numerous economically important marine fishery species such as spotted seatrout, sand seatrout, black drum, southern flounder, gulf menhaden, striped mullet, Atlantic croaker, and blue crab. Some of these species also serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks). The importance of fishery resources to the state of Louisiana and the national economy is shown by the fact that during 2007, 951,240 pounds of seafood was landed at Louisiana ports totaling $259 million dollars in dockside value[a]. To demonstrate the value of the project area to commercial seafood production, ports at Intracoastal City and Cameron placed fifth and seventh, respectively, in the quantity (pounds) of landings as compared to the rest of the nation. More than 85% of these commercial landings are related to the harvest of estuarine dependent species (i.e., species that depend on access to coastal marsh during one or more life stage). NMFS recommends the DEIS fully describe and quantify the value of marine fishery resources in the study area to Louisiana and the nation and the dependence of those resources on access to, and the continued health of, coastal wetlands.

Alternatives Analysis

Sufficient information should be provided in the DEIS to demonstrate compliance with the Clean Water Act Section 404 regulations in determining the least environmentally damaging practicable alternative to provide the authorized project purpose. That project purpose is hurricane protection and storm damage risk reduction. Under the project authority, hurricane protection, storm surge risk reduction, and restoration are to be identified as measures to achieve the project purpose. To that end, a fully informed alternatives analysis should be prepared before indentifying a tentatively selected plan. Such an analysis should include direct and indirect wetland, EFH, and fishery resource impacts; risk and reliability; borrow material sources; cost; and time to construct for all alternatives, including the fulfillment of requisite compensatory mitigation needs. Whether for storm protection or habitat restoration, sediment sources for construction are a limiting resource and therefore represent a programmatic challenge. As with the ongoing updated 100-year protection for the Greater New Orleans Hurricane and Storm Damage Risk Reduction System, NMFS encourages alternatives analyzed for this study fully consider avoiding all wetland impacts for mining fill material.

NMFS agrees that information developed for the Louisiana Coastal Protection and Restoration Project, Final Technical Report would be a starting point for this authority. However, we are concerned that Report did not include wetland restoration measures in this area for a similar

[a] http://www.st.nmfs.noaa.gov/st1/publications.html

project purpose. NMFS recommends the Corps of Engineers (COE) re-evaluate some of the assumptions that resulted in a determination that wetland restoration efforts provided no storm surge risk reduction benefits.

NMFS also is concerned that some levee alternatives could prohibit the identification of a cost-effective project that would meet the objectives of providing hurricane and storm surge protection to the most developed areas while maintaining a natural system in areas where such protection may be less warranted. Combining levee alignments and wetland restoration features that stretch across the study area could result in the identification and selection of a project that is so expensive that funding would be prohibitive. Therefore, NMFS believes an alternative that includes construction of ring levees only around large population centers or important infrastructure, combined with more critical wetland restoration activities, should be included in the list of alternatives for in-depth evaluation.

Secondary Impacts

NMFS is concerned with the potential magnitude of secondary, or indirect, impacts to tidal wetlands that could result from the proposed construction of levees and installation of water control structures. Extensive secondary impacts to wetlands and fishery productivity could occur from enclosing wetlands and from mining sediment for levee construction. Considering the potentially large amount of tidally influenced wetlands and water bodies which would be enclosed within levees for certain alternatives, and the value of those wetlands to Louisiana's recreational and commercial marine fishery harvest, this issue is of paramount importance. Construction of levees and water control structures can impede fishery access to critical nursery and foraging habitats and result in the impoundment or semi-impoundment of those wetlands. The DEIS should quantify the acres of all categories of EFH to be enclosed within the levees or behind structures for all alternatives evaluated. The DEIS also should identify means to minimize the adverse impacts of those actions. This includes designing water control structures and developing operational plans to maximize passage of marine fishery organisms. Structure designs and operational plans should be developed in coordination with the natural resource agencies prior to the completion of the DEIS and described in specific detail in the document.

Enclosing wetlands under potential alternatives could result in landscape level alterations of wetland hydrology. This includes ponding of water on the marsh surface and interruption of the frequency and duration of tidal exchange necessary to help maintain plant health. If sufficient cross-sectional area is not provided at all necessary locations within a leveed system, introduced water from rainfall, runoff drainage or from storm overtopping could take an excessive amount of time to drain, which would increase soil anoxia and decrease plant health. Additionally, levees and water control structures could block the flow of sediments, detritus, and nutrients, which are important for maintaining plant health and soil elevations in a subsiding environment, to wetlands both within and outside the impounded system. This would result in an increase in the loss of wetlands in the affected systems. The DEIS should identify and discuss these issues and identify measures for each alternative necessary to maintain the health of enclosed or adjacent wetlands. NMFS believes that an in-depth, comprehensive hydrologic model will have to be developed to adequately evaluate potential hydrologic impacts and the need for drainage pathways. The DEIS should discuss the need for hydrologic modeling to identify the locations

of necessary drainage sites and to quantify the cross-sectional area required to rapidly remove rainfall and storm waters from enclosed wetlands.

The DEIS should evaluate the indirect impacts from the creation of borrow sources. For example, this should include an assessment of impacts on the regional sedimentation processes, impacts on wave refraction/diffraction (if applicable), slope stability, and water quality. Particularly concerning to NMFS would be excavation of continuous borrow pits adjacent to levees. Such an alternative source for fill material would contribute substantially to landscape level alterations to hydrology and likely adversely impact marsh health. If the borrow pits were located outside of the levee, these features can become navigational and hydrologic pathways that could result in erosion of adjacent banklines. While plugs can be constructed in continuous borrow pits to keep this from occurring, such plugs usually are only temporary features in a subsiding and deteriorating environment. The DEIS should address this issue, identify the most likely sources of fill for levee construction, and discuss measures necessary to ensure borrow site locations don't result in adverse impacts to wetland hydrology and marsh health.

Mitigation

The DEIS should contain sufficient information to support a determination of compliance with the Clean Water Act (CWA) Section 404(b)(1) Guidelines. The potential that wetland restoration efforts could offset some or all of the adverse impacts to marsh should not preclude required sequencing to first avoid and then minimize impacts of the proposed action on wetlands. Mitigation requirements for proposed hurricane levee alignments that impact wetlands also should comply with Section 2036 of the Water Resources Development Act (WRDA) of 2007 which requires mitigation for water resources project to comply with the mitigation standards and policies established by the COE regulatory program. In the case of this project, mitigation assessed should be in compliance with the April 10, 2008, CWA Section 404 mitigation regulations, which were issued jointly by the COE and the Environmental Protection Agency. Of primary pertinence is the requirement that mitigation plans include 12 components: objectives, site selection (rationale), site protection instrument, baseline information, determination of credits, mitigation work plan, maintenance plan, performance standards, monitoring requirements, long-term management plan, adaptive management plan, and financial assurances. The need for compensatory mitigation should be recognized in the DEIS, including a discussion of mitigation, and a draft mitigation plan that fully complies with the CWA and WRDA 2007 should be described in the Mitigation section of the document.

In addition to this, wetland restoration and/or flood protection activities are underway under the Louisiana Coastal Protection and Restoration project; the Coastal Wetlands Planning, Protect and Restoration Act; the Louisiana Coastal Area Feasibility Study; the Coastal Protection and Restoration Authority Master Plan; and the Coastal Impact Assessment Program. Additionally, regional sediment management efforts are underway that this study should utilize and adhere to in terms of identifying sediment quantity and quality and priority of its use relative to other programs. The DEIS should identify and discuss all programs that are involved in wetland restoration and flood protection efforts. Furthermore, the COE should make every effort necessary to coordinate planning under this project with those other efforts to facilitate the

exchange of information and ensure that activities being undertaken do not compromise the efforts of each.

NMFS is committed to working cooperatively with the COE, the State and other natural resource agencies to facilitate planning on this effort. We appreciate the opportunity to provide these comments for consideration in preparing this DEIS.

Sincerely,

Miles Croom
Assistant Regional Administrator
Habitat Conservation Division

Enclosure

c:
FWS, Lafayette
EPA, Dallas
LA DWF
LA DNR, Consistency
F/SER4
F/SER46, Swafford
Files

EFH Requirements for Species Managed by the Gulf of Mexico Fishery Management Council: Ecoregion 4, Mississippi River Delta (South Pass) to Freeport, Tx, that occur in the study area.

Species	Life Stage	System	EFH
Brown shrimp	larvae/postlarvae	M/E	<82 m; planktonic, sand/shell/soft bottom, SAV, emergent marsh, oyster reef
	juvenile	E	<18 m; SAV, sand/shell/soft bottom, SAV, emergent marsh, oyster reef
White shrimp	larvae/postlarvae	M/E	<82 m; soft bottom, emergent marsh
	juvenile	E	<30 m; soft bottom, emergent marsh
Gulf stone crab	eggs	E/M	<18 m; sand/shell/soft bottom
	larvae/postlarvae	E/M	<18 m; planktonic/oyster reefs, soft bottom
	juvenile	E	<18 m; sand/shell/soft bottom, oyster reef
Red drum	larvae/postlarvae	E	all estuaries planktonic, SAV; sand/shell/soft bottom, emergent marsh
	juvenile	E/M	GOM <5 m Vermilion Bay; all estuaries; SAV,; and/shell/soft/hard bottom, emergent marsh
	adults	E/M	GOM 1-46 m; Vermilion Bay; all estuaries; SAV; sand/shell/soft/hard bottom, emergent marsh
lane snapper	larvae	E/M	4-132 m; reefs; SAV
	juvenile	E/M	<20 m; SAV; mangrove; reefs; sand/shell/soft bottom
bonnethead shark	juvenile/adult	M	inlets; estuaries; coastal waters <25 m; Louisiana to Texas

M=marine, E=estuarine

SOUTHWEST COASTAL LOUISIANA INTEGRATED FINAL FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex E
Natural Resources Conservation Service Prime and Unique Farmlands Coordination

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
3737 Government Street
Alexandria, LA 71302

(318) 473-7751
Fax: (318) 473-7626

December 13, 2013

U.S. Army Corps of Engineers
Regional Planning and Environmental Division South
New Orleans Environmental Branch
CEMVN-PDC-CEC
Attn: Eric M. Williams
P.O. Box 60267
New Orleans, Louisiana 70160-0267

RE: Southwest Coastal Louisiana Study – Chenier Ridge Reforestation Project

Dear Mr. Williams:

I have reviewed the above referenced project for potential requirements of the Farmland Protection Policy Act (FPPA) and potential impact to Natural Resources Conservation Service projects in the immediate vicinity.

Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements can be forest land, pastureland, cropland, or other land, but not water or urban built-up land.

The project narrative and maps submitted with your request indicates that the proposed construction areas will not "irreversibly" impact prime farmland and therefore is exempt from the rules and regulations of the Farmland Protection Policy Act (FPPA)—Subtitle I of Title XV, Section 1539-1549. Furthermore, we do not predict impacts to NRCS work in the vicinity.

For specific information about the soils found in the project area, please visit our Web Soil Survey at the following location: http://websoilsurvey.nrcs.usda.gov/

Please direct all future correspondence to me at the address shown above.

Respectfully,

Kevin D. Norton
State Conservationist

ACTING FOR

Attachment

Helping People Help the Land

An Equal Opportunity Provider and Employer

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request: 11/22/2013	
Name of Project: Southwest Coastal Louisiana Study		Federal Agency Involved: US Army Corp of Engineers	
Proposed Land Use: Chenier Ridge Reforestation		County and State: Cameron and Vermilion Parishes, Louisiana	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS: 11-22-2013	Person Completing Form: M. Lindsey
Does the site contain Prime, Unique, Statewide or Local Important Farmland? (If no, the FPPA does not apply - do not complete additional parts of this form)	YES ☐ NO ☑	Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction: Acres: %	Amount of Farmland As Defined in FPPA: Acres: %	
Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	672.9	458.7	251.9	29.6
B. Total Acres To Be Converted Indirectly	0	0	0	0
C. Total Acres In Site	672.9	458.7	251.9	29.6
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide Important or Local Important Farmland				
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value				
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)				

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	Maximum Points	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)				
2. Perimeter In Non-urban Use	(10)				
3. Percent Of Site Being Farmed	(20)				
4. Protection Provided By State and Local Government	(20)				
5. Distance From Urban Built-up Area	(15)				
6. Distance To Urban Support Services	(15)				
7. Size Of Present Farm Unit Compared To Average	(10)				
8. Creation Of Non-farmable Farmland	(10)				
9. Availability Of Farm Support Services	(5)				
10. On-Farm Investments	(20)				
11. Effects Of Conversion On Farm Support Services	(10)				
12. Compatibility With Existing Agricultural Use	(10)				
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐

Reason For Selection:

Name of Federal agency representative completing this form: Eric M. Williams — Date: 11/22/2013

(See Instructions on reverse side) — Form AD-1006 (03-02)

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fpa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s) of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map, or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: If the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 160 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \times 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

From: Williams, Eric MVN
To: "Walters, Cheryl - NRCS, Alexandria, LA"
Subject: AD-1006, Prime and Unique Farmlands Evaluation - Southwest Coastal Louisiana Study, U.S. Army Corps of Engineers, New Orleans District (UNCLASSIFIED)
Date: Friday, November 22, 2013 3:56:00 PM
Attachments: SW Coastal Louisiana Study_AD-1006.pdf
SW Coastal_AD-1006_Chenier Ridge Project Description.pdf
Site_A.dbf
Site_A.prj
Site_A.sbn
Site_A.sbx
Site_A.shp
Site_A.shp.xml
Site_A.shx
Site_B.dbf
Site_B.prj
Site_B.sbn
Site_B.sbx
Site_B.shp
Site_B.shp.xml
Site_B.shx
Site_C.dbf
Site_C.prj
Site_C.sbn
Site_C.sbx
Site_C.shp
Site_C.shp.xml
Site_C.shx
Site_D.dbf
Site_D.prj
Site_D.sbn
Site_D.sbx
Site_D.shp
Site_D.shp.xml
Site_D.shx

Classification: UNCLASSIFIED
Caveats: NONE

Ms. Walters,

Please see the attached form AD-1006 and project description for the subject. The U.S. Army Corps of Engineers is preparing an EIS for the subject project and request that the NRCS provide an evaluation of the prime and unique farmlands for proposed chenier ridge reforestation in southwest Louisiana. The proposed reforestation would convert approximately 1,431 acres of existing chenier ridge from future agricultural or grazing use. Shape files are attached for use in the evaluation. If you have questions regarding the project, the attached form AD-1006, or the shape files, please do not hesitate to contact me at (504) 862-2862.

Please advise if use of email is acceptable, or if in the future we should transmit these requests via another method.

Eric M. Williams

RPEDS, South/CEMVN-PDN-NCR

504/862-2862

Fax: 504/862-2088

eric.m.williams@usace.army.mil

Classification: UNCLASSIFIED
Caveats: NONE

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request 11/22/2013	
Name of Project Southwest Coastal Louisiana Study		Federal Agency Involved US Army Corp of Engineers	
Proposed Land Use Chenier Ridge Reforestation		County and State Cameron and Vermilion Parishes, Louisiana	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS	Person Completing Form:
Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☐ NO ☐	Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount of Farmland As Defined in FPPA Acres: %	
Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	672.9	458.7	251.9	29.6
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PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland				
B. Total Acres Statewide Important or Local Important Farmland				
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value				
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Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☐
Reason For Selection:		
Name of Federal agency representative completing this form: Eric M. Williams		Date: 11/22/2013

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

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(For Federal Agency)

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Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \times 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

Project Description for the Chenier Reforestation Measure of the National Environmental Restoration Component of the Southwest Coastal Louisiana Study

The proposed activity would consist of planting trees for the reforestation of chenier ridges along the southwest Louisiana coast:

- Original measures included all cheniers and elevated features identified by the *Cheniers and Natural Ridges Study* (Providence Engineering and Environmental Group LLC 2009).
- From these, east/west-oriented cheniers with elevations generally greater than +5 feet NAVD 88 (from LIDAR) were selected. The +5 feet NAVD 88 target elevation is considered a conservative minimum elevation that could sustain tree plantings for the duration of the study period given relative sea level rise, and is taken from Didier (2007) and other professional opinions. The selected cheniers included: Measure 510a - Blue Buck Ridge; Measure 510b - Hackberry Ridge; Measure 510d - Front Ridge; Measure 416 - Grand Chenier Ridge; Measure 509c - Bill Ridge; and Measure 509d - Cheniere Au Tigre.
- Within these measures, reforestation focused specifically on large, continuous, sparsely wooded tracts greater than 5 acres, excluding: areas below +5 feet NAVD 88; areas with residential or industrial development; and sand borrow pits.
- For purposes of the prime and unique farmlands evaluation and to more easily correspond with Form AD-1006, the measures have been grouped as sites A – D. All of the measures discussed are part of the proposed action, and shape files for each *Site* are provided:
    - **Site A**
        - Measure 510a – Blue Buck Ridge: Eight tracts totaling 524.4 acres were identified (from west to east: 16.2, 40.4, 45.6, 141.2, 18.2, 20.4, 202.8, and 39.6- acre tracts).
        - Measure 510b – Hackberry Ridge: Three tracts totaling 148.5 acres were identified (from west to east: 62.7, 72.2, and 13.6-acre tracts). The western two miles (including the 62.7-acre tract) of this measure have been identified by the Louisiana Natural Heritage Program as "Remnant Chenier Forest", but appear to have been damaged by recent hurricanes.
    - **Site B**
        - Measure 510d – Front Ridge: The eastern 3.1 miles of this measure do not encompass large swaths of suitable elevation. Of the remainder, eleven tracts totaling 458.7 acres were identified (from west to east: 35.7, 47.1, 70.0, 125.6, 65.2, 12.3, 22.4, 15.0, 29.8, 13.0, 22.6-acre tracts).
    - **Site C**
        - Measure 416 – Grand Chenier Ridge: The eastern 5.8 miles of this measure do not encompass large swaths of suitable elevation. Of the remainder, nine tracts totaling 251.9 acres were identified (from west to east: 8.5, 11.0, 13.1, 19.4, 85.6, 46.7, 25.7, 29.1, and 12.8-acre tracts).

- **Site D**
  - Measure 509c – Bill Ridge: Three tracts were indentified that encompass 8.8 acres of the northern ridge, and 6.5 and 6.1 acres of the southern ridge. The middle section of the southern ridge was excluded due to insufficient elevation.
  - Measure 509d – Cheniere Au Tigre: The majority of this chenier is forested with the exception of an 8.2 acre tract on the western end. The eastern part of the measure along the Gulf shoreline was removed due to concerns about the sustainability of tree plantings in these exposed areas.

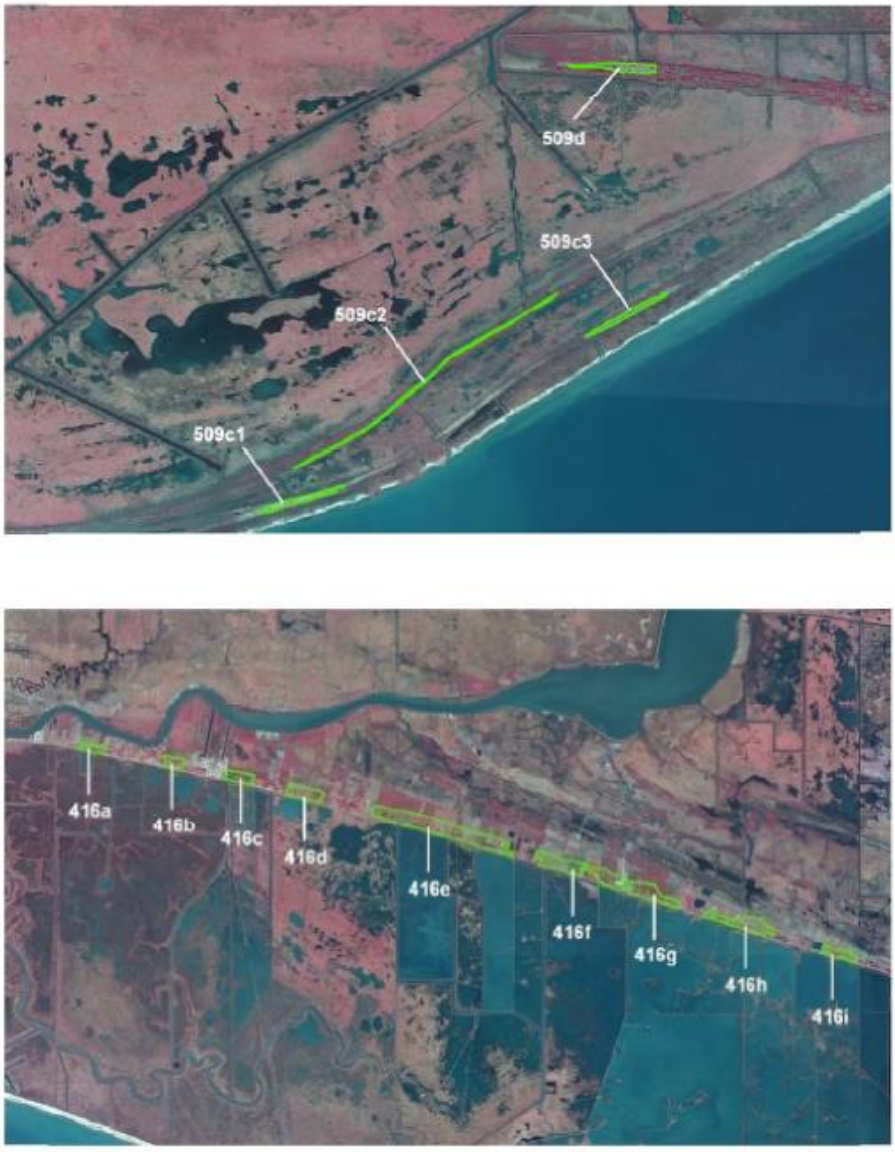

Figure 1. Selected reforestation tracts for Measures 509c, 509d, and 416.

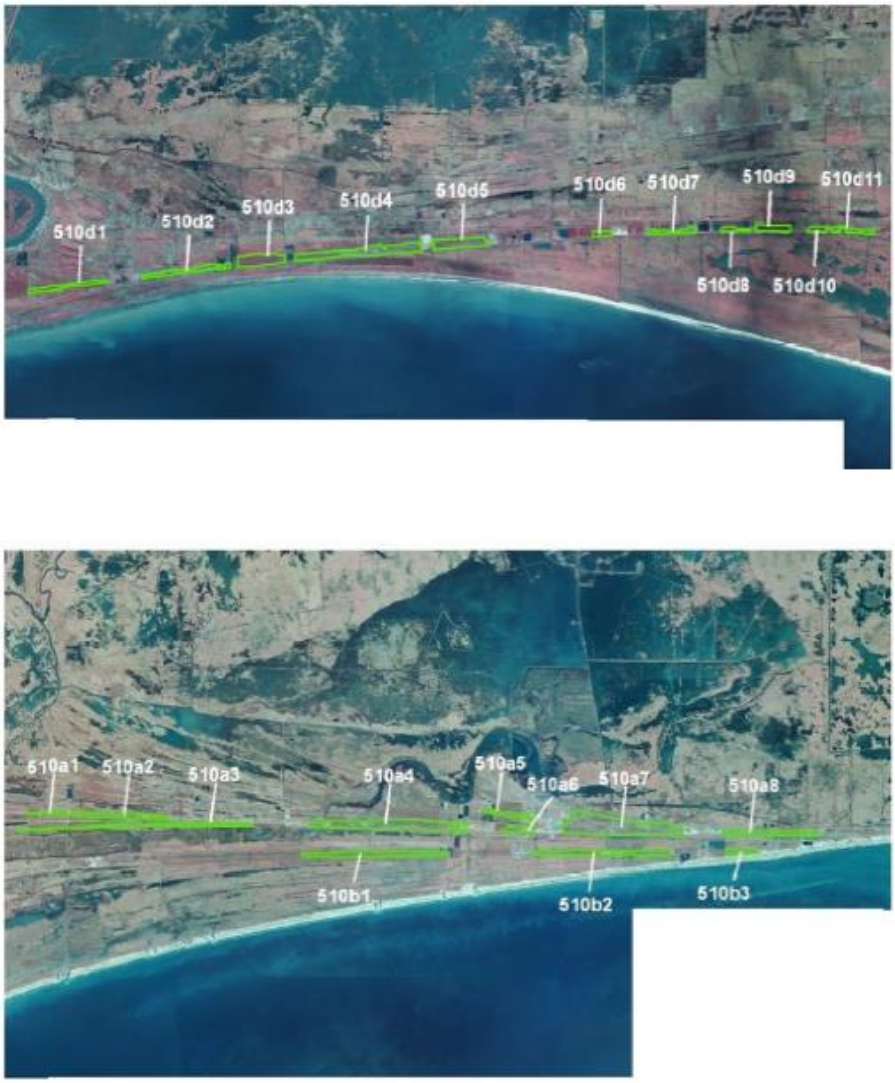

Figure 2. Selected reforestation tracts for Measures 510d, 510a, and 510b.

SOUTHWEST COASTAL LOUISIANA
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A
Annex F
State Historic Preservation Officer (SHPO) and
Tribal Coordination Letters

Programmatic Agreement
National Economic Development/
National Ecosystem Restoration

PROGRAMMATIC AGREEMENT
AMONG THE UNITED STATES ARMY CORPS OF ENGINEERS,
THE LOUISIANA STATE HISTORIC PRESERVATION OFFICER, AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NATIONAL ECONOMIC DEVELOPMENT COMPONENT OF THE
SOUTHWEST COASTAL LOUISIANA STUDY

WHEREAS, historically, the low elevation and proximity of the Calcasieu, Cameron and Vermilion Parishes to the Gulf of Mexico puts these southwest coastal Louisiana communities at risk of damages from storm surge flooding and coastal erosion; and

WHEREAS, the U.S. Congress through separate reciprocal authorizations, authorized the investigation of alternatives to: (1) provide hurricane and storm damage risk reduction measures; and (2) significantly restore environmental conditions that existed prior to the large scale alteration of the natural ecosystem in this three (3) parish area. This study, hereafter referred to as the Southwest Coastal Louisiana Study (SWC Study), focuses on a 4,700 square mile study area located in Calcasieu, Cameron, and Vermilion Parishes (the Study Area); and

WHEREAS, the Louisiana Coastal Protection and Restoration Authority Board (CPRAB) is the non-federal sponsor for SWC Study; and

WHEREAS, the hurricane and storm damage risk reduction component of the SWC Study, referred to as the National Economic Development (NED) plan (NED Plan), is the subject of this Programmatic Agreement (PA or this Agreement), and the ecosystem restoration component of the SWC Study, referred to as the National Ecosystem Restoration (NER) component, is the subject of a separate programmatic agreement; and

WHEREAS, the NED component of the SWC Study was authorized based on language in the River and Harbor Act of 1962 and a resolution of the Committee on Transportation and Infrastructure of the United States House of Representatives following the impact of Hurricane Rita in 2005, to wit:

"Surveys of the coastal areas of the United States and its possessions, including the shores of the Great Lakes, in the interest of beach erosion control, hurricane protection and related purposes: Provided, 'That surveys of particular areas shall be authorized by appropriate resolution of either the Committee on Public Works of the United States Senate or the Committee on Public Works of the House of Representatives."

AND

"Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, that, in accordance with Section 110 of the River and Harbor Act of 1962, the Secretary of the Army is requested to survey the coast of Louisiana in Cameron, Calcasieu, and Vermilion parishes with particular reference to the advisability

of providing hurricane protection and storm damage reduction and related purposes to include the feasibility of constructing an armored 12-foot levee along the Gulf Intracoastal Waterway." (December 7, 2005 – Committee on Transportation and Infrastructure, U.S. House of Representatives, Resolution Docket 2747, Southwest Coastal Louisiana); and

WHEREAS, the NED Plan includes nonstructural hurricane and storm damage risk reduction measures for residential and non-residential structures that meet the eligibility criteria for the NED Plan located in the Study Area with first-floor elevations at or below the 25-year base flood elevation based on year 2025 hydrology (NED Structures); and

WHEREAS, pursuant to 36 CFR Part 800, the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. § 306108), the U.S. Army Corps of Engineers (USACE) has determined that implementation of the NED Plan will result in Undertakings that have the potential to cause effects on properties listed in or eligible for listing in the National Register of Historic Places (NRHP) and properties that have religious and cultural significance for federally-recognized Indian Tribes as defined in 36 CFR § 800.16(m) (Tribes) (collectively, "historic properties" as defined in 36 CFR § 800.16(l)(1)); and

WHEREAS, an Undertaking, as defined in 36 CFR § 800.16(y) may include any one of the following nonstructural hurricane and storm damage risk reduction measures and any related project activities that have the potential to cause effects on historic properties: 1. elevation of residential structures, 2. dry flood proofing of non-residential structures, 3. construction of localized storm surge risk reduction measures of less than 6 feet in height around non-residential structures, and 4. acquisition and demolition of residential and/or non-residential structures; and

WHEREAS, each Undertaking with its respective area of potential effects (APE) will be treated separately for the purposes of Section 106 consultation; and

WHEREAS, USACE has elected to fulfill its Section 106 obligations through execution and implementation of a programmatic agreement as provided for in 36 CFR § 800.14(b); and

WHEREAS, USACE has notified the Advisory Council on Historic Preservation (ACHP) of the potential for the Undertakings to affect historic properties and that a programmatic agreement will be prepared, and the ACHP has chosen to participate in consultation to develop this Agreement; and

WHEREAS, USACE has consulted with the Louisiana State Historic Preservation Officer (SHPO), Tribes, Tribal Historic Preservation Officers (THPOs), ACHP, CPRAB, and other appropriate consulting parties in developing this Agreement in order to define efficient and cost effective processes for taking into consideration the effects of the Undertakings upon historic properties; and

WHEREAS, USACE acknowledges Tribes as sovereign nations which have a unique government-to-government relationship with the federal government and its agencies; USACE further acknowledges its Trust Responsibility to those Tribes; and

WHEREAS, USACE has made a reasonable and good faith effort to identify any Tribes that may attach religious and cultural significance to historic properties that may be affected by the Undertakings; and

WHEREAS, USACE has invited the Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Muscogee (Creek) Nation, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and the Tunica-Biloxi Tribe of Louisiana, Tribes for which historic properties located in the State of Louisiana have religious and cultural significance, to consult in the development of this Agreement; and

WHEREAS, the Quapaw Tribe of Oklahoma and the Muscogee (Creek) Nation have determined that the Undertakings are not within their geographic area of interest and have chosen not to participate in the development of this Agreement; and

WHEREAS, the Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Seminole Nation of Oklahoma, and Seminole Tribe of Florida have chosen to participate in the development of this Agreement and have been invited to sign this Agreement as an Invited Signatory Party; and

WHEREAS, the Tunica-Biloxi Tribe of Louisiana and those Tribes that have not participated in the development of this Agreement but that may choose to participate in Section 106 consultation will be invited to sign this Agreement as a Concurring Party; and

WHEREAS, CPRAB has participated in the development of this Agreement and has been invited to sign this Agreement as an Invited Signatory Party; and

WHEREAS, USACE has taken appropriate measures to identify other consulting parties that may be interested in Section 106 consultation, by notification to the Parish Presidents of Calcasieu, Cameron, and Vermilion parishes, as well as the Abbeville Community and Historic Preservation Commission, Abbeville Main Street, Calcasieu Historical Preservation Society, Foundation for Historical Louisiana, Lake Charles Historic Preservation Commission, Louisiana Trust for Historic Preservation, National Trust for Historic Preservation, Vermilion Historical Society, and the Atakapa-Ishak Nation. Consulting parties that participate in Section 106 consultation may be invited to sign this Agreement as a Concurring Party; and

WHEREAS, USACE has involved the public through the National Environmental Policy Act (NEPA) process, which affords all persons, organizations, and government agencies the right to review and comment on proposed major federal actions that are

evaluated by a NEPA document. Public meetings to collect input during planning were held in March 2009, July 2009, February 2010, March 2010, July 2010, October 2011, April 2012, July 2013, and August 2013. On December 13, 2013, USACE released an Integrated Draft Feasibility Report and Environmental Impact Statement for the SWC Study (Draft Report) to the public for a review period of forty-five (45) calendar days, which was extended an additional fourteen (14) days until February 13, 2014. This document included a general discussion of cultural resources within the study area. Public hearings of the Draft Report were held on January 7 and 9, 2014. On March 20, 2015, USACE released a Revised Integrated Draft Feasibility Report and Environmental Impact Statement for the SWC Study (Revised Draft Report) to the public for a review period of forty-five (45) calendar days. Public hearings of the Revised Draft Report were held on April 14, 15, and 16, 2015. USACE has also notified the public of the development of this Agreement with newspaper announcements in the *Abbeville Meridional, American* Press, and *The Advocate*; and

NOW, THEREFORE, USACE, SHPO, and ACHP agree that the Undertakings shall be implemented in accordance with the following stipulations in order to take into account the effects of the Undertakings on historic properties.

STIPULATIONS

To the extent of its legal authority, USACE shall ensure that the following terms are carried out:

I. Consultation and Coordination

A. Following Congressional authorization and appropriation to implement the entirety or some portion of the NED Plan, USACE shall meet with Signatory and Invited Signatory parties to review the NED Nonstructural Implementation Plan and this Agreement.

B. USACE shall make a reasonable and good faith effort to identify any additional Tribes that might attach religious and cultural significance to historic properties in the APE for an Undertaking and invite those Tribes to participate in Section 106 consultation.

C. USACE shall consult with Tribes that are Invited Signatory Parties and Concurring Parties, as well as any other Tribe that requests in writing to be a consulting party (collectively, "Consulting Tribes").

D. USACE shall provide Consulting Tribes with an executed copy of this Agreement and with copies of all plans, determinations, and findings provided to the SHPO.

E. Owners of NED Structures (Property Owners) are entitled to participate as consulting parties in the Section 106 process as it relates to the property in which they hold an ownership interest.

F. Individuals or organizations with a demonstrated interest in an Undertaking, including certified local governments, may be invited to participate as consulting parties due to the nature of their legal or economic relations to an Undertaking or affected properties, or their concern with an Undertaking's effects on historic properties, if agreed upon by the USACE and SHPO.

G. To the extent permitted under applicable federal laws and regulations, for example, Section 304 of the NHPA (54 U.S.C. § 307103), 36 CFR § 800.11(c), and Section 9 of the Archaeological Resources Protection Act of 1979 (ARPA) (16 U.S.C. 470aa-mm; Public Law 96-95 and amendments to it), USACE will make available to the public documents developed pursuant to this Agreement.

H. Electronic mail (email) will serve as the official correspondence method for all communications regarding this Agreement and its provisions. See Appendix A for a list of contacts and email addresses. Contact information in Appendix A may be updated as needed without an amendment to this Agreement. It is the responsibility of each signatory to immediately inform the USACE of any change in name, address, email address, or phone number of any point-of-contact. USACE will forward this information to all signatories by email. Failure of any party to this Agreement to notify the USACE of any change to a point-of-contact's information shall not be grounds for asserting that notice of a proposed action was not received.

I. All standard response timeframes established by 36 CFR Part 800 will apply to this Agreement, unless an alternative response timeframe is agreed to by the SHPO and Consulting Tribes on a case-by-case basis.

J. All time designations will be in calendar days. If any party does not comment within the agreed upon timeframes, USACE may assume that party's concurrence with the USACE's determination, and will notify all consulting parties of the action and proceed in accordance with this Agreement.

II. Standards

A. All work carried out pursuant to this Agreement shall be done by or under the direct supervision of historic preservation professionals who meet the *Secretary of the Interior's Professional Qualifications Standards* (36 CFR Part 61).

B. All work carried out pursuant to this Agreement shall meet the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (36 CFR Part 68).

C. The elevation of residential structures carried out pursuant to this Agreement that may affect historic properties shall meet the Louisiana Division of Historic Preservation's *Elevation Guidelines for Historic Buildings in the Louisiana GO Zone*.

D. All historic standing structures surveys carried out pursuant to this Agreement shall be completed in accordance with the Louisiana Historic Resource Inventory Guidelines of the Louisiana Division of Historic Preservation.

E. All archaeological investigations carried out pursuant to this Agreement shall be completed in accordance with the Field Standards and documented in accordance with the Report Standards of the Louisiana Division of Archaeology.

III. Identification and Evaluation of Historic Properties

A. USACE, in consultation with the SHPO and Consulting Tribes, will determine and document the geographic areas within which an Undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist, hereafter referred to as an APE. USACE will conduct a reasonable and good faith effort to identify historic properties located within an APE.

1. USACE shall seek input from consulting parties, as appropriate, concerning:

   a. the historic significance of structures that have not previously been evaluated for eligibility for listing in the National Register, either individually or as contributing to a historic district;

   b. the potential for archaeological properties to be present; and

   c. the potential for properties of religious and cultural significance to Tribes to be present.

   Any comments provided to the USACE shall be considered by the USACE and SHPO in evaluating National Register eligibility.

2. USACE shall ensure that a Louisiana Historic Resource Inventory (LHRI) Form will be completed for each eligible and participating NED Structure 50 years of age or older and for additional structures 50 years of age or older located within an APE that have not been previously surveyed in accordance with the guidelines for Intensive Level Survey of the Louisiana Division of Historic Preservation. An LHRI Update Addendum will be completed for each eligible and participating NED Structure and additional structures located within an APE that have been previously surveyed.

3. USACE will consult with the SHPO and Consulting Tribes to determine the level of effort necessary to identify the anticipated type and location of archaeological properties or properties of religious and cultural significance to Tribes. The level of survey to be conducted within an APE and the survey methodology will be developed in consultation with the SHPO and Consulting Tribes and completed in a manner that meets the standards for Reconnaissance or Phase I Investigations as defined by the Louisiana Division of Archaeology. These efforts will be documented in reports that

USACE will submit to SHPO and Consulting Tribes for review and comment. USACE will ensure that the comments provided by the SHPO and Consulting Tribes are addressed and incorporated into a final report.

4. USACE will consult with the SHPO on the eligibility of all structures located in an APE, and with the SHPO and Consulting Tribes on the eligibility of all archaeological properties and properties of religious and cultural significance to Tribes located in an APE. For properties already eligible or listed in the National Register, USACE will consult to determine whether or not the property retains the characteristics that make it eligible for listing in the National Register.

B. Consultation under this Agreement for an Undertaking will be concluded for USACE findings of *no historic properties affected* when the SHPO and Consulting Tribes have been provided the opportunity to review and comment on the documentation specified in 36 CFR § 800.11(d) and either concur or do not object within the agreed upon response timeframe. USACE shall notify any additional consulting parties and make documentation of the finding available to the public. This shall complete the USACE's Section 106 responsibilities for these properties.

C. In the event of disagreement between the USACE, SHPO, and/or Consulting Tribes concerning the eligibility of a property for listing in the NRHP under 36 CFR Part 60, USACE shall request a formal determination of eligibility for that property from the Keeper of the NRHP (Keeper). The determination by the Keeper will serve as the final decision regarding the NRHP eligibility of the property.

IV. Historic Properties Affected

A. USACE shall notify the SHPO, Consulting Tribes, and other consulting parties, as appropriate, that an Undertaking may affect historic properties and shall continue consultation with the aforementioned parties to apply the criteria of adverse effects to historic properties within an APE in accordance with 36 CFR § 800.5.

B. Consultation under this Agreement will be concluded for USACE findings of *no adverse effect* when the SHPO and Consulting Tribes have been provided the opportunity to review and comment on the documentation specified in 36 CFR § 800.11(e) and either concur or do not object within the agreed upon response timeframe.

C. In the event of an objection by the SHPO and/or Consulting Tribes regarding a USACE finding of *no adverse effect*, USACE shall seek to resolve such objection through consultation in accordance with procedures outlined in Stipulation IX.

V. Resolution of Adverse Effects

A. USACE shall continue consultation with the SHPO, Consulting Tribes, and other consulting parties, as appropriate, pursuant to 36 CFR § 800.6 to avoid, minimize, or mitigate adverse effects to historic properties.

B. USACE shall notify the ACHP and other consulting parties, as appropriate, and determine their participation. The notification of the adverse effect shall include the documentation specified in 36 CFR § 800.11(e), subject to the confidentiality provisions of 36 CFR § 800.11(c), and such other documentation as may be developed during the consultation to resolve adverse effects, including views and summaries of the consulting parties. If the project activity will affect a National Historic Landmark, USACE shall also notify the National Park Service (NPS).

C. Once the USACE, SHPO, Consulting Tribes, and ACHP, should they decide to participate in consultation, agree on how the adverse effects will be resolved, they shall execute and implement a Memorandum of Agreement (MOA) pursuant to 36 CFR § 800.6(c). USACE shall submit a copy of the executed MOA, along with the documentation specified in 36 CFR § 800.11(f), to the ACHP prior to approving an Undertaking. A copy of the executed MOA shall be forwarded to all Signatory, Invited Signatory, and Concurring Parties.

D. Should the USACE, SHPO, and Consulting Tribes disagree on how the adverse effects will be resolved, USACE shall seek to resolve such objection through consultation in accordance with procedures outlined in Stipulation IX.

VI. Curation

A. USACE shall ensure that all collections resulting from identification and evaluation surveys, data recovery operations, or other studies pursuant to this Agreement are maintained in accordance with 36 CFR Part 79 as long as there is a USACE interest in the collections, minimally until the analysis is complete and the final report is accepted by the Division of Archaeology. USACE shall be responsible for costs to process, catalog, and accession all collections in accordance with 36 CFR Part 79.

B. USACE shall be responsible for consulting with landowners regarding the curation of collections resulting from identification and evaluation surveys, data recovery operations, or other studies pursuant to this Agreement. USACE shall encourage non-federal landowners to donate collections to the Division of Archaeology or other facility meeting the standards of 36 CFR Part 79 for long-term curation. USACE shall be responsible for negotiating the return of collections to non-federal landowners should they elect not to donate the collections, including any costs required to return the collections.

C. USACE shall be responsible for costs to prepare federally-owned collections, including the associated records of non-federal collections, and any non-federal collections donated to the Division or Archaeology or other facility agreed upon

by SHPO and Consulting Tribes for long-term curation. Collections to be deposited with a curation facility shall be prepared in accordance with the standards of that facility.

D. USACE shall be responsible for costs to curate federally-owned collections, including the associated records of non-federal collections, long-term in accordance with 36 CFR Part 79 and the curation agreement in effect with the facility accepting the collections. For non-federal collections donated to the Division of Archaeology or other facility, USACE shall be responsible for the one-time accession fee assessed by the Division of Archaeology or other facility meeting the standards of 36 CFR Part 79.

VII. Discovery of Human Remains

A. The following language shall be included in construction plans and specifications:

When human remains, suspected human remains, or indications of a burial are discovered during the execution of an Undertaking, the individual(s) who made the discovery shall immediately notify the local law enforcement, coroner/medical examiner, and the USACE, New Orleans District, and make a reasonable effort to protect the remains from any harm. The human remains shall not be touched, moved, or further disturbed. All activities shall cease within a minimum of 50 feet from the area of the find (50-foot radius "no work" buffer) until authorized by the USACE.

B. Upon notification, USACE shall ensure that the area of the find is secured and protected from further disturbance. USACE shall ensure that the following procedures will be followed if the area of the find is located on private or state land, or federal or tribal land.

1. Private or State Land. In the event that the area of the find is located on private or state land, the procedures established by the Louisiana Unmarked Human Burial Sites Preservation Act (La. R.S. 8:671-681) are applicable.

   a. USACE shall immediately notify the State Archaeologist of the discovery.

   b. USACE shall continue consultation with SHPO, Consulting Tribes, and additional consulting parties, as appropriate.

   c. USACE shall ensure that no remains will be removed from the area of the find until jurisdiction is established and the appropriate permits are obtained from the Division of Archaeology.

2. Federal or Tribal Land. In the event that the area of the find is located on federal or tribal land, the procedures established by the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (25 U.S.C. § 3001-3013, 18 U.S.C. § 1170) and the implementing regulations (43 CFR

Part 10), and ARPA and the implementing regulations (43 CFR Part 7) are applicable.

a. USACE shall immediately notify the responsible federal agency official or Indian tribe official with jurisdiction over the remains.

b. USACE shall continue consultation with SHPO, Consulting Tribes, and additional consulting parties, as appropriate.

c. If the USACE is the responsible federal agency, then the USACE shall ensure that the procedures established by NAGPRA and ARPA are followed, as applicable.

C. All Signatory and Invited Signatory Parties agree that the most appropriate treatment, if feasible, is to protect human remains and permanently preserve burial sites in situ.

VIII. Unanticipated Discoveries and Effects

A. The following language shall be included in construction plans and specifications:

When a previously unidentified cultural resource, including but not limited to archeological sites, standing structures, and properties of traditional religious and cultural significance to Tribes, is discovered during the execution of an Undertaking, the individual(s) who made the discovery shall immediately secure the vicinity, make a reasonable effort to avoid or minimize harm to the resource, and notify the USACE, New Orleans District. All activities shall cease within a minimum of 50 feet from the inadvertent discovery (50-foot radius "no work" buffer) until authorized by the USACE.

B. Upon notification, USACE shall implement any additional reasonable measures necessary to avoid or minimize effects to the resource. Any previously unidentified cultural resource will be treated as though it is eligible for the NRHP until such other determination may be made.

C. USACE shall immediately notify the SHPO, Consulting Tribes, and additional consulting parties, as appropriate, within 48 hours of the finding and request consultation to resolve potential adverse effects.

1. If consulting parties agree that the cultural resource is not eligible for the NRHP, then the suspension of work will end.

2. If consulting parties agree that the cultural resource is eligible for the NRHP, then the suspension of work will continue, and the USACE, in consultation with the SHPO and Consulting Tribes, will determine actions to avoid, minimize, or mitigate adverse effects to the historic property and will ensure that the appropriate actions are carried out.

D. In the event that the USACE is notified of the discovery of previously unidentified archaeological resources on federal or tribal land during the execution of an Undertaking, USACE shall ensure that procedures established by ARPA and implementing regulations (43 CFR Part 7) will be followed.

E. In the event that the USACE is notified of the discovery of funerary objects, sacred objects, or objects of cultural patrimony on federal or tribal land during the execution of an Undertaking, USACE shall ensure that procedures outlined in Stipulation VII will be followed.

F. In the event that effects to historic properties are identified following the completion of a project activity, any party may provide the USACE with evidence of such effects for a period of twelve (12) months from the completion of the affecting work. USACE shall review the evidence and consult with the SHPO, Consulting Tribes, and ACHP, as appropriate, to resolve any adverse effects.

G. If the USACE, SHPO, and Consulting Tribes cannot agree on an appropriate course of action to address an unanticipated discovery or effects situation, then the USACE shall initiate the dispute resolution process set forth in Stipulation IX.

IX. Dispute Resolution

A. Except for the resolution of eligibility issues as set forth in Stipulation III, should any Signatory, Invited Signatory, or Concurring Party object in writing to the USACE at any time to any actions proposed or the manner in which the terms of this Agreement are implemented, USACE shall consult with such party to resolve the objection.

B. If the USACE determines that such objection cannot be resolved, the USACE shall forward all documentation relevant to the dispute, including USACE's proposed resolution, to the ACHP.

C. The ACHP shall provide the USACE with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, USACE shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, Signatories, Invited Signatories, and Concurring Parties, and provide them with a copy of this written response. USACE will then proceed according to its final decision.

D. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, USACE may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, USACE shall prepare a written response that takes into account any timely comments regarding the dispute from the Signatories, Invited Signatories, and Concurring Parties, and provide them and the ACHP with a copy of such written response. USACE will then proceed according to its final decision.

E. USACE's responsibility to carry out all other actions subject to the terms of this Agreement that are not the subject of the dispute remain unchanged.

X. Administration, Effect, and Duration

A. This Agreement shall take effect upon execution by the ACHP, USACE, and SHPO. USACE shall provide Signatory, Invited Signatory, and Concurring Parties with a complete copy of this Agreement including all executed signature pages.

B. This Agreement will remain in effect for twenty (20) years from the date of execution unless the Signatory Parties agree that there is a need to extend the term. Prior to the end of the twenty-year term, USACE will consult with ACHP and SHPO to determine interest in extending this Agreement. This Agreement may be extended by written agreement negotiated by Signatory Parties and by amending this Agreement consistent with Stipulation XII.

C. Each year following the execution of this Agreement until it expires or is terminated, USACE shall provide all Signatory, Invited Signatory, and Concurring Parties a summary report detailing work undertaken pursuant to its terms. Such report shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in USACE's efforts to carry out the terms of this Agreement.

D. Following authorization and appropriation, USACE shall coordinate a meeting of the Signatory, Invited Signatory, and Concurring Parties to be held annually on a mutually agreed upon date to evaluate the effectiveness of this Agreement and discuss activities carried out pursuant to this Agreement during the preceding year and activities scheduled for the upcoming year. After five (5) years, USACE will initiate the discussion of cumulative effects as provided for in Stipulation XI. The meeting shall be held in a location agreed upon by consensus of the Signatory Parties.

XI. Comprehensive Review

A. Upon completion of the implementation of the NED Plan, USACE will analyze the Undertakings holistically to assess cumulative effects upon historic properties. Cumulative effects are those which result from the incremental impacts of an undertaking when added to other past, present, and reasonably foreseeable future federal or non-federal undertakings.

B. USACE, in consultation with the Signatory and Invited Signatory Parties, will identify and implement measures, as appropriate, to mitigate adverse cumulative effects on historic properties. If there is a disagreement that cannot be resolved, USACE shall initiate the dispute resolution process set forth in Stipulation IX.

C. Agreed upon measures to resolve adverse cumulative effects will be documented in a report that meets the standards of the Louisiana Division of Historic

Preservation and the Division of Archaeology and will be submitted to SHPO and Consulting Tribes for review and comment. The final cumulative report will be distributed to the Signatory, Invited Signatory, and Concurring Parties.

XII. Amendment and Termination

A. Notwithstanding any provision of this Agreement, Signatory and Invited Signatory Parties may request that it be amended, whereupon these parties will consult to consider such amendment. USACE shall facilitate such consultation within thirty (30) days of receipt of the written request. Where no consensus can be reached, this Agreement will not be amended. Any amendment to this Agreement will be in writing and will be signed by Signatory and Invited Signatory Parties, and shall be effective on the date of the final signature.

B. Any Invited Signatory Party may withdraw its participation in this Agreement by providing thirty (30) days advance written notification to all other Signatory and Invited Signatory Parties. In the event of withdrawal by an Invited Signatory Party, this Agreement will remain in effect for the other Signatory and Invited Signatory Parties.

C. This Agreement may be terminated in accordance with 36 CFR Part 800, provided that the Signatory and Invited Signatory Parties consult during the period prior to termination to seek agreement on amendments or other actions that could avoid termination. Any Signatory Party requesting termination of this Agreement shall provide thirty (30) days advance written notification to all other Signatory and Invited Signatory Parties.

D. Termination of this Agreement does not relieve USACE of any remaining obligations it may have, as of the date of termination, under 36 CFR Part 800.

Execution of this Agreement by the ACHP, USACE, and SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the NED Plan upon historic properties and has afforded the ACHP an opportunity to comment.

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the SWC Study upon historic properties and has afforded the ACHP an opportunity to comment.

Signatory:

United States Army Corps of Engineers

By: Richard L. Hansen Date: 22 Feb 2016
Richard L. Hansen
Colonel, U.S. Army
District Commander

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the SWC Study upon historic properties and has afforded the ACHP an opportunity to comment.

Signatory:

Louisiana State Historic Preservation Officer

By: _____ Date: 2-19-16
Phil Boggan
Louisiana State Historic Preservation Officer
Louisiana Office of Cultural Development

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the SWC Study upon historic properties and has afforded the ACHP an opportunity to comment.

Signatory:

Advisory Council on Historic Preservation

By: _____ Date: 2/24/16
John M. Fowler
Executive Director
Advisory Council on Historic Preservation

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Chitimacha Tribe of Louisiana

By:_____ Date:_____
O'Neil J. Darden, Jr., Chairman

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Choctaw Nation of Oklahoma

By:_____ Date:_____
Gary Batton, Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Coushatta Tribe of Louisiana

By:_____ Date:_____
Kevin Sickey, Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Mississippi Band of Choctaw Indians

By:_____ Date:_____
Phyliss J. Anderson, Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Alabama-Coushatta Tribe of Texas

By: _____ Date:_____
Carlos Bullock, Chairman

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Caddo Nation of Oklahoma

By:_____ Date:_____
Tamara Francis-Fourkiller, Chairman/THPO

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Jena Band of the Choctaw Indians

By:_____ Date:_____
B. Cheryl Smith, Principal Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Seminole Nation of Oklahoma

By:_____ Date:_____
Leonard M. Harjo, Principal Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Seminole Tribe of Florida

By:_____ Date:_____
James Billie, Chaiman

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Concurring Party:

Tunica-Biloxi Tribe of Louisiana

By:_____ Date:_____
Joey Barbry, Chairman

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Economic Development Component of the
Southwest Coastal Louisiana Study

Concurring Party:

Coastal Protection and Restoration Authority Board

By:_____ Date:_____
Jerome Zeringue, Chair

PROGRAMMATIC AGREEMENT
AMONG THE UNITED STATES ARMY CORPS OF ENGINEERS,
THE LOUISIANA STATE HISTORIC PRESERVATION OFFICER, AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE NATIONAL ECOSYSTEM RESTORATION COMPONENT OF THE
SOUTHWEST COASTAL LOUISIANA STUDY

WHEREAS, historically, the low elevation and proximity of the Calcasieu, Cameron and Vermilion Parishes to the Gulf of Mexico puts these southwest coastal Louisiana communities at risk of damages from storm surge flooding and coastal erosion; and

WHEREAS, the U.S. Congress through separate reciprocal authorizations, authorized the investigation of alternatives to: (1) provide hurricane and storm damage risk reduction measures; and (2) significantly restore environmental conditions that existed prior to the large scale alteration of the natural ecosystem in this three (3) parish area. This study, hereafter referred to as the Southwest Coastal Louisiana Study (SWC Study), focuses on a 4,700 square mile study area located in Calcasieu, Cameron, and Vermilion Parishes (the Study Area); and

WHEREAS, the Louisiana Coastal Protection and Restoration Authority Board (CPRAB) is the non-federal sponsor for SWC Study; and

WHEREAS, the ecosystem restoration component of the SWC Study, referred to as the National Ecosystem Restoration (NER) plan (NER Plan), is the subject of this Programmatic Agreement (PA or this Agreement), and the hurricane and storm damage risk reduction component of the SWC Study, referred to as the National Economic Development (NED) component, is the subject of a separate programmatic agreement; and

WHEREAS, the NER component of the SWC Study was recommended in the 2005 Chief's Report for the Louisiana Coastal Area (LCA) Ecosystem Restoration Program, which was authorized in Title VII of the Water Resources Development Act (WRDA) of 2007.

SEC. 7003, LOUISIANA COASTAL AREA.

(a) IN GENERAL. – The Secretary may carry out a program for ecosystem restoration, Louisiana Coastal Area, Louisiana, substantially in accordance with the report of the Chief of Engineers, dated January 31, 2005.

Additional guidance is identified in Title V of WRDA 2007, SEC. 5007. EXPEDITED COMPLETION OF REPORTS AND CONSTRUCTION FOR CERTAIN PROJECTS. Guidance provided by the Director of Civil Works on December 19, 2008, states, "the coastal restoration components proposed as part of the LCA Chenier Plain study will be evaluated as part of the Southwest Coastal Louisiana feasibility study"; and

WHEREAS, the NER Plan comprises ecosystem restoration features that will be recommended for construction and ecosystem restoration features that will be recommended for additional study. Those recommended for construction are nine marsh restoration measures, five shoreline protection measures, and 35 chenier reforestation locations, and those recommended for additional study are two hydrologic and salinity control measures. Fact sheets prepared by CPRAB for the ecosystem restoration features are provided in Appendix A; and

WHEREAS, pursuant to 36 CFR Part 800, the regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. § 306108), the U.S. Army Corps of Engineers (USACE) has determined that implementation of the NER Plan will result in Undertakings that have the potential to cause effects on properties listed in or eligible for listing in the National Register of Historic Places (NRHP) and properties that have religious and cultural significance for federally-recognized Indian Tribes as defined in 36 CFR § 800.16(m) (Tribes) (collectively, "historic properties" as defined in 36 CFR § 800.16(l)(1)); and

WHEREAS, an Undertaking, as defined in 36 CFR § 800.16(y) may include any one of the ecosystem restoration features recommended for construction and any related project activities that have the potential to cause effects on historic properties, as identified in Appendix A; and

WHEREAS, each Undertaking with its respective area of potential effects (APE) will be treated separately for the purposes of Section 106 consultation; and

WHEREAS, USACE has elected to fulfill its Section 106 obligations through execution and implementation of a programmatic agreement as provided for in 36 CFR § 800.14(b); and

WHEREAS, USACE has notified the Advisory Council on Historic Preservation (ACHP) of the potential for the Undertakings to affect historic properties and that a programmatic agreement will be prepared, and the ACHP has chosen to participate in consultation to develop this Agreement; and

WHEREAS, USACE has consulted with the Louisiana State Historic Preservation Officer (SHPO), Tribes, Tribal Historic Preservation Officers (THPOs), ACHP, CPRAB, and other appropriate consulting parties in developing this Agreement in order to define efficient and cost effective processes for taking into consideration the effects of the Undertakings upon historic properties; and

WHEREAS, USACE acknowledges Tribes as sovereign nations which have a unique government-to-government relationship with the federal government and its agencies; USACE further acknowledges its Trust Responsibility to those Tribes; and

WHEREAS, USACE has made a reasonable and good faith effort to identify any Tribes that may attach religious and cultural significance to historic properties that may be affected by the Undertakings; and

WHEREAS, USACE has invited the Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Muscogee (Creek) Nation, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and the Tunica-Biloxi Tribe of Louisiana, Tribes for which historic properties located in the State of Louisiana have religious and cultural significance, to consult in the development of this Agreement; and

WHEREAS, the Quapaw Tribe of Oklahoma and the Muscogee (Creek) Nation have determined that the Undertakings are not within their geographic area of interest and have chosen not to participate in the development of this Agreement; and

WHEREAS, the Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Seminole Nation of Oklahoma, and Seminole Tribe of Florida have chosen to participate in the development of this Agreement and have been invited to sign this Agreement as an Invited Signatory Party; and

WHEREAS, the Tunica-Biloxi Tribe of Louisiana and those Tribes that have not participated in the development of this Agreement but that may choose to participate in Section 106 consultation will be invited to sign this Agreement as a Concurring Party; and

WHEREAS, CPRAB has participated in the development of this Agreement and has been invited to sign this Agreement as an Invited Signatory Party; and

WHEREAS, USACE has taken appropriate measures to identify other consulting parties that may be interested in Section 106 consultation, by notification to the Parish Presidents of Calcasieu, Cameron, and Vermilion parishes, as well as the Atakapa-Ishak Nation. Consulting parties that participate in Section 106 consultation may be invited to sign this Agreement as a Concurring Party; and

WHEREAS, USACE has involved the public through the National Environmental Policy Act (NEPA) process, which affords all persons, organizations, and government agencies the right to review and comment on proposed major federal actions that are evaluated by a NEPA document. Public meetings to collect input during planning were held in March 2009, July 2009, February 2010, March 2010, July 2010, October 2011, April 2012, July 2013, and August 2013. On December 13, 2013, USACE released an Integrated Draft Feasibility Report and Environmental Impact Statement for the SWC Study (Draft Report) to the public for a review period of forty-five (45) calendar days, which was extended an additional fourteen (14) days until February 13, 2014. This document included a general discussion of cultural resources within the study area. Public hearings of the Draft Report were held on January 7 and 9, 2014. On March 20, 2015, USACE released a Revised Integrated Draft Feasibility Report and Environmental Impact Statement for the SWC Study (Revised Draft Report) to the public for a review period of forty-five (45) calendar days. Public hearings of the Revised Draft Report were

held on April 14, 15, and 16, 2015. USACE has also notified the public of the development of this Agreement with newspaper announcements in the *Abbeville Meridional*, *American Press*, and *The Advocate*; and

NOW, THEREFORE, USACE, SHPO, and ACHP agree that the Undertakings shall be implemented in accordance with the following stipulations in order to take into account the effects of the Undertakings on historic properties.

STIPULATIONS

To the extent of its legal authority, USACE shall ensure that the following terms are carried out:

I. Consultation and Coordination

A. Following Congressional authorization and appropriation to implement the entirety or some portion of the NER Plan, USACE shall meet with Signatory and Invited Signatory parties to review this Agreement.

B. USACE shall make a reasonable and good faith effort to identify any additional Tribes that might attach religious and cultural significance to historic properties in the APE for an Undertaking and invite those Tribes to participate in Section 106 consultation.

C. USACE shall consult with Tribes that are Invited Signatory Parties and Concurring Parties, as well as any other Tribe that requests in writing to be a consulting party (collectively, "Consulting Tribes").

D. USACE shall provide Consulting Tribes with an executed copy of this Agreement and with copies of all plans, determinations, and findings provided to the SHPO.

E. Individuals or organizations with a demonstrated interest in an Undertaking may be invited to participate as consulting parties due to the nature of their legal or economic relations to an Undertaking or affected properties, or their concern with an Undertaking's effects on historic properties, if agreed upon by the USACE and SHPO.

F. To the extent permitted under applicable federal laws and regulations, for example, Section 304 of the NHPA (54 U.S.C. § 307103), 36 CFR § 800.11(c), and Section 9 of the Archaeological Resources Protection Act of 1979 (ARPA) (16 U.S.C. 470aa-mm; Public Law 96-95 and amendments to it), USACE will make available to the public documents developed pursuant to this Agreement.

G. Electronic mail (email) will serve as the official correspondence method for all communications regarding this Agreement and its provisions. See Appendix B for a list of contacts and email addresses. Contact information in Appendix B may be updated as needed without an amendment to this Agreement. It is the responsibility of each signatory to immediately inform the USACE of any change

in name, address, email address, or phone number of any point-of-contact. USACE will forward this information to all signatories by email. Failure of any party to this Agreement to notify the USACE of any change to a point-of-contact's information shall not be grounds for asserting that notice of a proposed action was not received.

H. All standard response timeframes established by 36 CFR Part 800 will apply to this Agreement, unless an alternative response timeframe is agreed to by the SHPO and Consulting Tribes on a case-by-case basis.

I. All time designations will be in calendar days. If any party does not comment within the agreed upon timeframes, USACE may assume that party's concurrence with the USACE's determination, and will notify all consulting parties of the action and proceed in accordance with this Agreement.

II. Standards

A. All work carried out pursuant to this Agreement shall be done by or under the direct supervision of historic preservation professionals who meet the *Secretary of the Interior's Professional Qualifications Standards* (36 CFR Part 61).

B. All work carried out pursuant to this Agreement shall meet the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (36 CFR Part 68).

C. All historic standing structures surveys carried out pursuant to this Agreement shall be completed in accordance with the Louisiana Historic Resource Inventory Guidelines of the Louisiana Division of Historic Preservation.

D. All archaeological investigations carried out pursuant to this Agreement shall be completed in accordance with the Field Standards and documented in accordance with the Report Standards of the Louisiana Division of Archaeology.

III. Identification and Evaluation of Historic Properties

A. USACE, in consultation with the SHPO and Consulting Tribes, will determine and document the geographic areas within which an Undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist, hereafter referred to as an APE. USACE will conduct a reasonable and good faith effort to identify historic properties located within an APE.

1. USACE shall seek input from consulting parties, as appropriate, concerning:

a. the historic significance of structures that have not previously been evaluated for eligibility for listing in the National Register, either individually or as contributing to a historic district;

b. the potential for archaeological properties to be present; and

c. the potential for properties of religious and cultural significance to Tribes to be present.

Any comments provided to the USACE shall be considered by the USACE and SHPO in evaluating National Register eligibility.

2. USACE shall complete cultural resources investigations following the recommendations provided in the *Cultural Resources Assessment and Research Design for the Southwest Coastal Louisiana Project, Calcasieu, Cameron, and Vermilion Parishes, Louisiana*, which shall be finalized in coordination with SHPO and consulting tribes prior to commencement of activities hereunder. For any portion of an APE not considered in the *Cultural Resources Assessment and Research Design*, the level of survey to be conducted and the survey methodology will be developed in consultation with the SHPO and Consulting Tribes. All surveys will be completed in a manner that meets the standards for Reconnaissance or Phase I Investigations as defined by the Louisiana Division of Archaeology. These efforts will be documented in reports that USACE will submit to SHPO and Consulting Tribes for review and comment. USACE will ensure that the comments provided by the SHPO and Consulting Tribes are addressed and incorporated into a final report.

3. USACE will consult with the SHPO on the eligibility of all structures located in an APE, and with the SHPO and Consulting Tribes on the eligibility of all archaeological properties and properties of religious and cultural significance to Tribes located in an APE. For properties already eligible or listed in the National Register, USACE will consult to determine whether or not the property retains the characteristics that make it eligible for listing in the National Register.

B. Consultation under this Agreement for an Undertaking will be concluded for USACE findings of *no historic properties affected* when the SHPO and Consulting Tribes have been provided the opportunity to review and comment on the documentation specified in 36 CFR § 800.11(d) and either concur or do not object within the agreed upon response timeframe. USACE shall notify any additional consulting parties and make documentation of the finding available to the public. This shall complete the USACE's Section 106 responsibilities for these properties.

C. In the event of disagreement between the USACE, SHPO, and/or Consulting Tribes concerning the eligibility of a property for listing in the NRHP under 36 CFR Part 60, USACE shall request a formal determination of eligibility for that property from the Keeper of the NRHP (Keeper). The determination by the Keeper will serve as the final decision regarding the NRHP eligibility of the property.

IV. Historic Properties Affected

A. USACE shall notify the SHPO, Consulting Tribes, and other consulting parties, as appropriate, that an Undertaking may affect historic properties and shall continue consultation with the aforementioned parties to apply the criteria of adverse effects to historic properties within an APE in accordance with 36 CFR § 800.5.

B. Consultation under this Agreement will be concluded for USACE findings of *no adverse effect* when the SHPO and Consulting Tribes have been provided the opportunity to review and comment on the documentation specified in 36 CFR § 800.11(e) and either concur or do not object within the agreed upon response timeframe.

C. In the event of an objection by the SHPO and/or Consulting Tribes regarding a USACE finding of *no adverse effect*, USACE shall seek to resolve such objection through consultation in accordance with procedures outlined in Stipulation IX.

V. Resolution of Adverse Effects

A. USACE shall continue consultation with the SHPO, Consulting Tribes, and other consulting parties, as appropriate, pursuant to 36 CFR § 800.6 to avoid, minimize, or mitigate adverse effects to historic properties.

B. USACE shall notify the ACHP and other consulting parties, as appropriate, and determine their participation. The notification of the adverse effect shall include the documentation specified in 36 CFR § 800.11(e), subject to the confidentiality provisions of 36 CFR § 800.11(c), and such other documentation as may be developed during the consultation to resolve adverse effects, including views and summaries of the consulting parties. If the project activity will affect a National Historic Landmark, USACE shall also notify the National Park Service (NPS).

C. Once the USACE, SHPO, Consulting Tribes, and ACHP, should they decide to participate in consultation, agree on how the adverse effects will be resolved, they shall execute and implement a Memorandum of Agreement (MOA) pursuant to 36 CFR § 800.6(c). USACE shall submit a copy of the executed MOA, along with the documentation specified in 36 CFR § 800.11(f), to the ACHP prior to approving an Undertaking. A copy of the executed MOA shall be forwarded to all Signatory, Invited Signatory, and Concurring Parties.

D. Should the USACE, SHPO, and Consulting Tribes disagree on how the adverse effects will be resolved, USACE shall seek to resolve such objection through consultation in accordance with procedures outlined in Stipulation IX.

VI. Curation

A. USACE shall ensure that all collections resulting from identification and evaluation surveys, data recovery operations, or other studies pursuant to this

Agreement are maintained in accordance with 36 CFR Part 79 as long as there is a USACE interest in the collections, minimally until the analysis is complete and the final report is accepted by the Division of Archaeology. USACE shall be responsible for costs to process, catalog, and accession all collections in accordance with 36 CFR Part 79.

B. USACE shall be responsible for consulting with landowners regarding the curation of collections resulting from identification and evaluation surveys, data recovery operations, or other studies pursuant to this Agreement. USACE shall encourage non-federal landowners to donate collections to the Division of Archaeology or other facility meeting the standards of 36 CFR Part 79 for long-term curation. USACE shall be responsible for negotiating the return of collections to non-federal landowners should they elect not to donate the collections, including any costs required to return the collections.

C. USACE shall be responsible for costs to prepare federally-owned collections, including the associated records of non-federal collections, and any non-federal collections donated to the Division or Archaeology or other facility agreed upon by SHPO and Consulting Tribes for long-term curation. Collections to be deposited with a curation facility shall be prepared in accordance with the standards of that facility.

D. USACE shall be responsible for costs to curate federally-owned collections, including the associated records of non-federal collections, long-term in accordance with 36 CFR Part 79 and the curation agreement in effect with the facility accepting the collections. For non-federal collections donated to the Division of Archaeology or other facility, USACE shall be responsible for the one-time accession fee assessed by the Division of Archaeology or other facility meeting the standards of 36 CFR Part 79.

VII. Discovery of Human Remains

A. The following language shall be included in construction plans and specifications:

> When human remains, suspected human remains, or indications of a burial are discovered during the execution of an Undertaking, the individual(s) who made the discovery shall immediately notify the local law enforcement, coroner/medical examiner, and the USACE, New Orleans District, and make a reasonable effort to protect the remains from any harm. The human remains shall not be touched, moved, or further disturbed. All activities shall cease within a minimum of 50 feet from the area of the find (50-foot radius "no work" buffer) until authorized by the USACE.

B. Upon notification, USACE shall ensure that the area of the find is secured and protected from further disturbance. USACE shall ensure that the following procedures will be followed if the area of the find is located on private or state land, or federal or tribal land.

1. Private or State Land. In the event that the area of the find is located on private or state land, the procedures established by the Louisiana Unmarked Human Burial Sites Preservation Act (La. R.S. 8:671-681) are applicable.

   a. USACE shall immediately notify the State Archaeologist of the discovery.

   b. USACE shall continue consultation with SHPO, Consulting Tribes, and additional consulting parties, as appropriate.

   c. USACE shall ensure that no remains will be removed from the area of the find until jurisdiction is established and the appropriate permits are obtained from the Division of Archaeology.

2. Federal or Tribal Land. In the event that the area of the find is located on federal or tribal land, the procedures established by the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (25 U.S.C. § 3001-3013, 18 U.S.C. § 1170) and the implementing regulations (43 CFR Part 10), and ARPA and the implementing regulations (43 CFR Part 7) are applicable.

   a. USACE shall immediately notify the responsible federal agency official or Indian tribe official with jurisdiction over the remains.

   b. USACE shall continue consultation with SHPO, Consulting Tribes, and additional consulting parties, as appropriate.

   c. If the USACE is the responsible federal agency, then the USACE shall ensure that the procedures established by NAGPRA and ARPA are followed, as applicable.

C. All Signatory and Invited Signatory Parties agree that the most appropriate treatment, if feasible, is to protect human remains and permanently preserve burial sites in situ.

VIII. Unanticipated Discoveries and Effects

A. The following language shall be included in construction plans and specifications:

When a previously unidentified cultural resource, including but not limited to archeological sites, standing structures, and properties of traditional religious and cultural significance to Tribes, is discovered during the execution of an Undertaking, the individual(s) who made the discovery shall immediately secure the vicinity, make a reasonable effort to avoid or minimize harm to the resource, and notify the USACE, New Orleans District. All activities shall cease within a minimum of 50 feet from the inadvertent discovery (50-foot radius "no work" buffer) until authorized by the USACE.

B. Upon notification, USACE shall implement any additional reasonable measures necessary to avoid or minimize effects to the resource. Any previously unidentified cultural resource will be treated as though it is eligible for the NRHP until such other determination may be made.

C. USACE shall immediately notify the SHPO, Consulting Tribes, and additional consulting parties, as appropriate, within 48 hours of the finding and request consultation to resolve potential adverse effects.

1. If consulting parties agree that the cultural resource is not eligible for the NRHP, then the suspension of work will end.

2. If consulting parties agree that the cultural resource is eligible for the NRHP, then the suspension of work will continue, and the USACE, in consultation with the SHPO and Consulting Tribes, will determine actions to avoid, minimize, or mitigate adverse effects to the historic property and will ensure that the appropriate actions are carried out.

D. In the event that the USACE is notified of the discovery of previously unidentified archaeological resources on federal or tribal land during the execution of an Undertaking, USACE shall ensure that procedures established by ARPA and implementing regulations (43 CFR Part 7) will be followed.

E. In the event that the USACE is notified of the discovery of funerary objects, sacred objects, or objects of cultural patrimony on federal or tribal land during the execution of an Undertaking, USACE shall ensure that procedures outlined in Stipulation VII will be followed.

F. In the event that effects to historic properties are identified following the completion of a project activity, any party may provide the USACE with evidence of such effects for a period of twelve (12) months from the completion of the affecting work. USACE shall review the evidence and consult with the SHPO, Consulting Tribes, and ACHP, as appropriate, to resolve any adverse effects.

G. If the USACE, SHPO, and Consulting Tribes cannot agree on an appropriate course of action to address an unanticipated discovery or effects situation, then the USACE shall initiate the dispute resolution process set forth in Stipulation IX.

IX. Dispute Resolution

A. Except for the resolution of eligibility issues as set forth in Stipulation III, should any Signatory, Invited Signatory, or Concurring Party object in writing to the USACE at any time to any actions proposed or the manner in which the terms of this Agreement are implemented, USACE shall consult with such party to resolve the objection.

B. If the USACE determines that such objection cannot be resolved, the USACE shall forward all documentation relevant to the dispute, including USACE's proposed resolution, to the ACHP.

C. The ACHP shall provide the USACE with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, USACE shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, Signatories, Invited Signatories, and Concurring Parties, and provide them with a copy of this written response. USACE will then proceed according to its final decision.

D. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, USACE may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, USACE shall prepare a written response that takes into account any timely comments regarding the dispute from the Signatories, Invited Signatories, and Concurring Parties, and provide them and the ACHP with a copy of such written response. USACE will then proceed according to its final decision.

E. USACE's responsibility to carry out all other actions subject to the terms of this Agreement that are not the subject of the dispute remain unchanged.

X. Administration, Effect, and Duration

A. This Agreement shall take effect upon execution by the ACHP, USACE, and SHPO. USACE shall provide Signatory, Invited Signatory, and Concurring Parties with a complete copy of this Agreement including all executed signature pages.

B. This Agreement will remain in effect for twenty (20) years from the date of execution unless the Signatory Parties agree that there is a need to extend the term. Prior to the end of the twenty-year term, USACE will consult with ACHP and SHPO to determine interest in extending this Agreement. This Agreement may be extended by written agreement negotiated by Signatory Parties and by amending this Agreement consistent with Stipulation XII.

C. Each year following the execution of this Agreement until it expires or is terminated, USACE shall provide all Signatory, Invited Signatory, and Concurring Parties a summary report detailing work undertaken pursuant to its terms. Such report shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in USACE's efforts to carry out the terms of this Agreement.

D. Following authorization and appropriation, USACE shall coordinate a meeting of the Signatory, Invited Signatory, and Concurring Parties to be held annually on a mutually agreed upon date to evaluate the effectiveness of this Agreement and discuss activities carried out pursuant to this Agreement during the preceding

year and activities scheduled for the upcoming year. After five (5) years, USACE will initiate the discussion of cumulative effects as provided for in Stipulation XI. The meeting shall be held in a location agreed upon by consensus of the Signatory Parties.

XI. Comprehensive Review

A. Upon completion of the implementation of the NER Plan, USACE will analyze the Undertakings holistically to assess cumulative effects upon historic properties. Cumulative effects are those which result from the incremental impacts of an undertaking when added to other past, present, and reasonably foreseeable future federal or non-federal undertakings.

B. USACE, in consultation with the Signatory and Invited Signatory Parties, will identify and implement measures, as appropriate, to mitigate adverse cumulative effects on historic properties. If there is a disagreement that cannot be resolved, USACE shall initiate the dispute resolution process set forth in Stipulation IX.

C. Agreed upon measures to resolve adverse cumulative effects will be documented in a report that meets the standards of the Louisiana Division of Archaeology and will be submitted to SHPO and Consulting Tribes for review and comment. The final cumulative report will be distributed to the Signatory, Invited Signatory, and Concurring Parties.

XII. Amendment and Termination

A. Notwithstanding any provision of this Agreement, Signatory and Invited Signatory Parties may request that it be amended, whereupon these parties will consult to consider such amendment. USACE shall facilitate such consultation within thirty (30) days of receipt of the written request. Where no consensus can be reached, this Agreement will not be amended. Any amendment to this Agreement will be in writing and will be signed by Signatory and Invited Signatory Parties, and shall be effective on the date of the final signature.

B. Any Invited Signatory Party may withdraw its participation in this Agreement by providing thirty (30) days advance written notification to all other Signatory and Invited Signatory Parties. In the event of withdrawal by an Invited Signatory Party, this Agreement will remain in effect for the other Signatory and Invited Signatory Parties.

C. This Agreement may be terminated in accordance with 36 CFR Part 800, provided that the Signatory and Invited Signatory Parties consult during the period prior to termination to seek agreement on amendments or other actions that could avoid termination. Any Signatory Party requesting termination of this Agreement shall provide thirty (30) days advance written notification to all other Signatory and Invited Signatory Parties.

D. Termination of this Agreement does not relieve USACE of any remaining obligations it may have, as of the date of termination, under 36 CFR Part 800.

Execution of this Agreement by the ACHP, USACE, and SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the NER Plan upon historic properties and has afforded the ACHP an opportunity to comment.

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the SWC Study upon historic properties and has afforded the ACHP an opportunity to comment.

Signatory:

United States Army Corps of Engineers

By: Richard L. Hansen Date: 22 Feb 2016
Richard L. Hansen
Colonel, U.S. Army
District Commander

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the SWC Study upon historic properties and has afforded the ACHP an opportunity to comment.

Signatory:

Louisiana State Historic Preservation Officer

By: Phil Boggan Date: 2-19-16

Phil Boggan
Louisiana State Historic Preservation Officer
Louisiana Office of Cultural Development

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Execution of this Agreement by the ACHP, USACE, and LA SHPO and implementation of its terms, evidences that the USACE has taken into account the effects of the SWC Study upon historic properties and has afforded the ACHP an opportunity to comment.

Signatory:

Advisory Council on Historic Preservation

By: for Date: 2/24/16
John M. Fowler
Executive Director
Advisory Council on Historic Preservation

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Chitimacha Tribe of Louisiana

By:_____ Date:_____
O'Neil J. Darden, Jr., Chairman

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Choctaw Nation of Oklahoma

By:_____ Date:_____
Gary Batton, Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Coushatta Tribe of Louisiana

By:_____ Date:_____
Kevin Sickey, Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Mississippi Band of Choctaw Indians

By:_____ Date:_____
Phyliss J. Anderson, Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Alabama-Coushatta Tribe of Texas

By: _____ Date:_____
Carlos Bullock, Chairman

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Caddo Nation of Oklahoma

By:_____ Date:_____
Tamara Francis-Fourkiller, Chairman/THPO

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Jena Band of the Choctaw Indians

By:_____ Date:_____
B. Cheryl Smith, Principal Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Seminole Nation of Oklahoma

By:_____ Date:_____
Leonard M. Harjo, Principal Chief

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Invited Signatory Party:

Seminole Tribe of Florida

By:_____ Date:_____
James Billie, Chaiman

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Concurring Party:

Tunica-Biloxi Tribe of Louisiana

By:_____ Date:_____
Joey Barbry, Chairman

Programmatic Agreement
among
The United States Army Corps of Engineers,
Louisiana State Historic Preservation Officer,
and
The Advisory Council on Historic Preservation
regarding the
National Ecosystem Restoration Component of the
Southwest Coastal Louisiana Study

Concurring Party:

Coastal Protection and Restoration Authority Board

By:_____ Date:_____
Jerome Zeringue, Chair

APPENDIX A: ECOSYSTEM RESTORATION FEATURE FACT SHEETS

The Ecosystem Restoration Feature Fact Sheets in Appendix A of this Agreement are the same as those found in Appendix K of the Integrated Final Feasibility Report and Environmental Impact Statement. Appendix A fact sheets can be provided upon request.

APPENDIX B: CONTACT INFORMATION

U.S. Army Corps of Engineers, New Orleans District
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District Commander
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State Historic Preservation Officer
Phil Boggan, SHPO
Department of Culture, Recreation and Tourism
Louisiana State Historic Preservation Office
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John Paul Darden, Chairman
Chitimacha Tribe of Louisiana
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Kimberly S. Walden
Cultural Director/Tribal Historic Preservation Officer
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Choctaw Nation of Oklahoma
Gary Batton, Chief
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Ian Thompson
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Mississippi Band of Choctaw Indians
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Alabama-Coushatta Tribe of Texas
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Bryant J. Celestine
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Caddo Nation of Oklahoma
Brenda Shemayme Edwards, Chairwoman
Caddo Nation of Oklahoma
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Robert Cast
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Natalie Deere
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P.O. Box 1498
Wewoka, OK 74884
(405) 303-2683, Ext. 7001
harjo.n@sno-nsn.gov

Seminole Tribe of Florida
James Billie
Chairman
6300 Sterling Road
Hollywood, FL 33024

Paul Backhouse
30290 Josie Billie Highway, PMB 1004
Clewiston, FL 33440
(863) 983-6549
paulbackhouse@semtribe.com

Tunica-Biloxi Tribe of Louisiana
Joey Barbry, Chairman
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351

Earl J. Barbry, Jr.
Cultural Director
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351
(318) 240-6451
earlii@tunica.org

Coastal Protection and Restoration Authority Board
Jerome Zeringue, Chair
P.O. Box 44027
Baton Rouge, LA 70804

Elizabeth Davoli
Coastal Resources Scientist Manager
Environmental Section, Planning & Research Division
Coastal Protection and Restoration Authority
450 Laurel Street
Baton Rouge, LA 70801
(225) 342-4616
Elizabeth.Davoli@la.gov

Correspondence

Preserving America's Heritage

March 13, 2014

Lieutenant General Thomas P. Bostick
Commanding General
U.S. Army Corps of Engineers
441 G. Street, NW
Washington, DC 20314-1000

REF: Implementing hurricane and storm damage risk reduction measures in southwest coastal Louisiana

Dear Lieutenant General Bostick:

The Advisory Council on Historic Preservation (ACHP) has been invited by the New Orleans District of the Corps of Engineers to assist in the development of a Programmatic Agreement (PA) to help ensure that historic properties are fully considered in the development and implementation of the measures to reduce the risk of severe storm damage to life and property for coastal portions of southwestern Louisiana. Pursuant to the Criteria for Council Involvement in Reviewing Individual Section 106 Cases (Appendix A to our regulations, 36 CFR Part 800) we believe the criteria are met for our participation in this undertaking. Actions that may include residential structure elevation and flood proofing, marsh restoration, shoreline protection, reforestation, and preservation of the historic Sabine oyster reef all have the potential to have substantial impacts to important historic properties and may involve important questions of policy and interpretation. Accordingly, the ACHP will participate in consultation with the New Orleans District on this undertaking.

By copy of this letter we are also notifying Ms. Joan Exnicios, Chief of the New Orleans District's Environmental Planning Branch, of our decision to participate in consultation.

Our participation will be handled by Dr. Tom McCulloch, who can be reached at 202-606-8554 or at tmcculloch@achp.gov. We look forward to working with the Corps on this important project.

Sincerely,

John M. Fowler
Executive Director

ADVISORY COUNCIL ON HISTORIC PRESERVATION
1100 Pennsylvania Avenue NW, Suite 803 • Washington, DC 20004
Phone: 202-606-8503 • Fax: 202-606-8647 • achp@achp.gov • www.achp.gov

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Carlos Bullock, Chairman
Alabama-Coushatta Tribe of Texas
571 State Park Rd 56
Livingston, TX 77351

Dear Chairman Bullock:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Bryant J. Celestine, Historic Preservation Officer, Alabama Coushatta Tribe of Texas, celestine.bryant@actribe.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Brenda Shemayme Edwards, Chairwoman
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Dear Chairwoman Edwards:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Robert Cast, Tribal Historic Preservation Officer, Caddo Nation of Oklahoma, rcast@caddonation.org.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

John Paul Darden, Chairman
Chitimacha Tribe of Louisiana
P.O. Box 661
Charenton, LA 70523

Dear Chairman Darden:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mrs. Kimberly Walden, M. Ed., Cultural Director/Tribal Historic Preservation Officer, Chitimacha Tribe of Louisiana, kswalden@chitimacha.gov.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Gregory E. Pyle, Chief
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74702-1210

Dear Chief Pyle:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Dr. Ian Thompson, Director/Tribal Historic Preservation Officer, Choctaw Nation of Oklahoma, ithompson@choctawnation.com.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Kevin Sickey, Chief
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, LA 70532

Dear Chief Sickey:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

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As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Dr. Linda Langley, Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, llangley@mcneese.edu, and Mr. Michael Tarpley, Deputy Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, kokua.aina57@gmail.com.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

B. Cheryl Smith, Principal Chief
Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342

Dear Principal Chief Smith:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

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As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Ms. Dana Masters, Tribal Historic Preservation Officer, Jena Band of Choctaw Indians, jbc.thpo106@aol.com, and Ms. Lillie McCormick, Environmental Director, Jena Band of Choctaw Indians, lmmccormickjbc@centurytel.net.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Phyliss J. Anderson, Chief
Mississippi Band of Choctaw Indians
P.O. Box 6257
Choctaw, MS 39350

Dear Chief Anderson:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Kenneth H. Carleton, Tribal Historic Preservation Officer/ Archaeologist, Mississippi Band of Choctaw Indians, kcarleton@choctaw.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Leonard M. Harjo, Principal Chief
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka, OK 74884

Dear Principal Chief Harjo:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

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A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Ms. Natalie Harjo, Tribal Historic Preservation Officer, Seminole Nation of Oklahoma, harjo.n@sno-nsn.gov.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

James Billie, Chairman
Seminole Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Dear Chairman Billie:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

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As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Paul N. Backhouse, Tribal Historic Preservation Officer, Seminole Tribe of Florida, paulbackhouse@semtribe.com; Ms. Anne Mullins, Deputy Tribal Historic Preservation Officer, annemullins@semtribe.com; Mr. Bradley Mueller, Compliance Review Supervisor, bradleymueller@semtribe.com; and Ms. Alison Swing, Compliance Review Data Analyst, alisonswing@semtribe.com.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 7, 2014

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Earl J. Barbry, Sr., Chairman
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351

Dear Chairman Barbry:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop Programmatic Agreements (PAs) for two studies, the Southwest Coastal Louisiana (SWC LA) study and the West Shore Lake Pontchartrain (WSLP) study, in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite you to participate in the consultation for the development of these two separate PAs.

The CEMVN has determined that implementation of the selected TSP for each study has the potential to cause effects on historic properties and proposes to develop two PAs to establish Section 106 consultation procedures tailored to the accelerated schedules required by the USACE SMART Feasibility Study Process. The undertakings have been summarized in previous Section 106 consultation correspondence and are detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx and the draft Integrated Feasibility Report and Environmental Impact Statement for the WSLP study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/WestShoreLakePontchartrain.

A teleconference has been scheduled for March 10, 2014, and the agenda and call-in information will be provided by email. We request that you inform us of your desire to participate as a consulting party in these PAs. Given the accelerated schedules, CEMVN requests that consultation for the development of the PAs utilize a combination of email and teleconferences.

As always, should you have any questions or concerns about the proposed action, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. An electronic copy of this letter and all future correspondence pertaining to the development of the PAs will be provided electronically to Mr. Earl Barbry, Jr., Cultural Director, Tunica-Biloxi Tribe of Louisiana, earlii@tunica.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

February 27, 2014

REPLY TO
ATTENTION OF:

Regional Planning and
Environment Division, South
Environmental Planning Branch

Reid Nelson, Director
Office of Federal Agency Programs
Advisory Council on Historic Preservation
Old Post Office
1100 Pennsylvania Ave., NW, Suite 809
Washington, D.C. 20004

Dear Mr. Nelson:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop a Programmatic Agreement (PA) for the Southwest Coastal Louisiana (SWC LA) study in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite the Advisory Council on Historic Preservation to participate in this consultation.

The CEMVN has determined that implementation of the selected TSP has the potential to cause effects on historic properties and proposes to develop a PA to establish Section 106 consultation procedures tailored to the accelerated schedule required by the USACE SMART Feasibility Study Process. Section 106 consultation was initiated with the Louisiana State Historic Preservation Office and federally-recognized Tribes on November 27, 2013, and the undertaking is detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx.

The CEMVN has completed a review of existing information on historic properties within the study area, and a copy of the draft Cultural Resources Assessment and Research Design is being provided electronically for review. A teleconference has been scheduled for March 6, 2014, and the agenda and call-in information will be provided by email.

Should you have any questions or concerns, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. An electronic copy of this letter, a copy of the letter to SHPO dated November 27, 2013, and the draft Cultural Resources Assessment and Research Design will be submitted to Tom McCulloch, tmcculloch@achp.gov.

Sincerely,

Sandra Stiles
for Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

February 27, 2014

REPLY TO
ATTENTION OF:

Regional Planning and
Environment Division, South
Environmental Planning Branch

Ms. Pam Breaux
State Historic Preservation Officer
Department of Culture, Recreation, & Tourism
P.O. Box 44247
Baton Rouge, LA 70804

Dear Ms. Breaux:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop a Programmatic Agreement (PA) for the Southwest Coastal Louisiana (SWC LA) study in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite the State Historic Preservation Office to participate in this consultation.

The CEMVN has determined that implementation of the selected TSP has the potential to cause effects on historic properties and proposes to develop a PA to establish Section 106 consultation procedures tailored to the accelerated schedule required by the USACE SMART Feasibility Study Process. The undertaking is summarized in our letter dated November 27, 2013, and is detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx.

The CEMVN has completed a review of existing information on historic properties within the study area, and a copy of the draft Cultural Resources Assessment and Research Design is being provided electronically for review and comment. A teleconference has been scheduled for March 6, 2014, and the agenda and call-in information will be provided by email.

Should you have any questions or concerns, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. An electronic copy of this letter and the draft Cultural Resources Assessment and Research Design will be submitted to Section106@crt.la.gov.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

February 27, 2014

REPLY TO
ATTENTION OF:

Regional Planning and
Environment Division, South
Environmental Planning Branch

Mr. Jerome Zeringue, Chairman
Coastal Protection and Restoration
Authority Board of Louisiana
P.O. Box 94004
Office of Governor-Coastal, 4th Floor
Baton Rouge, LA 70804

Dear Mr. Zeringue:

The United States Army Corps of Engineers, New Orleans District (CEMVN), is continuing consultation to develop a Programmatic Agreement (PA) for the Southwest Coastal Louisiana (SWC LA) study in accordance with 36 CFR § 800.14(b) of the regulations implementing Section 106 of the National Historic Preservation Act. We invite the Coastal Protection and Restoration Authority Board of Louisiana to participate in this consultation.

The CEMVN has determined that implementation of the selected TSP has the potential to cause effects on historic properties and proposes to develop a PA to establish Section 106 consultation procedures tailored to the accelerated schedule required by the USACE SMART Feasibility Study Process. The proposed undertaking is detailed in the draft Integrated Feasibility Report and Programmatic Environmental Impact Statement for the SWC LA study, available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx.

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Should you have any questions or concerns, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. An electronic copy of this letter and the draft Cultural Resources Assessment and Research Design will be submitted to Ms. Elizabeth Jarrell, elizabeth.jarrell@la.gov and Ms. Elizabeth Davoli, elizabeth.davoli@la.gov.

Sincerely,

Sandra Stills
for Joan M. Exnicios
Chief, Environmental Planning Branch

JAY DARDENNE
LIEUTENANT GOVERNOR

State of Louisiana
OFFICE OF THE LIEUTENANT GOVERNOR
DEPARTMENT OF CULTURE, RECREATION & TOURISM
OFFICE OF CULTURAL DEVELOPMENT

CHARLES R. DAVIS
DEPUTY SECRETARY

PAM BREAUX
ASSISTANT SECRETARY

February 18, 2014

Ms. Joan M. Exnicios
Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Re: Southwest Coastal Louisiana (SWC LA) Study
Calcasieu, Cameron, and Vermilion Parishes, Louisiana

Dear Ms. Exnicios,

This is response to your letter received December 4, 2014, initiating consultation for the above-referenced project. There are numerous known cultural resources located within the proposed Area of Potential Effects (APE) of this project. We look forward to work with your agency with identifying historic properties within un-surveyed areas that might be impacted and avoiding, minimizing, or mitigating impacts to historic properties within the APE.

If you have any questions, please do not hesitate to contact Rachel Watson in the Division of Archaeology at (225) 342-8165 or rwatson@crt.la.gov.

Sincerely,

Pam Breaux

Pam Breaux
State Historic Preservation Officer

PB:RW:s

P.O. BOX 44247 • BATON ROUGE, LOUISIANA 70804-4247 • PHONE (225) 342-8200 • FAX (225) 219-9772 • WWW.CRT.STATE.LA.US
AN EQUAL OPPORTUNITY EMPLOYER

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

Ms. Pam Breaux
State Historic Preservation Officer
Department of Culture, Recreation and Tourism
Office of Cultural Development
P.O. Box 44247
Baton Rouge, Louisiana 70804

Dear Ms. Breaux:

The United States Army Corps of Engineers (USACE) and the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) are investigating the feasibility of implementing hurricane and storm damage risk reduction measures as well as ecosystem restoration measures within southwest coastal Louisiana.

The New Orleans District (CEMVN) is preparing a Southwest Coastal Louisiana (SWC LA) Integrated Feasibility Report and Environmental Impact Statement (Integrated Report), which will describe all aspects of the SWC LA study, from its inception through the evolution of the various alternatives, the discussion of potential impacts to applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the SWC LA study, in partial fulfillment of responsibilities under the National Environmental Policy Act and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect historic properties.

Study Authority and History of Investigation

The hurricane and storm damage risk reduction purpose of the SWC LA study was authorized on December 7, 2005, by the Committee on Transportation and Infrastructure, U.S. House of Representatives, Resolution Docket 2747, and the ecosystem restoration purpose was recommended for approval in the 2005 USACE Chief's Report for the Louisiana Coastal Area (LCA) Ecosystem Restoration Program that was authorized in the Water Resources Development Act of 2007. The Feasibility Cost Share Agreement was signed with the CPRAB on January 14, 2009. In 2013 the CEMVN was directed to transition the project to SMART planning.

This is the second CEMVN study within the USACE SMART Planning framework, which organizes the planning process for feasibility studies around key decision points (please refer to enclosed diagram). Following preparation of the Integrated Report, a public comment period will be conducted along with technical, peer and policy reviews. Additional feasibility work remains to be completed on engineering, cost estimating, environmental, economic, real estate and construction elements of the plan. Results of the reviews and additional feasibility work will be incorporated into the final report, which will be made available for review before the Chief of Engineers makes a final recommendation on the project.

Study Area

The study area is located in southwestern Louisiana, covering an area of approximately 4,700 square miles (please refer to enclosed map of the study area). The area occupies a portion of the Pleistocene Prairie Terrace (or Prairie Complex) on the northern edge of Cameron and Vermilion parishes, as well as most of Calcasieu Parish, and most of the Marginal Plain (or Chenier Plain) on the coast in Cameron and the southern portions of Calcasieu and Vermilion parishes. The study area includes residential, commercial, industrial and undeveloped land.

Proposed Action

Proposed measures of the National Economic Development plan include residential structure elevation, flood proofing, and the acquisition of qualifying structures. The National Ecosystem Restoration (NER) purpose of SWC LA project is to significantly restore environmental conditions for the Chenier Plain ecosystem. Proposed NER measures include nine marsh restoration measures that would restore approximately 8,579 acres and nourish approximately 4,026 acres, resulting in approximately 8,714 net acres; two hydrologic and salinity control measures to restore approximately 6,092 net acres; five shoreline protection measures spanning approximately 266,884 linear feet to protect approximately 5,509 net acres; the preservation of the historic Sabine oyster reef; and a chenier reforestation program to include the planting of trees on approximately 1,413 acres (please refer to the two enclosed maps of the draft NER TSP). The alternatives will be further developed in the Integrated Report.

Section 106 Consultation

The USACE has determined that the proposed action is an undertaking as defined in 36 CFR § 800.16(y) that has the potential to cause effects on historic properties. This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). CEMVN is currently reviewing existing information on historic properties within the study area. Following the preparation of the Integrated Report, CEMVN will schedule a teleconference with consulting parties to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect historic properties is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action or the SMART Planning Framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Section106@crt.la.gov.

Sincerely,

Sandra Stiles

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

Carlos Bullock, Chairman
Alabama-Coushatta Tribe of Texas
571 State Park Rd 56
Livingston, TX 77351

Dear Chairman Bullock:

The United States Army Corps of Engineers (USACE) and the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) are investigating the feasibility of implementing hurricane and storm damage risk reduction measures as well as ecosystem restoration measures within southwest coastal Louisiana.

The New Orleans District (CEMVN) is preparing a Southwest Coastal Louisiana (SWC LA) Integrated Feasibility Report and Environmental Impact Statement (Integrated Report), which will describe all aspects of the SWC LA study, from its inception through the evolution of the various alternatives, the discussion of potential impacts to applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

The purpose of this letter is to initiate consultation for the SWC LA study, in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act. The CEMVN offers you the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands.

Study Authority and History of Investigation

The hurricane and storm damage risk reduction purpose of the SWC LA study was authorized on December 7, 2005, by the Committee on Transportation and Infrastructure, U.S. House of Representatives, Resolution Docket 2747, and the ecosystem restoration purpose was recommended for approval in the 2005 USACE Chief's Report for the Louisiana Coastal Area (LCA) Ecosystem Restoration Program that was authorized in the Water Resources Development Act of 2007. The Feasibility Cost Share Agreement was signed with the CPRAB on January 14, 2009. In 2013 the CEMVN was directed to transition the project to SMART planning.

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As always, should you have any questions or concerns about the proposed action or the SMART Planning Framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mr. Bryant J. Celestine, Historic Preservation Officer, Alabama Coushatta Tribe of Texas, celestine.bryant@actribe.org.

Sincerely,

for Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

Brenda Shemayme Edwards, Chairwoman
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Dear Chairwoman Edwards:

The United States Army Corps of Engineers (USACE) and the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) are investigating the feasibility of implementing hurricane and storm damage risk reduction measures as well as ecosystem restoration measures within southwest coastal Louisiana.

The New Orleans District (CEMVN) is preparing a Southwest Coastal Louisiana (SWC LA) Integrated Feasibility Report and Environmental Impact Statement (Integrated Report), which will describe all aspects of the SWC LA study, from its inception through the evolution of the various alternatives, the discussion of potential impacts to applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

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Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

As always, should you have any questions or concerns about the proposed action or the SMART Planning Framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mr. Robert Cast, Tribal Historic Preservation Officer, Caddo Nation of Oklahoma, rcast@caddonation.org.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

John Paul Darden, Chairman
Chitimacha Tribe of Louisiana
P.O. Box 661
Charenton, LA 70523

Dear Chairman Darden:

The United States Army Corps of Engineers (USACE) and the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) are investigating the feasibility of implementing hurricane and storm damage risk reduction measures as well as ecosystem restoration measures within southwest coastal Louisiana.

The New Orleans District (CEMVN) is preparing a Southwest Coastal Louisiana (SWC LA) Integrated Feasibility Report and Environmental Impact Statement (Integrated Report), which will describe all aspects of the SWC LA study, from its inception through the evolution of the various alternatives, the discussion of potential impacts to applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

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As always, should you have any questions or concerns about the proposed action or the SMART Planning Framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mrs. Kimberly Walden, M. Ed., Cultural Director/Tribal Historic Preservation Officer, Chitimacha Tribe of Louisiana, kswalden@chitimacha.gov.

Sincerely,

Sandra Stiles for
Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

Gregory E. Pyle, Chief
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74702-1210

Dear Chief Pyle:

The United States Army Corps of Engineers (USACE) and the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) are investigating the feasibility of implementing hurricane and storm damage risk reduction measures as well as ecosystem restoration measures within southwest coastal Louisiana.

The New Orleans District (CEMVN) is preparing a Southwest Coastal Louisiana (SWC LA) Integrated Feasibility Report and Environmental Impact Statement (Integrated Report), which will describe all aspects of the SWC LA study, from its inception through the evolution of the various alternatives, the discussion of potential impacts to applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

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Sincerely,

for Sandra Stiles
Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

Kevin Sickey, Chief
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, LA 70532

Dear Chief Sickey:

The United States Army Corps of Engineers (USACE) and the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) are investigating the feasibility of implementing hurricane and storm damage risk reduction measures as well as ecosystem restoration measures within southwest coastal Louisiana.

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Proposed Action

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As always, should you have any questions or concerns about the proposed action or the SMART Planning Framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Dr. Linda Langley, Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, llangley@mcneese.edu, and Mr. Michael Tarpley, Deputy Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, kokua.aina57@gmail.com.

Sincerely,

Sandra Stiles for

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

B. Cheryl Smith, Principal Chief
Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342

Dear Principal Chief Smith:

The United States Army Corps of Engineers (USACE) and the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) are investigating the feasibility of implementing hurricane and storm damage risk reduction measures as well as ecosystem restoration measures within southwest coastal Louisiana.

The New Orleans District (CEMVN) is preparing a Southwest Coastal Louisiana (SWC LA) Integrated Feasibility Report and Environmental Impact Statement (Integrated Report), which will describe all aspects of the SWC LA study, from its inception through the evolution of the various alternatives, the discussion of potential impacts to applicable natural, socioeconomic and cultural resources, to the decision to recommend a preferred alternative.

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Sincerely,

Sandra Stiles for
Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

Phyliss J. Anderson, Chief
Mississippi Band of Choctaw Indians
P.O. Box 6257
Choctaw, MS 39350

Dear Chief Anderson:

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Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

John Berrey, Chairman
Quapaw Tribe of Oklahoma
P.O. Box 765
Quapaw, OK 74363

Dear Chairman Berrey:

The United States Army Corps of Engineers (USACE) and the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) are investigating the feasibility of implementing hurricane and storm damage risk reduction measures as well as ecosystem restoration measures within southwest coastal Louisiana.

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Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

Leonard M. Harjo, Principal Chief
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka, OK 74884

Dear Principal Chief Harjo:

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Sincerely,

for Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

James Billie, Chairman
Seminole Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Dear Chairman Billie:

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Sincerely,

for Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

November 27, 2013

Regional Planning and
Environment Division, South

Earl J. Barbry, Sr., Chairman
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351

Dear Chairman Barbry:

The United States Army Corps of Engineers (USACE) and the Coastal Protection and Restoration Authority Board of Louisiana (CPRAB) are investigating the feasibility of implementing hurricane and storm damage risk reduction measures as well as ecosystem restoration measures within southwest coastal Louisiana.

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Study Area

The study area is located in southwestern Louisiana, covering an area of approximately 4,700 square miles (please refer to enclosed map of the study area). The area occupies a portion of the Pleistocene Prairie Terrace (or Prairie Complex) on the northern edge of Cameron and Vermilion parishes, as well as most of Calcasieu Parish, and most of the Marginal Plain (or Chenier Plain) on the coast in Cameron and the southern portions of Calcasieu and Vermilion parishes. The study area includes residential, commercial, industrial and undeveloped land.

Proposed Action

Proposed measures of the National Economic Development plan include residential structure elevation, flood proofing, and the acquisition of qualifying structures. The National Ecosystem Restoration (NER) purpose of SWC LA project is to significantly restore environmental conditions for the Chenier Plain ecosystem. Proposed NER measures include nine marsh restoration measures that would restore approximately 8,579 acres and nourish approximately 4,026 acres, resulting in approximately 8,714 net acres; two hydrologic and salinity control measures to restore approximately 6,092 net acres; five shoreline protection measures spanning approximately 266,884 linear feet to protect approximately 5,509 net acres; the preservation of the historic Sabine oyster reef; and a chenier reforestation program to include the planting of trees on approximately 1,413 acres (please refer to the two enclosed maps of the draft NER TSP). The alternatives will be further developed in the Integrated Report.

Section 106 Consultation

The USACE has determined that the proposed action is an undertaking as defined in 36 CFR § 800.16(y) that has the potential to cause effects on historic properties. This letter initiates formal Section 106 consultation pursuant to 36 CFR § 800.3(c). CEMVN is currently reviewing existing information on historic properties within the study area. Following the preparation of the Integrated Report, CEMVN will schedule a teleconference to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Your response to this letter, including any information your office may wish to provide at this time concerning the proposed undertaking and its potential to significantly affect protected tribal resources, tribal rights, or Indian lands is greatly appreciated. Please also notify us of any other interested party who may wish to participate in this consultation.

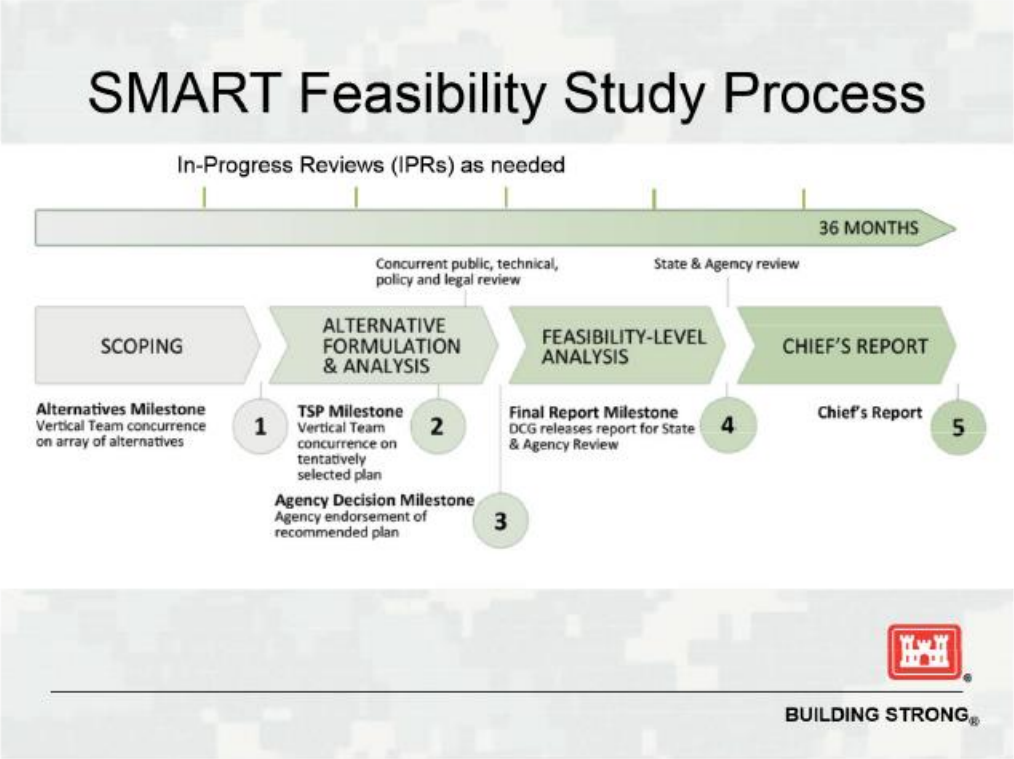
As always, should you have any questions or concerns about the proposed action or the SMART Planning Framework, you may contact Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; Rebecca.Hill@usace.army.mil. An electronic copy of this letter with enclosures will be provided to Mr. Earl Barbry, Jr., Cultural Director, Tunica-Biloxi Tribe of Louisiana, earlii@tunica.org.

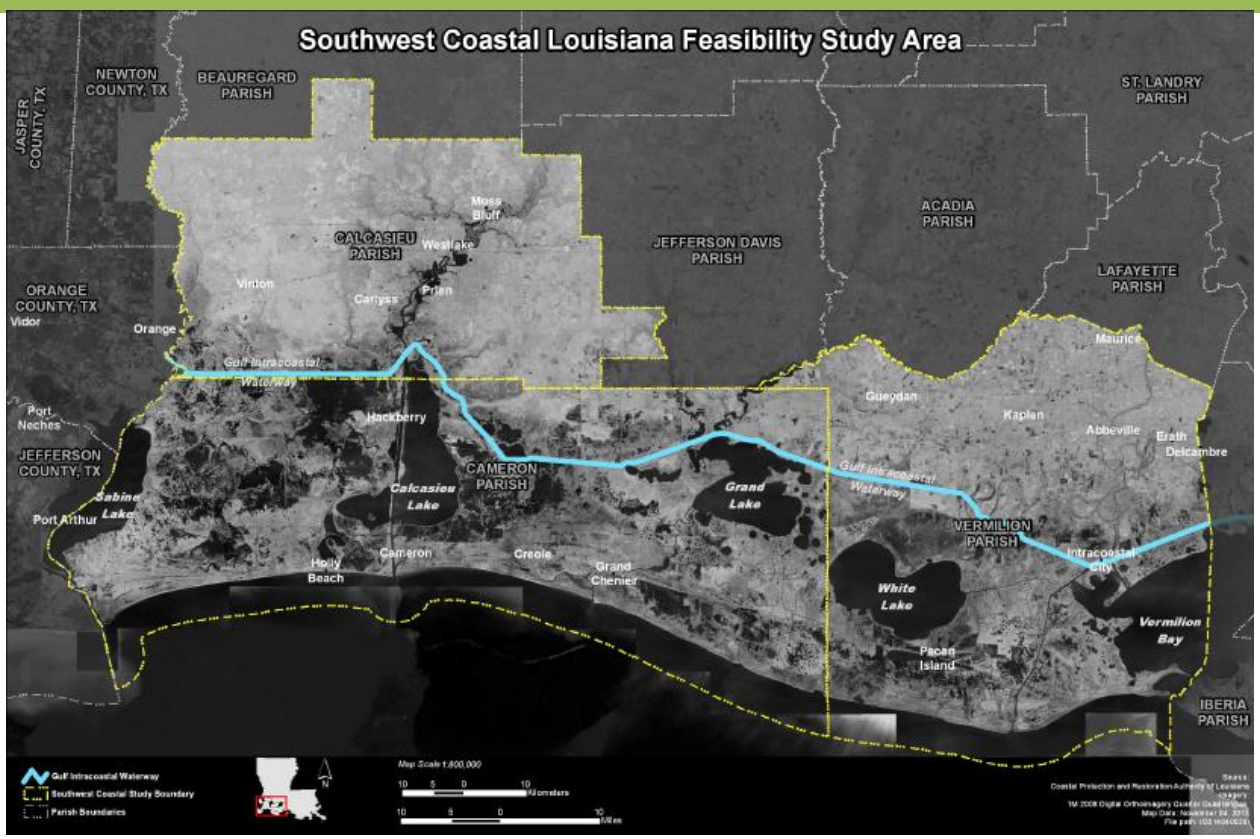
Sincerely,

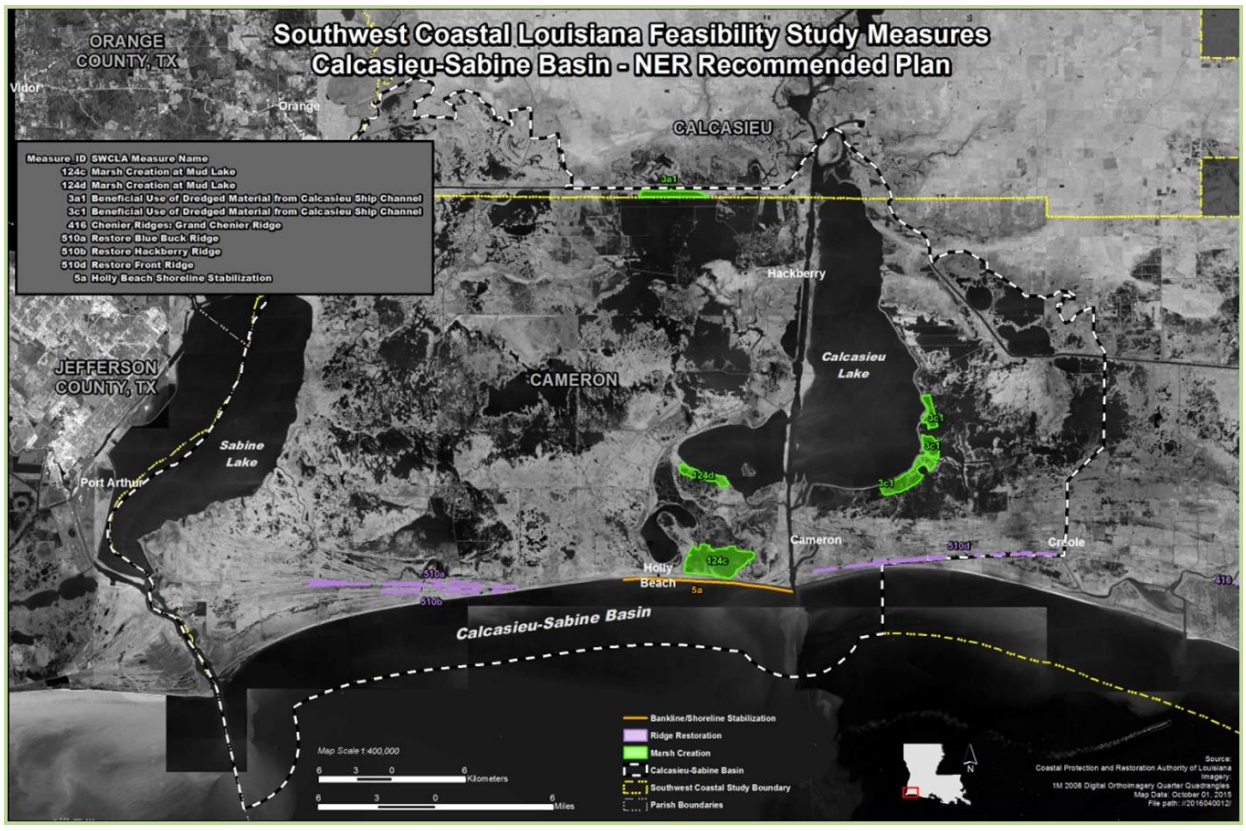
Sandra Stiles

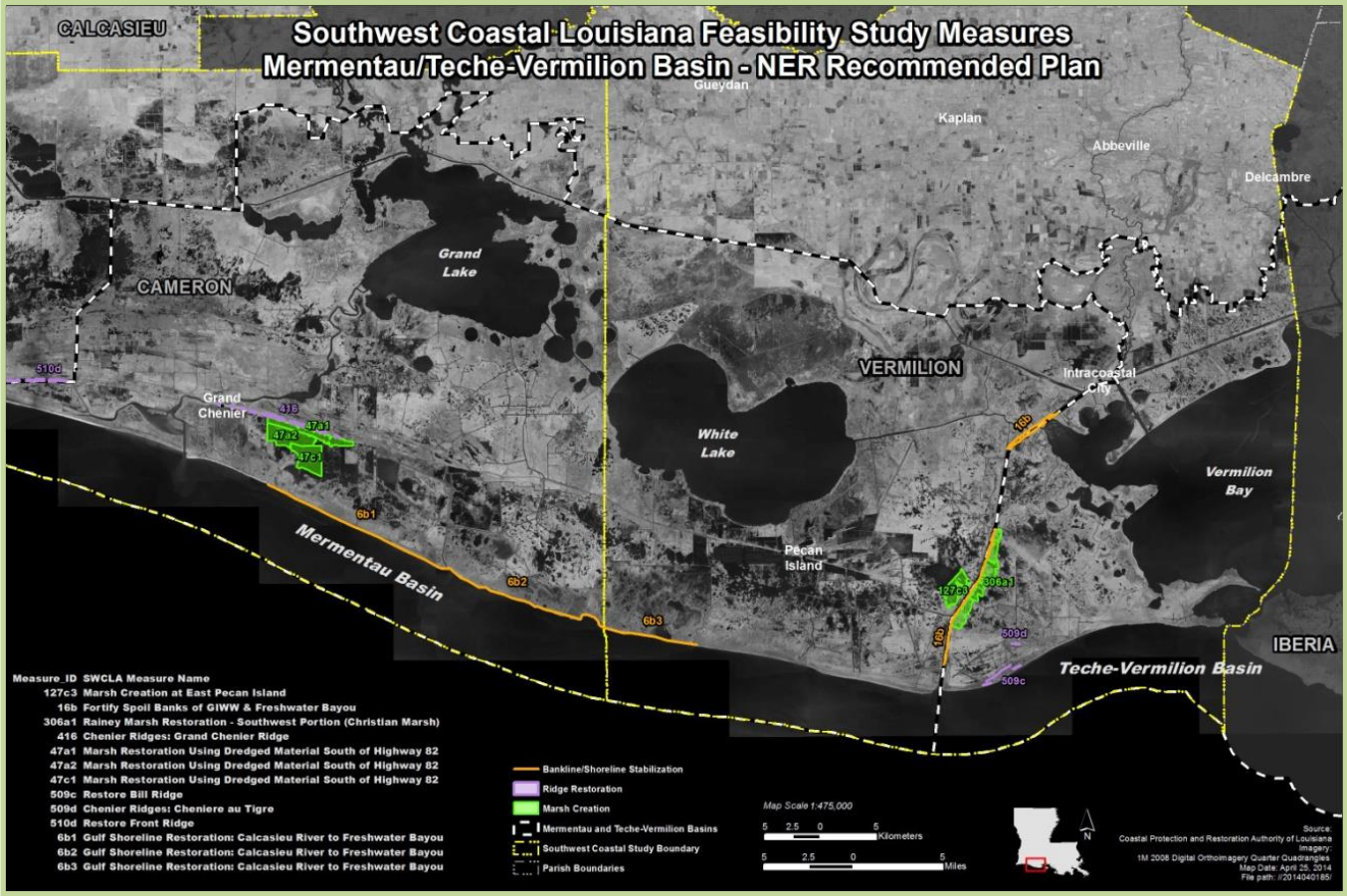
Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures


SMART Feasibility Study Process
In-Progress Reviews (IPRs) as needed
36 MONTHS
Concurrent public, technical, policy and legal review
State & Agency review
SCOPING
ALTERNATIVE FORMULATION & ANALYSIS
FEASIBILITY-LEVEL ANALYSIS
CHIEF'S REPORT
Alternatives Milestone
Vertical Team concurrence on array of alternatives
1
TSP Milestone
Vertical Team concurrence on tentatively selected plan
2
Agency Decision Milestone
Agency endorsement of recommended plan
3
Final Report Milestone
DCG releases report for State & Agency Review
4
Chief's Report
5
BUILDING STRONG®


Southwest Coastal Louisiana Feasibility Study Area
NEWTON COUNTY, TX
BEAUREGARD PARISH
JASPER COUNTY, TX
ST. LANDRY PARISH
ACADIA PARISH
CALCASIEU PARISH
JEFFERSON DAVIS PARISH
LAFAYETTE PARISH
ORANGE COUNTY, TX
Vidor
Orange
Vinton
Carlyss
Moss Bluff
Westlake
Prien
Gulf Intracoastal Waterway
Maurice
Gueydan
Kaplan
Abbeville
Erath
Delcambre
Port Neches
Hackberry
JEFFERSON COUNTY, TX
Port Arthur
Sabine Lake
Calcasieu Lake
CAMERON PARISH
Grand Lake
VERMILION PARISH
Intracoastal City
Holly Beach
Cameron
Creole
Grand Chenier
White Lake
Vermilion Bay
Pecan Island
IBERIA PARISH
Gulf Intracoastal Waterway
Southwest Coastal Study Boundary
Parish Boundaries
Map Scale 1:800,000
Kilometers
Miles


Southwest Coastal Louisiana Feasibility Study Measures
Calcasieu-Sabine Basin - NER Recommended Plan
ORANGE COUNTY, TX
Vidor
Orange
CALCASIEU
Measure ID SWCLA Measure Name
124c Marsh Creation at Mud Lake
124d Marsh Creation at Mud Lake
3a1 Beneficial Use of Dredged Material from Calcasieu Ship Channel
3c1 Beneficial Use of Dredged Material from Calcasieu Ship Channel
416 Chenier Ridges: Grand Chenier Ridge
510a Restore Blue Buck Ridge
510b Restore Hackberry Ridge
510d Restore Front Ridge
5a Holly Beach Shoreline Stabilization
Hackberry
JEFFERSON COUNTY, TX
CAMERON
Calcasieu Lake
Sabine Lake
Port Arthur
Cameron
Creole
Holly Beach
Calcasieu-Sabine Basin
Bankline/Shoreline Stabilization
Ridge Restoration
Marsh Creation
Calcasieu-Sabine Basin
Southwest Coastal Study Boundary
Parish Boundaries
Map Scale 1:400,000
Kilometers
Miles


Southwest Coastal Louisiana Feasibility Study Measures
Mermentau/Teche-Vermilion Basin - NER Recommended Plan
CALCASIEU
CAMERON
VERMILION
IBERIA
Gueydan
Kaplan
Abbeville
Delcambre
Grand Lake
White Lake
Vermilion Bay
Intracoastal City
Grand Chenier
Pecan Island
Mermentau Basin
Teche-Vermilion Basin
510d
416
47a1
47a2
47c1
6b1
6b2
6b3
48b
127c3
306a1
16b
509d
509c
Measure_ID SWCLA Measure Name
127c3 Marsh Creation at East Pecan Island
16b Fortify Spoil Banks of GIWW & Freshwater Bayou
306a1 Rainey Marsh Restoration - Southwest Portion (Christian Marsh)
416 Chenier Ridges: Grand Chenier Ridge
47a1 Marsh Restoration Using Dredged Material South of Highway 82
47a2 Marsh Restoration Using Dredged Material South of Highway 82
47c1 Marsh Restoration Using Dredged Material South of Highway 82
509c Restore Bill Ridge
509d Chenier Ridges: Cheniere au Tigre
510d Restore Front Ridge
6b1 Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou
6b2 Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou
6b3 Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou
Bankline/Shoreline Stabilization
Ridge Restoration
Marsh Creation
Mermentau and Teche-Vermilion Basins
Southwest Coastal Study Boundary
Parish Boundaries
Map Scale 1:475,000
5 2.5 0 5 Kilometers
5 2.5 0 5 Miles
N
Source:
Coastal Protection and Restoration Authority of Louisiana
Imagery:
1M 2008 Digital Orthoimagery Quarter Quadrangles
Map Date: April 25, 2014
File path: //2014040185/

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Carlos Bullock, Chairman
Alabama-Coushatta Tribe of Texas
571 State Park Rd 56
Livingston, TX 77351

Dear Chairman Bullock:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Draft Integrated Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated November 27, 2013.

The Draft Integrated Report proposes potential solutions that would provide nonstructural hurricane and storm damage risk reduction measures as well as ecosystem restoration features in the 4,700 square mile study area located in Calcasieu, Cameron and Vermillion parishes in southwest Louisiana.

Proposed measures of the National Economic Development plan include residential structure elevation, flood proofing and the acquisition of qualifying structures. The proposed measures of the National Ecosystem Restoration (NER) plan would significantly restore environmental conditions for the Chenier Plain ecosystem. The proposed NER measures include nine marsh restoration measures that would restore approximately 8,579 acres and nourish approximately 4,026 acres, resulting in approximately 8,714 net acres; two hydrologic and salinity control measures to restore approximately 6,092 net acres; five shoreline protection measures spanning approximately 266,884 linear feet to protect approximately 5,509 net acres; the preservation of the historic Sabine oyster reef; and a chenier invasive species control and reforestation program to include the planting of trees on approximately 1,413 acres.

Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN, and the CEMVN will continue consultation with the SHPO and federally recognized Tribes. With selection of the TSP as presented in the Draft Integrated Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally recognized Tribes in a continuation of Section 106 consultation.

CEMVN is nearing completion of its review of existing information on historic properties within the study area and will be scheduling a teleconference via a forthcoming email to Mr. Celestine to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be January 26, 2014. Please send comments and/or any questions or concerns about the SWC LA study or the SMART Planning framework to Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. Comments and/or questions may also be submitted via the contact information available on the website http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx. An electronic copy of this letter will be provided to Mr. Bryant J. Celestine, Historic Preservation Officer, Alabama Coushatta Tribe of Texas, celestine.bryant@actribe.org.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Brenda Shemayme Edwards, Chairwoman
Caddo Nation of Oklahoma
P.O. Box 487
Binger, OK 73009

Dear Chairwoman Edwards:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Draft Integrated Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated November 27, 2013.

The Draft Integrated Report proposes potential solutions that would provide nonstructural hurricane and storm damage risk reduction measures as well as ecosystem restoration features in the 4,700 square mile study area located in Calcasieu, Cameron and Vermillion parishes in southwest Louisiana.

Proposed measures of the National Economic Development plan include residential structure elevation, flood proofing and the acquisition of qualifying structures. The proposed measures of the National Ecosystem Restoration (NER) plan would significantly restore environmental conditions for the Chenier Plain ecosystem. The proposed NER measures include nine marsh restoration measures that would restore approximately 8,579 acres and nourish approximately 4,026 acres, resulting in approximately 8,714 net acres; two hydrologic and salinity control measures to restore approximately 6,092 net acres; five shoreline protection measures spanning approximately 266,884 linear feet to protect approximately 5,509 net acres; the preservation of the historic Sabine oyster reef; and a chenier invasive species control and reforestation program to include the planting of trees on approximately 1,413 acres.

Section 106 Consultation

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CEMVN is nearing completion of its review of existing information on historic properties within the study area and will be scheduling a teleconference via a forthcoming email to Mr. Cast to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be January 26, 2014. Please send comments and/or any questions or concerns about the SWC LA study or the SMART Planning framework to Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. Comments and/or questions may also be submitted via the contact information available on the website http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx. An electronic copy of this letter will be provided to Mr. Robert Cast, Tribal Historic Preservation Officer, Caddo Nation of Oklahoma, rcast@caddonation.org.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

John Paul Darden, Chairman
Chitimacha Tribe of Louisiana
P.O. Box 661
Charenton, LA 70523

Dear Chairman Darden:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Draft Integrated Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated November 27, 2013.

The Draft Integrated Report proposes potential solutions that would provide nonstructural hurricane and storm damage risk reduction measures as well as ecosystem restoration features in the 4,700 square mile study area located in Calcasieu, Cameron and Vermillion parishes in southwest Louisiana.

Proposed measures of the National Economic Development plan include residential structure elevation, flood proofing and the acquisition of qualifying structures. The proposed measures of the National Ecosystem Restoration (NER) plan would significantly restore environmental conditions for the Chenier Plain ecosystem. The proposed NER measures include nine marsh restoration measures that would restore approximately 8,579 acres and nourish approximately 4,026 acres, resulting in approximately 8,714 net acres; two hydrologic and salinity control measures to restore approximately 6,092 net acres; five shoreline protection measures spanning approximately 266,884 linear feet to protect approximately 5,509 net acres; the preservation of the historic Sabine oyster reef; and a chenier invasive species control and reforestation program to include the planting of trees on approximately 1,413 acres.

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CEMVN is nearing completion of its review of existing information on historic properties within the study area and will be scheduling a teleconference via a forthcoming email to Mrs. Walden to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be January 26, 2014. Please send comments and/or any questions or concerns about the SWC LA study or the SMART Planning framework to Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. Comments and/or questions may also be submitted via the contact information available on the website http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx. An electronic copy of this letter will be provided to Mrs. Kimberly Walden, M. Ed., Cultural Director/Tribal Historic Preservation Officer, Chitimacha Tribe of Louisiana, kswalden@chitimacha.gov.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Gregory E. Pyle, Chief
Choctaw Nation of Oklahoma
P.O. Box 1210
Durant, OK 74702-1210

Dear Chief Pyle:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

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CEMVN is nearing completion of its review of existing information on historic properties within the study area and will be scheduling a teleconference via a forthcoming email to Dr. Thompson and Ms. Jacobs to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be January 26, 2014. Please send comments and/or any questions or concerns about the SWC LA study or the SMART Planning framework to Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. Comments and/or questions may also be submitted via the contact information available on the website http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx. An electronic copy of this letter will be provided to Dr. Ian Thompson, Director/Tribal Historic Preservation Officer, Choctaw Nation of Oklahoma, ithompson@choctawnation.com and Ms. Johnnie Jacobs, NHPA Section 106 Coordinator, jjacobs@choctawnation.com.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Kevin Sickey, Chief
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, LA 70532

Dear Chief Sickey:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

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CEMVN is nearing completion of its review of existing information on historic properties within the study area and will be scheduling a teleconference via a forthcoming email to Dr. Langley and Mr. Tarpley to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be January 26, 2014. Please send comments and/or any questions or concerns about the SWC LA study or the SMART Planning framework to Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. Comments and/or questions may also be submitted via the contact information available on the website http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx. An electronic copy of this letter will be provided to Dr. Linda Langley, Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, llangley@mcneese.edu, and Mr. Michael Tarpley, Deputy Tribal Historic Preservation Officer, Coushatta Tribe of Louisiana, kokua.aina57@gmail.com.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

B. Cheryl Smith, Principal Chief
Jena Band of Choctaw Indians
P.O. Box 14
Jena, LA 71342

Dear Principal Chief Smith:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

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Section 106 Consultation

Formal Section 106 consultation pursuant to 36 CFR § 800.3(c) has been initiated with the Louisiana State Historic Preservation Officer (SHPO) and eleven federally recognized Tribes with an interest in USACE undertakings within the boundaries of CEMVN, and the CEMVN will continue consultation with the SHPO and federally recognized Tribes. With selection of the TSP as presented in the Draft Integrated Report, the CEMVN will now proceed with the identification and evaluation of historic properties, the results of which will be coordinated with the SHPO and federally recognized Tribes in a continuation of Section 106 consultation.

CEMVN is nearing completion of its review of existing information on historic properties within the study area and will be scheduling a teleconference via a forthcoming email to Ms. Masters and Ms. McCormick to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be January 26, 2014. Please send comments and/or any questions or concerns about the SWC LA study or the SMART Planning framework to Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. Comments and/or questions may also be submitted via the contact information available on the website http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx. An electronic copy of this letter will be provided to Ms. Dana Masters, Tribal Historic Preservation Officer, Jena Band of Choctaw Indians, jbc.thpo106@aol.com, and Ms. Lillie McCormick, Environmental Director, Jena Band of Choctaw Indians, lmmccormickjbc@centurytel.net.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Phyliss J. Anderson, Chief
Mississippi Band of Choctaw Indians
P.O. Box 6257
Choctaw, MS 39350

Dear Chief Anderson:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Draft Integrated Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated November 27, 2013.

The Draft Integrated Report proposes potential solutions that would provide nonstructural hurricane and storm damage risk reduction measures as well as ecosystem restoration features in the 4,700 square mile study area located in Calcasieu, Cameron and Vermillion parishes in southwest Louisiana.

Proposed measures of the National Economic Development plan include residential structure elevation, flood proofing and the acquisition of qualifying structures. The proposed measures of the National Ecosystem Restoration (NER) plan would significantly restore environmental conditions for the Chenier Plain ecosystem. The proposed NER measures include nine marsh restoration measures that would restore approximately 8,579 acres and nourish approximately 4,026 acres, resulting in approximately 8,714 net acres; two hydrologic and salinity control measures to restore approximately 6,092 net acres; five shoreline protection measures spanning approximately 266,884 linear feet to protect approximately 5,509 net acres; the preservation of the historic Sabine oyster reef; and a chenier invasive species control and reforestation program to include the planting of trees on approximately 1,413 acres.

Section 106 Consultation

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CEMVN is nearing completion of its review of existing information on historic properties within the study area and will be scheduling a teleconference via a forthcoming email to Mr. Carleton to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be January 26, 2014. Please send comments and/or any questions or concerns about the SWC LA study or the SMART Planning framework to Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. Comments and/or questions may also be submitted via the contact information available on the website http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx. An electronic copy of this letter will be provided to Mr. Kenneth H. Carleton, Tribal Historic Preservation Officer/ Archaeologist, Mississippi Band of Choctaw Indians, kcarleton@choctaw.org.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

John Berrey, Chairman
Quapaw Tribe of Oklahoma
P.O. Box 765
Quapaw, OK 74363

Dear Chairman Berrey:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Draft Integrated Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated November 27, 2013.

The Draft Integrated Report proposes potential solutions that would provide nonstructural hurricane and storm damage risk reduction measures as well as ecosystem restoration features in the 4,700 square mile study area located in Calcasieu, Cameron and Vermillion parishes in southwest Louisiana.

Proposed measures of the National Economic Development plan include residential structure elevation, flood proofing and the acquisition of qualifying structures. The proposed measures of the National Ecosystem Restoration (NER) plan would significantly restore environmental conditions for the Chenier Plain ecosystem. The proposed NER measures include nine marsh restoration measures that would restore approximately 8,579 acres and nourish approximately 4,026 acres, resulting in approximately 8,714 net acres; two hydrologic and salinity control measures to restore approximately 6,092 net acres; five shoreline protection measures spanning approximately 266,884 linear feet to protect approximately 5,509 net acres; the preservation of the historic Sabine oyster reef; and a chenier invasive species control and reforestation program to include the planting of trees on approximately 1,413 acres.

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CEMVN is nearing completion of its review of existing information on historic properties within the study area and will be scheduling a teleconference via a forthcoming email to Mr. Bandy to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be January 26, 2014. Please send comments and/or any questions or concerns about the SWC LA study or the SMART Planning framework to Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. Comments and/or questions may also be submitted via the contact information available on the website http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx. An electronic copy of this letter will be provided to Mr. Everett Bandy, Tribal Historic Preservation Officer, Quapaw Tribe of Oklahoma, ebandy@quapawtribe.com.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Leonard M. Harjo, Principal Chief
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka, OK 74884

Dear Principal Chief Harjo:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Draft Integrated Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated November 27, 2013.

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Proposed measures of the National Economic Development plan include residential structure elevation, flood proofing and the acquisition of qualifying structures. The proposed measures of the National Ecosystem Restoration (NER) plan would significantly restore environmental conditions for the Chenier Plain ecosystem. The proposed NER measures include nine marsh restoration measures that would restore approximately 8,579 acres and nourish approximately 4,026 acres, resulting in approximately 8,714 net acres; two hydrologic and salinity control measures to restore approximately 6,092 net acres; five shoreline protection measures spanning approximately 266,884 linear feet to protect approximately 5,509 net acres; the preservation of the historic Sabine oyster reef; and a chenier invasive species control and reforestation program to include the planting of trees on approximately 1,413 acres.

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Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

James Billie, Chairman
Seminole Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Dear Chairman Billie:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act (NEPA), and Section 106 of the National Historic Preservation Act, the CEMVN offers you the opportunity to review and comment on the potential of the proposed action described in the Draft Integrated Report to significantly affect protected tribal resources, tribal rights, or Indian lands. Consultation for the proposed action was initiated in a letter dated November 27, 2013.

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Please review the Integrated Draft Report and provide comments. The official closing date for receipt of comments will be January 26, 2014. Please send comments and/or any questions or concerns about the SWC LA study or the SMART Planning framework to Ms. Rebecca Hill; Archeologist/Tribal Liaison; U.S. Army Corps of Engineers, New Orleans District; (504) 862-1474; rebecca.hill@usace.army.mil. Comments and/or questions may also be submitted via the contact information available on the website http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx. An electronic copy of this letter will be provided to Mr. Paul N. Backhouse, Tribal Historic Preservation Officer, Seminole Tribe of Florida, paulbackhouse@semtribe.com; Ms. Anne Mullins, Deputy Tribal Historic Preservation Officer, annemullins@semtribe.com; Mr. Bradley Mueller, Compliance Review Supervisor, bradleymueller@semtribe.com; and Ms. Alison Swing, Compliance Review Data Analyst, alisonswing@semtribe.com.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

DECEMBER 11, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environment Division, South

Earl J. Barbry, Sr., Chairman
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, LA 71351

Dear Chairman Barbry:

The United States Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a draft Integrated Feasibility Report and Programmatic Environmental Impact Statement (Draft Integrated Report) for the Southwest Coastal Louisiana (SWC LA) Study. A copy of the Draft Integrated Report is enclosed and is available electronically for review at http://www.mvn.usace.army.mil/About/Projects/SouthwestCoastal.aspx; hard copies are available upon request.

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CEMVN is nearing completion of its review of existing information on historic properties within the study area and will be scheduling a teleconference via a forthcoming email to Mr. Barbry to discuss the area of potential effects (APE), the existing information on historic properties within the APE, as well as data concerning possible historic properties not yet identified, and the level of effort for the identification and evaluation of historic properties.

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Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

SOUTHWEST COASTAL LOUISIANA
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex G

U.S. Fish and Wildlife Service Final Coordination Act Report

Southwest Coastal Louisiana Feasibility Study

FINAL
FISH AND WILDLIFE COORDINATION ACT REPORT

PROVIDED TO
NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

PREPARED BY

RONALD PAILLE
SENIOR FISH AND WILDLIFE BIOLOGIST

U.S. FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
LAFAYETTE, LOUISIANA

FEBRUARY 2016

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (Corps) was requested to conduct the Southwest Coastal Louisiana Feasibility Study (SWLA Study) via Resolution Docket 2747 adopted on December 7, 2005, by the U.S. House of Representatives Committee on Transportation and Infrastructure. That Docket specifically requested the Secretary of the Army, in accordance with section 10 of the River and Harbors Act, to "survey the coast of Louisiana in Cameron, Calcasieu, and Vermilion Parishes with particular reference to the advisability of providing hurricane protection and storm damage reduction and related purposes to include the feasibility of constructing an armored 12-foot levee along the Gulf Intracoastal Waterway."

Measures to provide storm damage reduction and ecosystem restoration were evaluated within the study area. Those measures included construction of levees designed to provide hurricane storm surge protection and non-structural measures such as structure flood proofing, relocations, and buyouts. Measures to protect and restore coastal wetlands and unique natural ecosystem features (such as cheniers) were evaluated, including the construction of shoreline protection measures along navigation canals, interior lakes and bays, and the Gulf of Mexico, plus measures to re-create marshes in shallow open water areas.

The initial list of proposed project measures was derived from existing large-scale coastal protection and ecosystem restoration plans (e.g., the Louisiana Coastal Protection and Restoration Plan [LACPR], the Louisiana Coastal Area Ecosystem Restoration Study Report [LCA], and the Louisiana's Comprehensive Master Plan for a Sustainable Coast [State Master Plan 2012]). Public comments were received during the project scoping process, and recommendations were provided by local representatives and natural resource agencies during the initial planning phase of the project. The initial list of potential project measures was reduced to a more focused and achievable final list of measures based on criteria that were approved by an interagency project delivery team.

The final list of measures was assembled into 6 possible protection levee alternatives and 6 ecosystem restoration alternatives, all of which were evaluated for cost effectiveness. Of the flood protection features, only the non-structural protection measures in select locations were cost effective and included in the Recommended Plan (RP). Restoration Alternative 4 (Entry Salinity Control Alternative) was initially chosen as the most cost effective of the comprehensive plans and was included in the RP. However, subsequent consideration resulted in modifying alternative 4 to eliminate the Cameron-Creole Spillway structure, the Sabine Pass and Calcasieu Ship Channel salinity control structures (measures 47a, 48 and 7, respectively), and to add the shoreline protection measures on the Gulf shore at Rockefeller Refuge (measures 6b1, 6b2, and 6b3).

In addition to providing hurricane storm surge protection in developed portions of the project area, implementation of the RP would restore, enhance, and protect substantial areas of coastal marsh and forested chenier habitat. However, implementation of some restoration measures could result in some minor adverse impacts. The recommendations provided below address ways to avoid such unintended impacts and to improve fish and wildlife habitat quality in

restoration areas. Therefore, the Service supports implementation of the RP provided the following recommendations are included as part of the plan.

1. To the greatest degree practical, borrow pits for construction of marsh creation measures should be located to avoid and minimize direct and indirect impacts to vegetated wetlands. Borrow pit construction should also avoid the following:
    a. avoid inducing wave refraction/diffraction erosion of existing shorelines
    b. avoid inducing slope failure of existing shorelines
    c. avoid submerged aquatic vegetation
    d. avoid increased saltwater intrusion
    e. avoid excessive disturbance to area water bottoms
    f. avoid inducing hypoxia

2. Marsh creation measures should avoid, to the degree practical, areas of dense submerged aquatic vegetation.

3. The Corps should monitor ecosystem restoration features to document the degree of success achieved. We recommend the Service and other interested natural resource agencies be included in developing those monitoring criteria and in the review of subsequent monitoring information and reports.

4. The Corps should obtain a right-of-way from the Service prior to conducting any work on Sabine or Cameron Prairie National Wildlife Refuges, in conformance with Section 29.21-1, Title 50, Right-of-Way Regulations. Issuance of a right-of-way will be contingent on a determination that the proposed work will be compatible with the purposes for which the Refuge was established.

5. All planning, design, or other construction-related activities (e.g., surveys, geotechnical borings, etc.) conducted on National Wildlife Refuges (NWRs) will require the Corps to obtain a Special Use Permit from the Refuge Manager of the Southwest Louisiana Refuge Complex. We recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact the Refuge Manager (337/598-2216 or SWLRComplex@fws.gov) for further information on compatibility of proposed ecosystem restoration measures, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

6. The Corps should contact the Louisiana Department of Wildlife and Fisheries prior to conducting any work on Rockefeller Refuge (337-491-2593).

7. We recommend the Corps continue to coordinate with the Service throughout planning and construction to ensure that the proposed project does not impact waterbird nesting colonies, threatened or endangered species, or species that may be listed in the future.

8. We recommend the Corps coordinate with the Service and other interested natural resource agencies when developing detailed plans regarding restoration measures, especially during the Preliminary Engineering and Design Phase (PED) and construction phase, for measures where specific recommendations have been provided below.

9. To the greatest degree possible, sediment pumping should be conducted during non-growing season periods to reduce possible salinity impacts on adjoining vegetation.

Service recommendations regarding specific ecosystem restoration measures are provided below:

10. Marsh creation measures south of Grand Chenier (47a1, 47a2, and 47c1)
    a. Combined, these measures would convert over 2,000 acres of existing shallow open water to solid marsh. We recommend that some of those open water areas not be filled to maintain aquatic habitat (i.e., ponds) used by fisheries, waterfowl, and other wildlife.
    b. To avoid saltwater entrapment impacts, the engineers are encouraged to design channels to provide drainage/water exchange, and avoid ponding of Gulf water effluent within or adjacent to the fill areas. Similarly, we recommend any ponds or enclosed non-fill areas have drainage channels (existing or man-made) to carry away Gulf water effluent and avoid concentration of salts.
    c. To pump into eastern and western extremes of the designated fill area, the pipeline route should depart from that designated route only within the proposed fill area, and should be routed through unvegetated open water areas, to avoid impacting existing marshes.

11. Marsh creation along Freshwater Bayou Canal (measures 127c3 and 306a1)
    a. To avoid saltwater effluent impacts, we recommend the effluent be drained toward Freshwater Bayou Canal and not into the interior marshes. After construction, once saltwater drainage from the fill areas has been completed, those drainage routes should be plugged and drainage of the fill areas should be redirected into interior marshes.
    b. If a containment dike is constructed adjacent to the Freshwater Bayou Canal, the Service recommends that it not be degraded after construction so that it can help to maintain the desired hydrologic isolation of the interior marshes from the canal.

12. Marsh creation near Mud Lake (measure 124c)
    a. This measure would convert over 1,900 acres of existing shallow open water to solid marsh. We recommend that some of those open water areas not be filled to maintain aquatic habitat (i.e., ponds) used by fisheries and waterfowl.
    b. To avoid saltwater entrapment impacts, the engineers are encouraged to design channels to provide drainage/water exchange, and avoid ponding of Gulf water effluent within or adjacent to the fill areas. Similarly, we recommend any ponds or enclosed non-fill areas have drainage channels (existing or man-made) to carry away Gulf water effluent and avoid concentration of salts.

c. The proposed containment dikes along the western and southeastern fill area boundaries may block existing drainage routes for marshes adjacent to the fill area. To avoid potential saltwater entrapment impacts and impaired drainage impacts, we recommend weir boxes along those sections of dike be eliminated unless the presence of unimpeded drainage routes can be documented.

13. Marsh creation near West Cove (measure 124d)
    a. To prevent ponding impacts and saltwater entrapment impacts to marshes south of the fill area, we recommend the containment dike designs avoid closing both canals that provide drainage for the fill area and adjacent marshes.
    b. If funding is provided to the Service to construct this or other measures located on National Wildlife Refuges, that funding should include funding necessary to cover the necessary administration, engineering, and design work.

This final report is submitted in fulfillment of the requirements of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and constitutes the final report of the Secretary of the Interior as required by Section 2(b) of that Act. This report has incorporated comments made by the National Marine Fisheries Service (see Appendix A) on our draft Coordination Act Report dated February 26, 2015. No comments on our February 2015 draft Coordination Act Report were received from the Louisiana Department of Wildlife and Fisheries.

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INTRODUCTION

The Southwest Coastal Louisiana Feasibility Study (SWLA Study) was authorized by Resolution Docket 2747 adopted on December 7, 2005, by the U.S. House of Representatives Committee on Transportation and Infrastructure. That Docket specifically requested the Secretary of the Army, in accordance with section 10 of the River and Harbors Act, to "survey the coast of Louisiana in Cameron, Calcasieu, and Vermilion Parishes with particular reference to the advisability of providing hurricane protection and storm damage reduction and related purposes to include the feasibility of constructing an armored 12-foot levee along the Gulf Intracoastal Waterway." Investigation of area ecosystem restoration measures was authorized via the Water Resources Development Act of 2007 (Title VII, Louisiana Coastal Area program, Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study).

The study area is located within Louisiana's Chenier Plain which is characterized by lakes, bayous, wetlands, cheniers, and coastal beaches. The Mermentau Basin and the Calcasieu/Sabine Basin are the two major hydrologic basins within the Chenier Plain. There are numerous communities within the study area including Abbeville, Cameron, Delcambre, Erath, Gueydan, Hackberry, Kaplan, Lake Arthur, Lake Charles, and Sulphur. Although the approved Southwest Coastal Louisiana Feasibility Study authorization is restricted to Calcasieu, Cameron, and Vermilion Parishes, several project alternatives occurring beyond those parishes were considered because of their anticipated effects on the project area.

Numerous project measures and groups of measures were evaluated. Surge protection alternatives included alternative levee alignments (including the armored 12-foot levee described above), as well as non-structural alternatives. Ecosystem restoration alternatives included various combinations of salinity control/reduction measures, strategic marsh creation measures, strategically located shoreline protection measures, and restoration/reforestation of cheniers.

This report provides an analysis of the impacts of the Recommended Plan (RC) on fish and wildlife resources. The RC is a combination of non-structural storm surge protection measures, and an array of different types of ecosystem restoration features. The proposed non-structural measures may include earthen berms (3 – 7 feet high) around individual structures. Where structures are located adjacent to wetlands, sheet pile structures will be constructed in lieu of earthen berms to avoid possible wetland impacts associated with berm construction.

The Fish and Wildlife Service (Service) has reviewed available information regarding construction of the proposed ecosystem restoration measures. Our comments, provided herein, are intended to assist the U.S. Army Corps of Engineers (Corps) in avoiding adverse impacts to adjoining marshes that could occur due to construction of the proposed restoration measures.

This final report is submitted in fulfillment of the requirements of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and constitutes the final report of the Secretary of the Interior as required by Section 2(b) of that Act. This report has incorporated comments made by the National Marine Fisheries Service (see Appendix A) on our draft Coordination Act Report dated February 26, 2015. No comments on our February 2015

draft Coordination Act Report were received from the Louisiana Department of Wildlife and Fisheries.

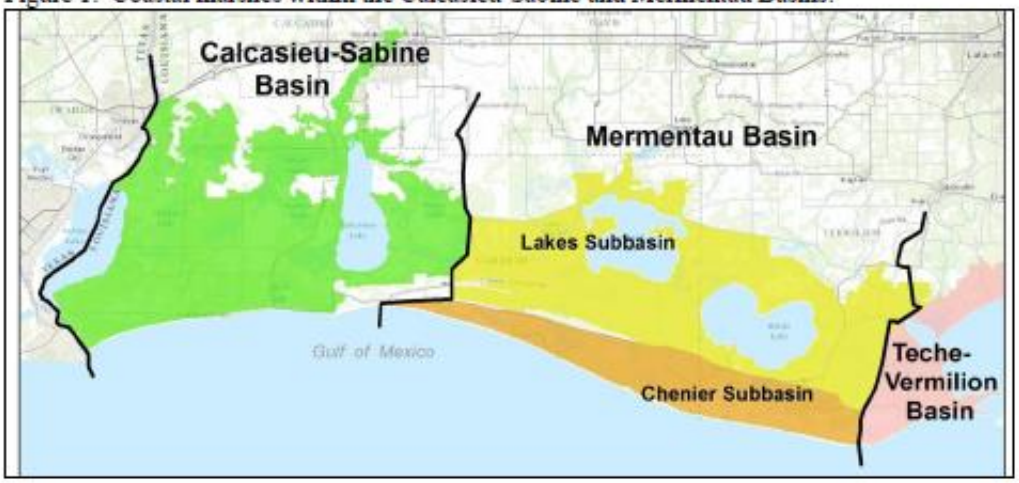
DESCRIPTION OF STUDY AREA

The study area, which encompasses Calcasieu, Cameron, and Vermilion Parishes, is typically termed the Chenier Plain of Louisiana. The Chenier Plain encompasses the southwestern Louisiana coastal zone from Freshwater Bayou west of Vermilion Bay to Sabine Lake on the Texas-Louisiana border. Cheniers are relict beach ridges that generally parallel the Gulf shoreline, and derive their name from the Cajun word "chene" meaning oak, because oaks are the dominant tree species on the crests of the higher chenier ridges (Penland et al. 1989). Because chenier elevations are higher than the surrounding marshes, they often serve as hydrologic barriers, with varying levels of effectiveness, between saline marshes to the south and freshwater marshes to the north (U.S. Army Corps of Engineers 2008). The two hydrologic basins encompassed by the study area are the Mermentau and the Calcasieu-Sabine Basins (Figure 1).

Mermentau Basin

The Mermentau River Basin is located between Freshwater Bayou Canal to the east and that segment of Louisiana Highway 27 east of Calcasieu Lake. The Basin encompasses an area of about 4.2 million acres and contains productive agricultural lands and a variety of natural environments (U.S. Army Corps of Engineers 1999). Coastal wetlands within the Mermentau Basin are divided into two sub-basins, the Lakes and Chenier Sub-basins (Figure 1), both of

Figure 1. Coastal marshes within the Calcasieu-Sabine and Mermentau Basins.



which occur within the feasibility study boundary. North of the Lakes Sub-basin are uplands beyond the study boundary that cover an area of 3,683 square miles of predominantly agricultural land (Gammill et al. 2002). The principal agricultural products in this region are rice and

crawfish, which both require ample supplies of fresh water typically provided via the Corps' management of the Mermentau Basin Project (U.S. Army Corps of Engineers 1999).

The Lakes Sub-basin is located roughly between the Gulf Intracoastal Waterway (GIWW) and Louisiana Highway 82, and historically functioned as a low-salinity brackish estuary (Corps 2008). Construction of navigation channels, locks, and water control structures has altered the historical north-south river and tidal-driven hydrology and shifted it to an east-west system that drains through the GIWW. The Corps' locks and water control structures that are located along the perimeter of the Lakes Sub-basin regulate both salinity and water level so that the Lakes Sub-basin now functions more as a freshwater reservoir and less as the low-salinity estuary that existed prior to these alterations (Gammill et al. 2002). The demand for a reliable fresh water supply for agricultural use was the primary reason for the development of the Mermentau Basin Project (U.S. Army Corps of Engineers 1999).

The Mermentau Basin Project involves the operation and management of five navigation locks and control structures: (1) the Calcasieu Lock located on the Gulf Intracoastal Waterway (GIWW) near the intersection of Louisiana Highway 384, (2) the Leland Bowman Lock situated on the GIWW near Intracoastal City, (3) the Freshwater Bayou Lock located on the Freshwater Bayou Canal approximately one mile north of the Gulf of Mexico, (4) the Catfish Point Control Structure located on the southwest side of the basin where the Mermentau River exits Grand Lake, and (5) the Schooner Bayou Control Structure located on the east side of the basin in the old Intracoastal Waterway between Freshwater Bayou and White Lake. The target water level inside the basin is 2.0 feet above mean low Gulf and the five Corps structures are operated in concert to maintain this level and preclude saltwater intrusion (U.S. Army Corps of Engineers 1999).

The Chenier Sub-basin is located south of the Lakes Sub-basin, between Louisiana Highway 82 and the Gulf of Mexico. Approximately one-third of this sub-basin is comprised of the State-owned and operated Rockefeller Wildlife Refuge. The Chenier Sub-basin is characterized by tidally influenced salt marshes, though hydrology throughout much of the area is managed through impoundments that range in size from hundreds to thousands of acres. The purpose of that management is to control salinity in order to reduce wetland losses and/or sustain recreational and agricultural endeavors (U.S. Army Corps of Engineers 2008).

Calcasieu-Sabine Basin

The Calcasieu-Sabine Basin extends from Sabine Lake and River eastward to the Louisiana Highway 27 segment east of Calcasieu Lake. The Calcasieu-Sabine Basin consists of two semi-distinct sub-basins, the Calcasieu River Basin and the Sabine River Basin. When the GIWW was built in the 1920s, it breached the Gum Cove Ridge which had historically formed a partial north-to-south oriented hydrologic barrier between the Calcasieu and Sabine Lake systems. That breach, in combination with several smaller canals, now facilitates water exchange between the sub-basins, and has exacerbated saltwater intrusion problems in the marshes adjacent to the GIWW. The typical water-movement scenario is that south winds push salt water into Calcasieu Lake, westward through the GIWW, and across the Gum Cove Ridge breach. This water is eventually swept down the Sabine River and into Sabine Lake. Currently, salt water that is

pushed into Calcasieu Lake remains there because there is little back flow from the Lake. Without the Gum Cove Ridge breach, the current semi-circular flow patterns would not exist, and lake levels would rise more modestly, thus reducing the volume of seawater entering Calcasieu Lake (Lopez et al. 2008).

The widening and deepening (to -40 feet deep by 400 feet wide) of the Calcasieu River and Pass Ship navigation channel (referred to as the Calcasieu Ship Channel [CSC]), as well as the removal of the channel mouth bar, has increased saltwater and tidal intrusion into the Calcasieu-Sabine Basin, resulting in marsh loss, tidal export of organic marsh substrate, and an overall shift to more saline habitats in the region. In 1968, the Corps completed construction of the Calcasieu River Saltwater Barrier on the Calcasieu River north of the City of Lake Charles. This barrier minimizes the flow of salt water into the upper reaches of the Calcasieu River to protect agricultural water supplies (Gammill et al. 2002). The Corps-maintained Calcasieu Lock, located east of the CSC on the GIWW near its intersection with Louisiana Highway 384, is operated to prevent saltwater intrusion into the Mermentau Basin as part of the Corps' Mermentau Basin Project.

The Sabine River has a drainage area of approximately 9,325 square miles and is the dominant influence across most of the Calcasieu-Sabine Basin in moderating salinity and tidal fluctuations. Sabine Pass was first dredged for navigation in 1880, and has been progressively deepened to its present depth of -40 feet. The Sabine-Neches Canal (later to become the Sabine-Neches Waterway) was constructed in the early 1900s. That channel not only facilitates saltwater intrusion into the area, it also funnels freshwater inflows more directly to the gulf, largely bypassing the adjacent marshes in Louisiana and Texas. A feasibility analysis has been conducted to deepen and widen the Sabine-Neches Ship Channel, but construction has yet to be initiated due to lack of funding. Saltwater intrusion in the Neches River has, in the past, necessitated the release of large quantities of water from the Sam Rayburn Reservoir to prevent saltwater contamination of industrial, agricultural, and municipal freshwater supply for Beaumont, Texas. To remedy those problems, a permanent saltwater barrier in the Neches River at Beaumont was constructed in 2003.

FISH AND WILDLIFE RESOURCE CONDITIONS

Existing Fish and Wildlife Habitats

The Chenier Plain consists of open water ponds and lakes, cheniers, gulf shorelines, and freshwater, intermediate, brackish, and saline marsh (Giron and Perez 2009). Marshes within Louisiana's Chenier Plain began forming about 3,000-4,000 years ago during periods when the Mississippi River occupied a more westerly course (Gosselink et al.1979). Expansive mud flats were created by large quantities of Mississippi River sediment that periodically accreted along the Gulf shoreline. When the river would shift to a more easterly location, erosion would rework the gulf shoreline to form beach ridges parallel to shore (Gammill et al. 2002). These ridges, consisting mainly of sand and shell, were typically higher in elevation than surrounding marshes and were colonized by live oaks. Early explorers called the ridges "cheniere," a French word meaning "place of oaks" (Kniffen and Hilliard 1988). Over time, a series of Gulf of Mexico

shoreline transgressions and regressions caused by periodic shifting of the Mississippi channel from east to west resulted in the shore-parallel ridge and swale topography that dominates Louisiana's Chenier Plain today (Gammill et al. 2002). Despite substantial hydrologic alterations, wetlands of the Chenier Plain continue to support nationally significant fish and wildlife resources. They provide important habitat for various species of plants, fish and wildlife, and they serve as ground water recharge areas, provide storage areas for storm and flood waters, serve as natural water filtration areas, provide protection from wave action, erosion, and storm damage, and provide various consumptive and non-consumptive recreational opportunities. Predominant habitats and their associated fish and wildlife values are described below.

Forested Habitat

The four major forest types within the study area include swamp, bottomland hardwood, pine-oak forests, and upland chenier forest. Swamps are generally dominated with baldcypress, water tupelo, swamp red maple, and various understory plant species. Coastal swamp forests typically occupy the area between fresh marshes and areas of higher elevation, including the transition zones between bottomland hardwood forests on riverine interdistributary ridges and lower elevation marshes. Healthy cypress swamps occur in fresh water areas experiencing minimal daily tidal action and where the salinity range does not normally exceed 2 parts per thousand (ppt). Salinities of 3 ppt or higher may cause significant stress and mortality of baldcypress. However, short-term exposure to such salinities may be tolerated if it does not penetrate into and persist in the soil (U.S. Army Corps of Engineers 2009).

Bottomland hardwood forests occur primarily along the floodplains and distributary ridges of the various bayous and rivers within northern portions of the study area. Common tree species include sugarberry, water oak, live oak, nuttall oak, overcup oak, bitter pecan, black willow, American elm, swamp red maple, box elder, green ash, and baldcypress (U.S. Army Corps of Engineers 2009).

The suppression of fire within area pine flatwoods has resulted in the conversion of those forests to pine-oak forests. These pine-oak forests are generally found on poorly drained flats and depressional areas north of the GIWW and predominantly around the cities of Sulphur and Lake Charles. Common tree species include loblolly pine, slash pine, longleaf pine, water oak, laurel oak, sweet bay, sweetgum, rough-leaf dogwood, and wax myrtle. These former pine flatwood communities may also contain a very diverse herbaceous community that can include many state rare species (U.S. Army Corps of Engineers 2009).

A unique feature of the Chenier Plain is the chenier ridge habitat that formed on abandoned beach ridges. These ancient beaches, composed primarily of sand and shell fragments, were stranded behind prograding shorelines built during periods of sedimentation fed by the Mississippi River. Common tree species on cheniers include live oak, sugarberry, swamp red maple, sweetgum, and water oak. Red mulberry, toothache-tree, and sweet acacia also occur on these ridges (U.S. Army Corps of Engineers 2009). Cheniers are important storm surge buffers, often serving as hydrologic barriers that limit saltwater intrusion into interior marshes (U.S. Army Corps of Engineers 2008). Wooded habitats on the cheniers are critically important

stopover habitat for neotropical songbirds migrating across the Gulf (Moore and Simons 1992, Moore 1999).

Scrub-Shrub Habitat

Scrub-shrub habitat within the study area often occupies a zone where marshes transition into slightly higher elevation habitats. Scrub shrub habitats are found along bayou ridges and on dredged material embankments, and areas typically bordered by marsh, swamp, or bottomland hardwoods. In saline areas, scrub-shrub communities are dominated by black mangrove on flooded saltmarsh edges, or by marsh elder and eastern baccharis on low ridges, bayou banks, and spoil banks and other disturbed areas. Brackish scrub-shrub wetlands are also dominated by eastern baccharis and marsh elder, although wax myrtle is common on low ridges, bayousides, and spoilbanks as well. Typical scrub-shrub vegetation in intermediate and fresh areas includes elderberry, wax myrtle, buttonbush, rattlebox, swamp red maple, Chinese tallow tree, marsh elder, and eastern baccharis. Dwarf palmetto and prickly pear cactus are common in the understory of Chenier/maritime forest. Yaupon, dwarf palmetto, swamp privet and Virginia willow also occur in thickets and the understory of swamps and bottomland hardwood forests (U.S. Army Corps of Engineers 2009). Those habitats often support a variety of wildlife, depending on local conditions; they provide nesting and feeding sites for wading birds, songbirds and other birds, and wildlife escape cover.

Fresh Marsh

Freshwater marshes are quite heterogeneous, with local species composition governed by frequency and duration of flooding, micro-topography, substrate, current flow and salinity. This marsh type is typically dominated by maidencane, duck potato, spikerushes, pennywort, elephant-ear and alligatorweed. Other common plants are California bulrush, giant cutgrass, beggarticks and cattail. Fresh marshes are often very diverse with different species of grasses and broad-leaved annuals waxing and waning throughout the growing season. Chabreck (1972) documented 93 plant species occurring in the fresh marshes of coastal Louisiana. In some areas, fresh marshes consist of nearly pure stands of maidencane. Aquatic plants commonly found in fresh marsh waters are duckweed, coontail, Eurasian watermilfoil, southern naiad, water hyacinth, pondweeds, white waterlily, elodea, hydrilla, water celery, water shield, fanwort, American lotus, and several invasive species of *Salvinia*. Fresh marsh salinity rarely exceeds 2 ppt, with a year-round range of approximately 0.5-1.0 parts per thousand (ppt).

Canal-induced saltwater intrusion has drastically reduced the extent of fresh marsh that historically existed within the Calcasieu-Sabine Basin (Figure 2). However, fresh marsh remains the dominant marsh type within the upper Lakes Sub-basin of the Mermentau Basin (Figure 3).

Freshwater marshes support extremely high densities of migratory waterfowl and other wildlife. However, because of saltwater intrusion, freshwater marshes have undergone the highest rate of reduction in acreage of any of the marsh type in Louisiana over the past few decades.

Figure 2. Marsh types (2007) within the Calcasieu-Sabine Basin.

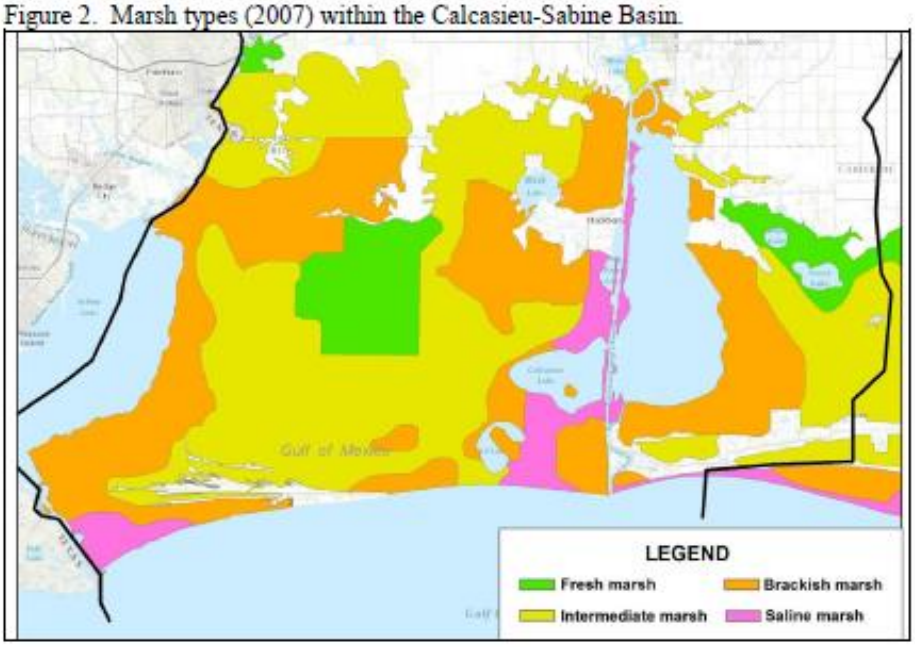
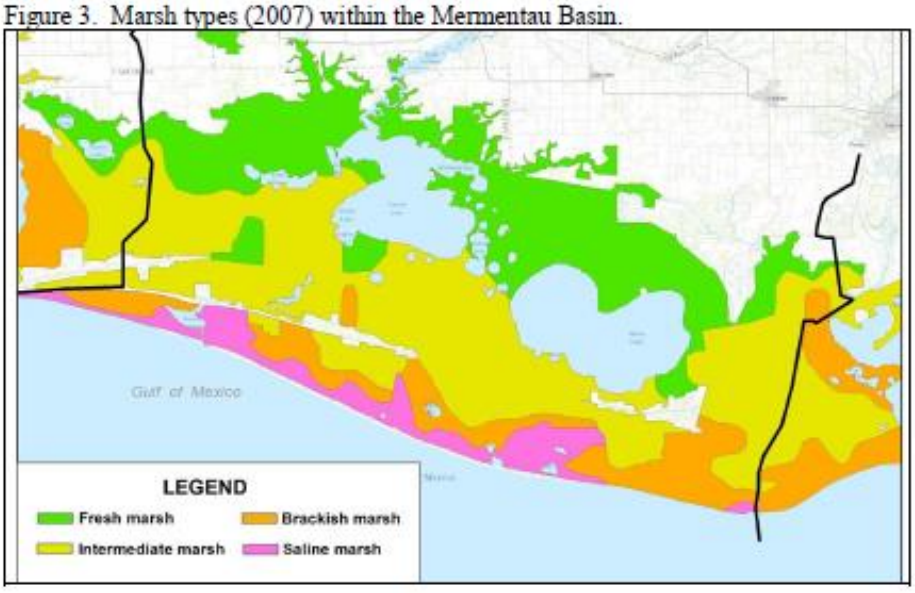


Figure 3. Marsh types (2007) within the Mermentau Basin.



Intermediate Marsh

Intermediate marsh may occur when annual salinity averages 3 to 4 ppt; but often intermediate marsh salinities may be fresh for much of the year with higher salinity conditions occurring during the late summer and early fall. Chabreck's (1972) identification of 54 species of plants in intermediate marsh indicates that plant species richness is relatively high. The intermediate marsh can be difficult to identify, as it sometimes may not appear as a transitional zone between brackish and fresh marshes. Saltmeadow cordgrass or duck potato is usually the dominant or co-dominant species. These are commonly accompanied by three-cornered grass, common reed, seashore paspalum, coastal waterhyssop, California bulrush, Walter's millet, sawgrass, deer pea, spikerushes, and flatsedges. Aquatic plant species found in intermediate marsh waters include widgeon grass, Eurasian watermilfoil, water celery, and southern naiad. Intermediate marshes are considered extremely important for many wildlife species, such as alligators and wading birds, and serve as important nursery areas for juvenile marine organisms. Although still a common natural community type in Louisiana, intermediate marsh appears to be declining in aerial extent, which has been attributed to a shift toward brackish marsh due to increased salinity levels. Expanding on previous studies by Penfound and Hathaway (1938) and Chabreck (1970), Visser et al. (2000), classified intermediate marsh in the Chenier Plain as a combination of sawgrass, saltmeadow cordgrass, and California bulrush.

Intermediate marsh occurs within the more interior portions of the Calcasieu-Sabine Basin where exposure to saltwater intrusion is lessened by distance from saltwater sources. Intermediate marsh may have an irregular tidal regime, with salinity ranging from 3 to 10 ppt. This marsh type is very important to many species of avian wildlife and supports large numbers of wintering waterfowl. It is also critical nursery habitat to juvenile marine organisms. Gradual changes in salinity conditions can cause this habitat to shift towards brackish marsh.

Brackish Marsh

Inland from salt marsh, and subject to moderate tidal influence, are brackish marshes. This marsh type is dominated by saltmeadow cordgrass. Brackish marshes are often interspersed with numerous small ponds and water channels and have experienced substantial marsh breakup and degradation in recent years. Salinity levels often range between 0.5 to 5.0 ppt and average salinity is in the range of 8 ppt, however, much higher salinities may occur periodically. In the brackish marsh, saltmeadow cordgrass is the dominant herbaceous species. Saltgrass, three-cornered grass, smooth cordgrass, black needlerush, and leafy three-square are often co-dominant or common in this zone. It should be noted that some of these species also occur in saline marsh, but the order of dominance differs. Chabreck (1972) identified forty species of plants in brackish marsh. Aquatic plants that commonly occur in brackish marsh waters include widgeon grass, Eurasian watermilfoil, water celery, and horned pondweed. Visser et al. (2000) classified brackish marsh in the Chenier Plain as a combination of saltmeadow cordgrass, three-cornered grass, and leafy three square.

Brackish marshes occur predominantly along the borders of Calcasieu and Sabine Lakes. Brackish marshes are extremely important as nurseries for fish and shellfish. Wading birds, muskrats and shorebirds are also common in such areas.

Saline Marsh

Salt marshes usually receive regular tidal inundation and occur in the most saline zones along the Gulf of Mexico shoreline and adjacent to the Calcasieu Ship Channel. Smooth cordgrass is the dominant plant in this marsh type, and often forms near-monotypic stands. Herbaceous vegetation of the saline marsh is typically dominated by smooth cordgrass intermixed with saltgrass, saltmeadow cordgrass, black needlerush, and saltwort. Chabreck (1972) identified 12 species of emergent vegetation typically associated with this marsh type. Within the described marsh zones, many ponds and lakes support submerged and/or floating-leafed aquatic vegetation (SAV). Aquatic vegetation is rare in saline waters along the Louisiana coast (Chabreck, 1972). However, widgeon grass may occur in open water areas of saline marshes bordering on the brackish marsh zone and in saline areas where tidal flow has been decreased by structures or other changes in hydrology. Average salinity is approximately 16 ppt. Relative to other marsh types, salt marsh typically supports fewer terrestrial vertebrates although some species like seaside sparrows and clapper rails are common (U.S. Army Corps of Engineers 2009). Salinity levels may range from 5.0 to 18 ppt, however, salinities may occasionally be lower or higher.

Saline marsh habitat exists in the project area closest to the Gulf of Mexico beach rim and along the Lower Lake (i.e., river miles (RMs) 5 to 12) and Calcasieu Pass (i.e., RMs 0 to 5) portions of the Calcasieu Ship Channel. Saline marshes are regularly flooded by high tides and have less plant diversity than the other marsh types.

Open Water

Small ponds and shallow open water areas associated with each of the above marsh plant communities are scattered throughout the project area. Some of the larger well known open water areas include Lake Charles, Prien Lake, Moss Lake, and Calcasieu Lake along the ship channel. Black Lake, Browns Lake, and Mud Lake are open water areas occurring west of the ship channel. Willow Lake and Sweet Lake occur east of the ship channel.

Submerged Aquatic Vegetation Habitat

Some protected shallow open water habitats within the project area support submerged aquatic vegetation (SAV). Prior to Hurricane Rita concentrations of SAVs densities up to 80 percent coverage occurred within Cameron Prairie National Wildlife Refuge (NWR) and those concentrations are expected to return (personal communication with NWR personnel 2007). Project area SAV habitats may include areas of widgeon grass, duckweeds, coontail, bladderworts, watermilfoil, hydrilla, mermaidweeds, and pondweeds. As these aquatic plants die, their decomposition by bacteria and fungi contribute to the food web by providing detritus for many aquatic invertebrates. SAVs are very important to wildlife and are utilized by many duck species.

Developed Lands

Developed areas are located on the higher elevations of the Pleistocene terrace along the GIWW and around the Lake Charles area and are typically well drained. Within the coastal marshes, most development is located on cheniers. They include agricultural lands and commercial and residential developments. Levees are also included in this category. Levees are frequently mowed, and, as such, provide poor wildlife habitat. Some levees are vegetated with an

assortment of scrub/shrub species including marsh elder, eastern baccharis, Chinese tallow tree, common reed, and goldenrod. These higher-elevation areas may provide low-to-moderate-value habitat for terrestrial wildlife, including some migratory bird species.

Existing Fishery Resources

The project-area wetlands and associated shallow waters provide nursery and feeding habitat for recreationally and commercially important estuarine-dependent fishes and shellfishes (e.g., red drum, black drum, Atlantic croaker, spot, sand seatrout, spotted seatrout, southern flounder, Gulf menhaden, striped mullet, blue crab, white shrimp and brown shrimp). Commercial shrimp harvests have been positively correlated with the area of tidal emergent wetlands (Turner 1977 and 1982). Future commercial harvests of shrimp and other fishes and shellfishes would likely be adversely impacted by continued losses in estuarine marsh habitat (Turner 1982). Portions of the project area also provide habitat for freshwater fishes that can tolerate low-salinity conditions, including largemouth bass, bluegill, warmouth, gars, freshwater drum, blue catfish and channel catfish.

Salt and brackish marshes serve as nursery areas for myriads of juvenile shrimp, crabs, redfish, seatrout, Gulf menhaden, etc., and greatly enhance the production of marine organisms. Vegetation production rates in estuarine marshes are extremely high, providing an abundance of detritus to support the estuarine food web.

Much of the existing project area-wetlands are subject to permitted structural management that varies from semi-impounded to completely impounded marsh. The majority of the water control structures within the semi-impounded management areas are supposed to be operated to allow ingress and egress of estuarine fishery organisms, especially brown shrimp and white shrimp, except during drawdowns, periods of high salinity, or waterfowl seasons. Unmanaged coastal wetlands are of particular importance due to their relative scarcity within the Calcasieu-Sabine Basin.

Essential Fish Habitat

Estuarine wetlands and associated shallow waters within the project area have been identified as Essential Fish Habitat (EFH) for postlarval, juvenile and sub-adult stages of brown shrimp, white shrimp, and red drum. EFH in the nearshore, marine-portion of the project area and in the lower portions of the estuary has also been designated as EFH for an array of other species (Table 1). EFH requirements vary depending upon species and life stage. Categories of EFH in the project area include estuarine emergent wetlands, estuarine water column, submerged aquatic vegetation, and estuarine water bottoms. Detailed information on Federally managed fisheries and their EFH is provided in the 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico, prepared by the Gulf of Mexico Fishery Management Council (GMFMC). That generic amendment was prepared in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), (P.L. 104-297). Estuarine-dependent species listed in Table 1 may also serve as prey for other species managed under the MSFCMA by the GMFMC (e.g., red

drum, mackerels, snappers, and groupers) and highly migratory species (e.g., billfishes and sharks) managed by the NOAA-Fisheries.

Table 1. EFH requirements for Managed Fisheries Species in Ecoregion 4.

EFH Requirements for Species Managed by the Gulf of Mexico Fishery Management Council: Ecoregion 4, Mississippi River Delta (South Pass) to Freeport, TX.			
Species	Life Stage	System[1]	EFH
Brown shrimp	juvenile	E	<18m; SAV, sand/shell/soft bottom, emergent marsh, oyster reef
White shrimp	larvae/postlarvae	M/E	<82m; pelagi, soft bottom, emergent marsh
	juvenile	E	<30m; soft bottom, emergent marsh
Red drum	larvae/postlarvae	E	all estuaries planktonic, SAV, sand/shell/soft bottom, emergent marsh
	juvenile	M/E	GOM, <5m Vermilion Bay & E; all estuaries SAV, sand/shell/soft/hard bottom, emergent marsh
	adults	M/E	GOM 1-46 m Vermilion Bay & E; SAV, sand/shell/soft/hard bottom, emergent marsh
Lane snapper	larvae	E/M	4-132 m; reefs, SAV
	juvenile	E/M	<20; SAV, mangrove, reefs, sand/shell/soft bottom
	adults	E/M	4-132 m; shoal banks
King mackerel	juvenile	M	<9m; pelagic
Vermilion snapper	juvenile	M	1-25 m; hard bottom
Grey snapper	adult	E/M	0180 m; emergent marsh, soft bottom, hard bottom, sand shell, shoal banks
Cobia	adult/juvenile	M	1-300 m; pelagic
Greater amberjack	adult/juvenile	M	1-360 m; pelagic, drift algae
Atlantic sharpnose shark	neonate/juvenile/adult	M	All nearshore and offshore waters Freeport, TX, to mouth of the Mississippi River
Scalloped hammerhead	neonate	M	All nearshore waters to 30 fathoms; Galveston Bay, Vermilion Bay to West Bay, TX
Bull shark	neonate	M	Estuarine and nearshore waters Freeport to mouth of Sabine River; nearshore waters off west Cameron Parish.
[1]E=Estuarine, M=marine			

Existing Wildlife Resources

The project area supports an array of productive coastal habitats, dominated by intermediate and brackish marshes and associated shallow estuarine waters. The project-area wetlands and adjacent shallow waters, as well as the chenier ridges, support numerous federal-trust wildlife resources, including migratory birds, threatened and endangered species, and various federal and private land holdings that are held or managed to benefit those species.

The chenier and coastal forest habitats associated with the project area provide nesting habitat for songbirds (e.g., the mockingbird, yellow-billed cuckoo, brown thrasher and northern parula), as

well as stopover areas for trans-Gulf migrating songbirds. Other avian species found in project area's forested habitats include the American woodcock, common yellow-shafted flicker, belted kingfisher, and several species of raptors (e.g., red-tailed hawk and red-shouldered hawk). Wading bird colonies containing species such as anhinga, great egret, and great blue heron typically occur in wooded wetland and scrub-shrub habitat.

Mammals associated with the project area forested habitats include game species such as eastern cottontail, swamp rabbit, white-tailed deer, and gray and fox squirrels; commercially important furbearers such as river otter, muskrat, and nutria; and other mammal species such as striped skunk, coyote, nine-banded armadillo, and Virginia opossum. Smaller mammals such as the cotton rat, marsh rice rat, and white-footed mouse serve as forage for both mammalian and avian carnivores.

Reptiles which utilize study-area forested habitats include the ground skink, five-lined skink, green anole, and western ribbon snake, and numerous other species. Some of the amphibians expected to be found in study-area forested habitats including small-mouthed salamander, green treefrog, bullfrog, and southern leopard frog.

Wildlife expected to utilize the study-area estuarine marshes include wading birds (e.g., herons, egrets, ibises, and roseate spoonbills), rails, migratory waterfowl (e.g., green-winged teal, blue-winged teal, mottled duck, gadwall, American widgeon, and lesser scaup), raptors, and songbirds. Brackish marshes having abundant submerged aquatic vegetation often support large numbers of puddle ducks. Shorebirds utilizing estuarine marshes include killdeer, American avocet, black-necked stilt, American oystercatcher, common snipe, and various other species. Seabirds include white pelican, brown pelican, black skimmer, herring gull, laughing gull, and several species of terns. Other nongame birds such as boat-tailed grackle, red-winged blackbird, seaside sparrow, olivaceous cormorant, belted kingfisher, and sedge wren also utilize estuarine marshes.

Estuarine marsh wildlife also includes swamp rabbit, nutria, muskrat, mink, river otter, raccoon, white-tailed deer, and coyote. Reptiles are limited primarily to the American alligator in intermediate and brackish marshes, and the diamond-backed terrapin and gulf salt marsh snake in brackish and saline marshes. Juvenile sea turtles may seasonally utilize bays and saline marsh ponds in the lower Calcasieu Estuary.

Species of Management Concern

Species of fish, wildlife, and plants labeled as "S1" and S2" by the Louisiana Department of Wildlife and Fisheries are rare species that are vulnerable to extirpation in Louisiana. These species, along with those identified as priority species by the Gulf Coast Joint Venture are species of management concern. Continued population declines could result in these species becoming candidates for listing under the Endangered Species Act.

Species of concern which use project area Gulf beaches include snowy plover, Wilson's plover, long-billed curlew, Hudsonian godwit, gull-billed tern, reddish egret, black skimmer, and peregrine falcon. An "S2" plant found on beaches in Cameron Parish is the wedge leaf prairie

clover. Species of concern that would use project area intermediate, brackish and saline marsh habitat and adjacent open waters include the Louisiana-eyed silk moth, glossy ibis, seaside sparrow, black rail, mottled duck, peregrine falcon, and the diamondback terrapin.

Threatened and Endangered Species

Federally listed threatened or endangered species that occur within the study area include the piping plover (*Charadrius melodus*), the red knot (*Calidris canutus rufa*), the whooping crane (*Grus americana*), and the West Indian manatee (*Trichechus manatus*). Also, threatened and endangered species of sea turtles are known to occur in the southern portion of Calcasieu Lake and/or in nearshore Gulfwaters including the green sea turtle, the hawksbill sea turtle, the Kemp's Ridley sea turtle, and the leatherback sea turtle. The Sprague's pipet (*Anthus spragueii*) is a candidate species for federal listing as a threatened or endangered species

By letter dated March 20, 2015, the Service concurred with the Corps' determination that the project "may affect but will not likely adversely affect" the piping plover or it's critical habitat, red knot, West Indian Manatee, Gulf sturgeon, loggerhead and Kemps Ridley sea turtles, and would have "no effect" on the red-cockaded woodpecker, green, leatherback, and hawksbill sea turtles or loggerhead critical habitat.

By letter dated August 25, 20015, the Service concurred with the Corps' determination that the revised National Economic Development portion of the project would have no effect of the red-cockaded woodpecker.

No further ESA consultation with the Service will be necessary for the proposed action, unless there are significant changes in the scope or location of the proposed project or the project has not been initiated one year from the date of the above-referenced letters. If the proposed project has not been initiated within one year, follow-up consultation (via telephone call or e-mail) should be accomplished with the Service prior to making expenditures because our threatened and endangered species information is updated periodically. If the scope or location of the proposed project is changed significantly, consultation should occur as soon as such changes are made.

Wildlife Management Areas and Parks

Sabine National Wildlife Refuge (NWR) is comprised of 124,511 acres of coastal marsh west of the Calcasieu Lake, and its primary management objective is to preserve a large area of coastal wetlands for wintering and migrating waterfowl from both the Mississippi and Central Flyways. This refuge is also a major nursery area for many estuarine-dependent marine species as well as being the home for alligators and other reptiles, mammals, and numerous wading, water and marsh birds. Cameron Prairie NWR is located east of Calcasieu Lake. Two units (i.e., the Gibbstown and East Cove units) compose this refuge and provide fresh marsh and brackish to saline marsh habitats to support alligators, cottonmouth snakes, white-tailed deer, rabbits, roseate spoonbills, and more than 200 other birds, as well as shrimp, crabs, and many species of fish. Lacassine NWR is located in the Mermentau Basin, northwest of Grand Lake, and is very heavily used by wintering waterfowl. Should proposed project activities directly or indirectly affect those NWRs, please contact the Refuge Complex Leader of the Southwest Louisiana National

Wildlife Refuges (337-598-2216), to obtain a Compatible-Use Determination, and to ascertain the need for a Special Use Permit that may be required should work be conducted on that NWR. The Rockefeller Wildlife Refuge, owned and operated by the Louisiana Department of Wildlife and Fisheries is located south of Grand Chenier in the Mermentau Basin. This 76,000-acre refuge consists of numerous tidal marsh management units operated to provide habitat for wintering migratory waterfowl. Project activities on Rockefeller Refuge should be coordinated with the Refuge manager (337-491-2593).

Future Fish and Wildlife Resources

Loss of coastal marshes is the primary problem affecting study area fish and wildlife resources. Satellite land acreage data (1985-2010) from the U.S. Geological Survey (USGS) was plotted and linear regressions were used to calculate average annual loss rates in percent of 1985 acres per year. Regression derived acreages were aggregated to generate regional loss rates (Figure 4).

Throughout the study area, an average of 930 acres has been lost per year from 1985 to 2010 (Table 2). Hurricane Rita (2005) and Hurricane Ike (2008) caused substantial marsh losses and have likely driven marsh loss rates higher than the rates that existed prior to those storms.

Figure 4. Average annual regional marsh acreage change from 1985 to 2010 (percent/year).

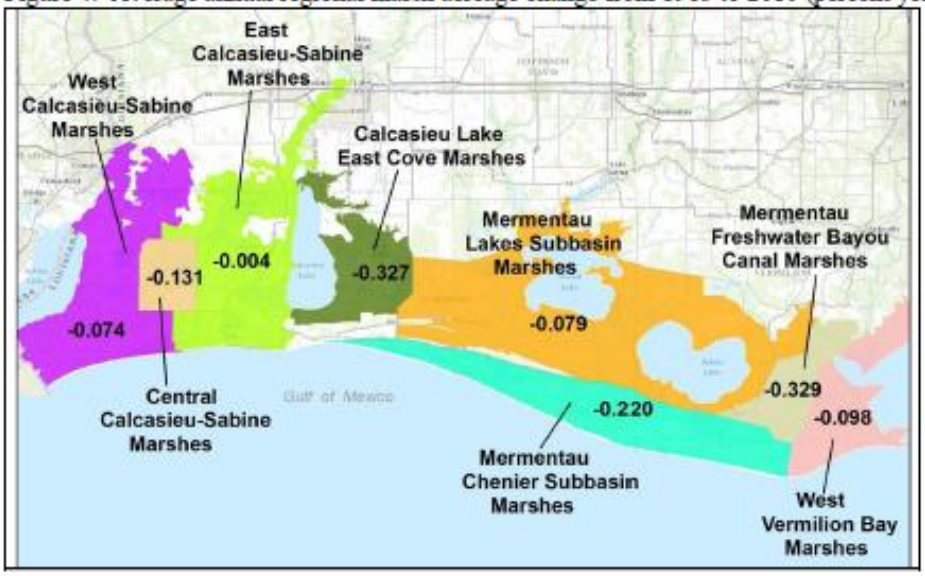


Table 2. Average annual marsh acres lost (1985 to 2010).

Calcaiseu-Sabine Basin				Mermentau Basin	
West Cal-Sab Marshes	Central Cal-Sab Marshes	East Cal-Sab Marshes	East Calcasieu Lake Marshes	Merm. Lakes Subbasin Marshes	Merm. Chenier Subbasin Marshes
-119	-39	-5	-197	-231	-338
			-361		-569

Marsh loss within the West Calcasieu-Sabine marshes is the result of recent rapid losses in the Cameron Meadows Oil and Gas Field north of Johnsons Bayou. Observations suggest that the marsh in this area has drowned and was likely caused by mineral extraction related subsidence of the vegetated marsh surface. Except for this area, the region was experiencing minimal marsh loss prior to Hurricanes Rita and Ike. Central and East Calcasieu-Sabine regions were relatively stable until impacted by Hurricanes Rita and Ike. Recent marsh creation and dredged material disposal efforts have partially offset hurricane related losses in that east region. Marshes east of Calcasieu Lake and throughout the Mermentau Basin were also adversely impacted by these recent hurricanes.

A major cause of marsh loss in the Calcasieu-Sabine Basin has been saltwater intrusion caused by the construction and enlargement of the Calcasieu River and Pass navigation channel, the GIWW, and the Sabine Neches Waterway (LCWCRTF 1998). Those deep-draft channels increased salinity levels, water levels, and duration of high tides (Suhayda et al. 1989) throughout the estuary. The increased salinity stressed fresh and intermediate marsh vegetation, contributing to plant death and ultimately conversion of those marshes to shallow open water. Those hydrology changes resulted in the rapid conversion of interior low-salinity marshes to open water and brackish marshes. Once those losses had occurred, loss rates decreased as the most vulnerable areas had become open water. However, saltwater intrusion continues to impact sensitive low-salinity marsh areas during drought-induced high salinity periods.

Prior to Hurricanes Rita and Ike, the Lakes Sub-basin marshes and other study area marshes were relatively stable. However, significant study area marsh loss occurred prior to 1985
Other Mermentau Basin problems include shoreline erosion along the Gulf of Mexico, which is greatest in the vicinity of Rockefeller Refuge where 30 to 40 feet per year is lost to the Gulf (van Beek and Meyer-Arendt 1982 and Williams et al. 1992).

Shoreline erosion is also a problem along the shores of large lakes such as Calcasieu Lake, Sabine Lake, Grand Lake, and White Lake. Ship wakes and wind waves are the predominant mechanism of erosion causing the Calcasieu Ship Channel to widen at an average of 7.5 feet per year in this reach (Fischenich 2004).

Using tide gage data from the Sabine Pass tide gage and U.S. Army Corps of Engineers methods, a subsidence rate of 3.9 mm/year has been calculated and is assumed to be the rate affecting the entire study area. The combination of subsidence and sea level rise is called submergence or relative sea level rise. Submergence causes marshes to become inundated with higher water levels, stressing most non-fresh marsh plants and leading to plant death and conversion of marshes to open water. Other major causes of study-area marsh loss include altered hydrology, storm events, and developments including the direct and indirect impacts of dredge and fill activities (LCWCRTF 1998).

Wetland losses result in increasing acreage of open water. Continued wetland losses are expected to cause significant declines in coastal fish and shellfish production and in the study area's carrying capacity for migratory waterfowl, wading birds, other migratory birds, alligators, furbearers, and game mammals such as white-tailed deer and swamp rabbit. Wetland losses will also reduce storm surge protection of developed lands, and will likely contribute to water quality degradation associated with excessive nutrient inputs.

Aside from marsh loss, saltwater intrusion has converted fresh marsh habitats to more brackish communities. Marshes not hydrologically managed will continue to provide habitat for more salt tolerant species. Because of continued saltwater intrusion, habitat quantity and quality for freshwater fishes, waterfowl, alligators, and more freshwater-tolerant estuarine species (i.e., Gulf menhaden, white shrimp) will continue to decrease throughout most of this area. Habitat quantity will increase for species such as brown shrimp, spotted seatrout, and black drum, which prefer brackish and saline conditions (LCWCRTF 1999). However, continued degradation of those brackish and saline marshes may reduce production of those fish and shellfish.

DESCRIPTION OF ALTERNATIVES AND RECOMMENDED PLAN

Project goals are to provide hurricane protection and ecosystem restoration that improves ecosystem sustainability. Specific planning objectives were identified to solve the problems by taking advantage of opportunities (Table 3). Levee alternatives were developed and evaluated to provide storm surge protection for the communities of Lake Charles/Sulphur and Abbeville/Erath/Delcambre. Each of those alignments was evaluated at levee heights to protect against 0.5 percent, 1.0 percent, and 2.0 percent annual chance of occurrence storms. In addition to those traditional levee alternatives, non-structural alternatives consisting of buyouts and elevating flood prone structures have also been evaluated throughout the study area.

None of the protection levee alternatives were cost efficient. However, non-structural protection measures did provide a cost-efficient alternative within some regions of the project area and hence, non-structural measures for those regions were selected for inclusion in the TSP (Figure 5). Those non-structural measures will include the construction of 3-7 foot high earthen berms around specific structures. Where construction of those berms could result in impacts to adjacent wetlands, sheetpile structures will be constructed in lieu of earthen berms.

Table 3. Protection and restoration planning objectives.

Objective No.	Objective Description
1	Reduce the risk of damages and losses from hurricane and storm surge flooding in southwest Louisiana
2	Manage tidal flows in southwest coastal Louisiana to improve drainage and prevent salinity from exceeding 2 ppt for fresh marsh and 6 ppt for intermediate marsh
3	Increase wetland productivity in southwest coastal Louisiana in fresh and intermediate marshes to maintain function by reducing the time water levels exceed marsh surfaces.
4	Reduce shoreline erosion and stabilize canal banks in southwest coastal Louisiana areas to protect adjacent wetlands.
5	Restore landscapes, including marsh, shoreline, and cheniers in southwest coastal Louisiana, to maintain their function as wildlife habitat and improve their ability to serve as protective barriers

Figure 5. Map of non-structural protection reaches included in the Recommended Plan.

Ecosystem restoration measures were classified into either hydrology/salinity control measures, marsh creation measures, shoreline protection measures, chenier restoration/reforestation, or oyster reef restoration measures (to improve wetland hydrology). The hydrology/salinity control measures included water control structures and/or navigation locks at Sabine Pass and Calcasieu Pass to reduce saltwater intrusion into the estuary, or control structures to reduce marsh flooding and saltwater intrusion from Calcasieu Lake into interior marshes. Marsh creation/restoration measures and shoreline protection measures were strategically located to protect areas where erosion and marsh loss could result in the establishment of new channels connecting the Gulf of Mexico with interior marshes. Candidate measures were screened based on cost effectiveness, and only the most cost effective measures were retained.

The retained measures were then combined to create an array of restoration alternatives (Table 4). Alternative 1, the Large Integrated Restoration across Basins plan, incorporates all hydrology/salinity control measures, except the Gum Cove Ridge control structure, plus the full array of marsh creation and shoreline protection features, plus all chenier restoration features. Alternative 2, the Moderate Integrated Restoration plan, is similar to Alternative 1 except that it has a reduced number of marsh creation and shoreline protection features. Alternative 3, the Moderate Integrated Restoration Plan with Gum Cove, is identical to Alternative 2 except that it includes the Gum Cove Ridge water control structure. Alternative 4, the Entry Salinity Control plan, includes the water control structures that regulate exchange with the Gulf (this includes the Catfish Point structure), plus a lesser number of marsh creation and shoreline protection features compared to Alternatives 2 and 3.

Table 4. Ecosystem restoration alternatives evaluated.

Alternative Number	Alternative Description
1	Large Integrated Restoration Across Basins
2	Moderate Integrated Restoration
3	Moderate Integrated Restoration w/ Gum Cove
4	Entry Salinity Control Focus
5	Interior Perimeter Control Focus
6	Marsh & Shoreline Focus

Chenier restoration is included in this and all alternatives. Alternative 5 is similar to Alternative 4 except that Alternative 5, the Interior Perimeter Control plan, includes hydrology/salinity control measures that are limited to the interior perimeter control structures (including the Catfish Point structure and the Gum Cove Ridge structure). Chenier restoration is included in

Alternative 5. Alternative 6, the Marsh and Shoreline plan, includes the same interior perimeter hydrology/salinity control measures, minus the Gum Cove control structure, and it includes all marsh creation measures, most of the shoreline protection measures, and all chenier restoration measures.

Restoration Alternative 4 (Entry Salinity Control Alternative), minus the Calcasieu Ship Channel salinity control structure, was initially chosen as the most cost effective of the comprehensive plans. However, subsequent consideration resulted in modifying alternative 4 to eliminate the Sabine Pass salinity control structure (measure 48) and the freshwater retention structure on Little Pecan Bayou (measure 13). Shoreline protection measures on the Gulf shore at Rockefeller Refuge (measures 6b1, 6b2, and 6b3) were also added to this plan. Although the Calcasieu Ship Channel salinity control structure might provide significant environmental benefits, it could not be adequately evaluated under this study because of its complexity. It is recommended that consideration of the Calcasieu Ship Channel salinity control structure be pursued via a separate and independent feasibility analysis. The Cameron-Creole Watershed Spillway is poorly defined and benefits for this feature are also uncertain. It too is being recommended for additional study. RP measures in the Calcasieu-Sabine and the Mermentau Basins are illustrated in Figures 6 and 7, respectively, and listed in Table 5.

FISH AND WILDLIFE CONCERNS IN THE PROJECT AREA

Major fish and wildlife resource concerns in the study area include ecosystem-wide hydrologic alterations associated with construction of major navigation channels within the study area and the resulting loss of coastal marsh and the conversion of fresher marshes to more saline habitats. Marsh loss due to shoreline erosion along the Gulf of Mexico is also a problem. The Service is also concerned with water-quality degradation from agricultural and urban run-off, and industrial discharges, into upper Calcasieu Basin waterbodies. Forested areas that once provided habitat for neotropical migrants have suffered extensive losses and continue to be lost to development and sea level rise and subsidence.

The coastal marshes of the Calcasieu-Sabine Basin have been identified by the North American Waterfowl Management Plan (NAWMP), Gulf Coast Joint Venture, as a key waterfowl wintering area. The Gulf Coast is the terminus of the Central and Mississippi Flyways and is therefore one of the most important waterfowl areas in North America, providing both wintering and migration habitat for significant numbers of the continental duck and goose populations that use both flyways. Aside from being a key waterfowl wintering area, the Chenier Plain provides important year round habitat for over 90 % of the continental population of mottled ducks and serves as a key breeding area for whistling ducks. The goal of the NAWMP, Chenier Plain Initiative is to provide wintering and migration habitat for significant numbers of dabbling ducks, diving ducks, and geese (especially lesser snow and greater white-fronted), as well as year-round habitat for mottled ducks. Because wintering waterfowl prefer fresh and intermediate marshes, and because navigation projects have contributed to substantial reductions in those preferred waterfowl habitats, measures to reduce salinity levels would have a positive impact of waterfowl habitat quantity, quality, and usage.

Figure 6. Recommended Plan measures in the Calcasieu-Sabine Basin

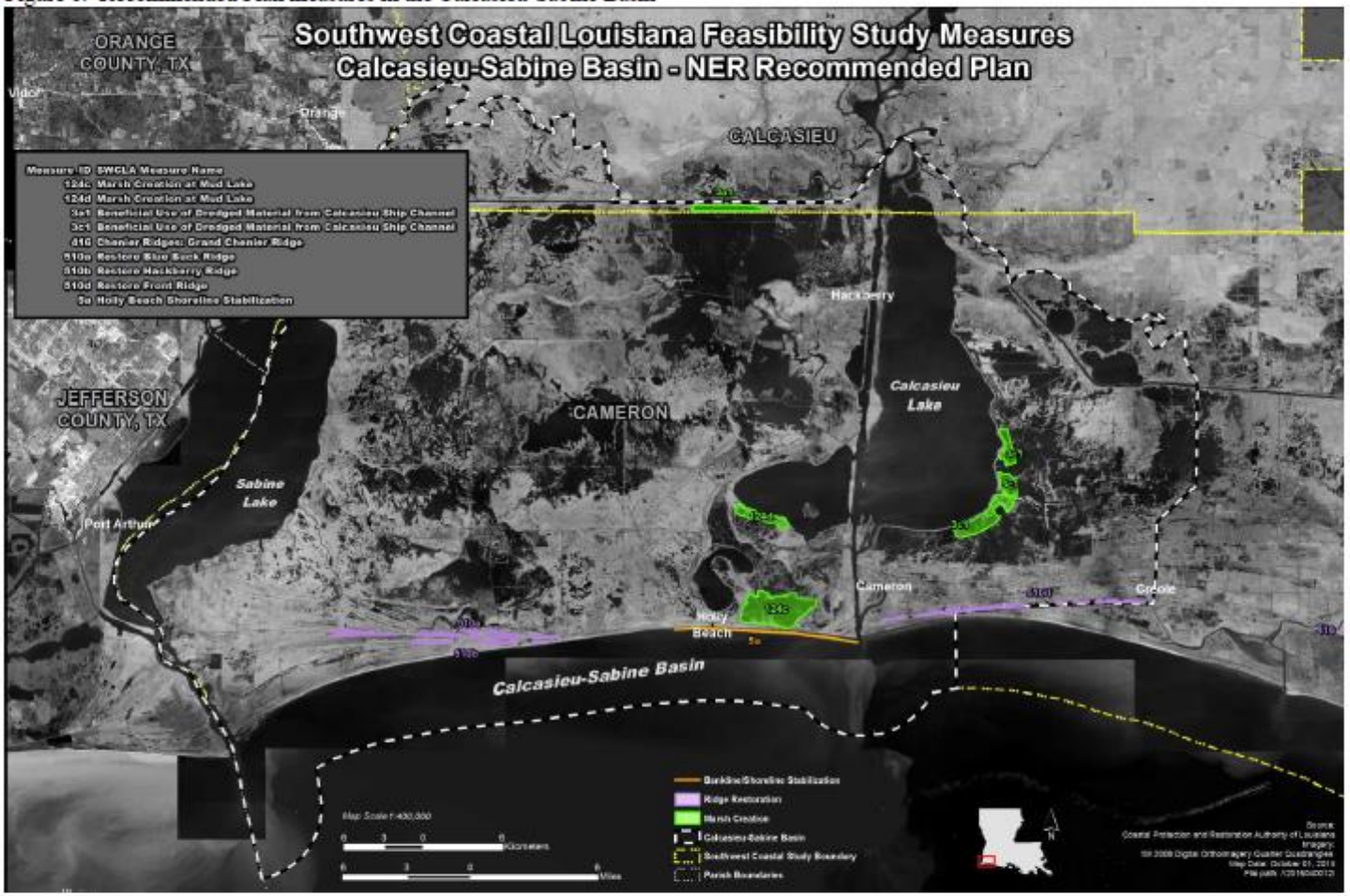


Figure 7. Recommended Plan measures in the Mermentau Basin.

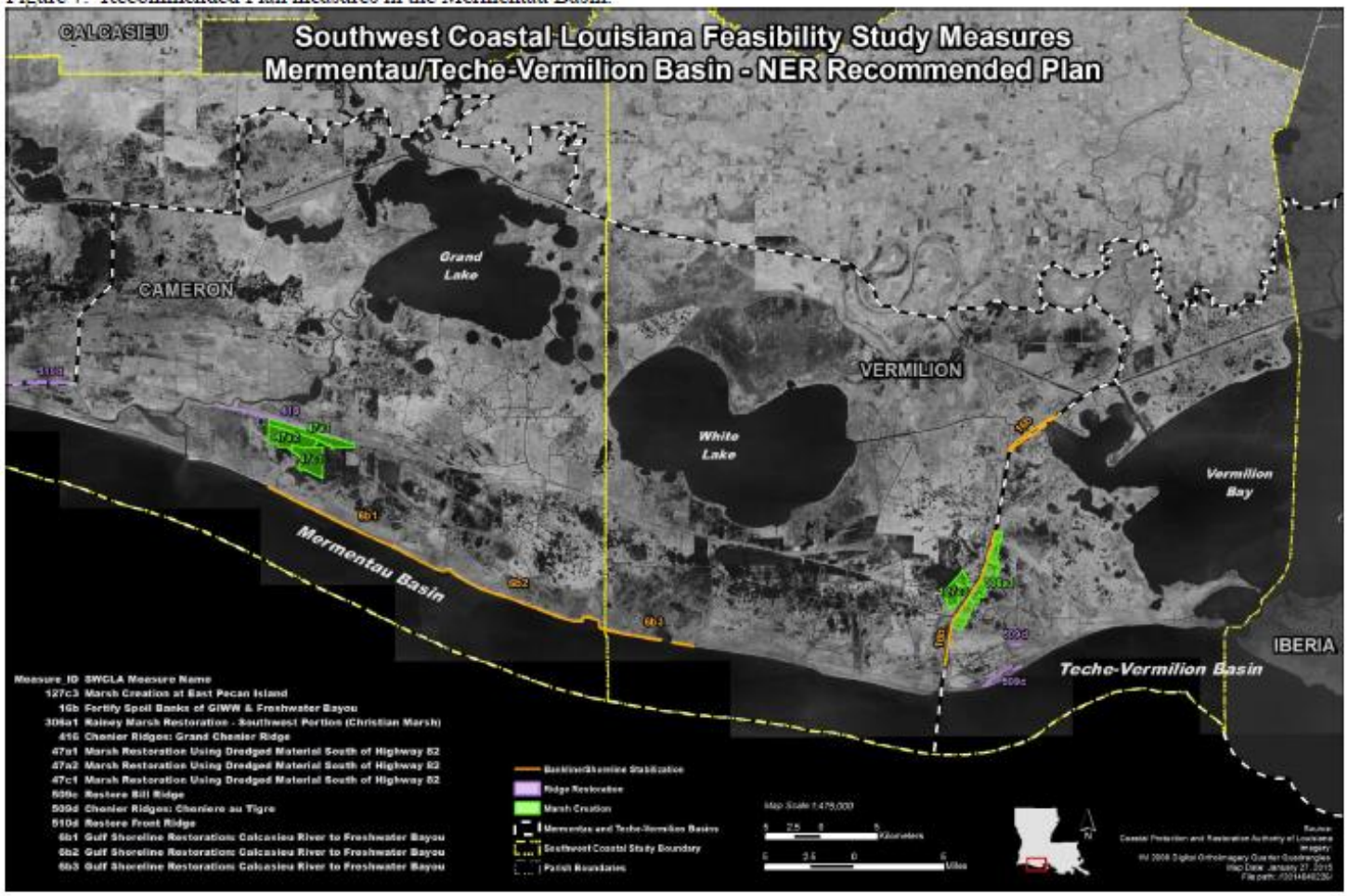


Table 5. Restoration measures comprising the Recommended Plan, by basin.

Basin	Measure Type	Measure Number	Measure Description
CS	Marsh Creation	124c	Marsh creation at Mud Lake
CS	Marsh Creation	124d	Marsh creation at Mud Lake
CS	Marsh Creation	3a1	Beneficial use of dredged material from ship channel
CS	Marsh Creation	3c1	Beneficial use of dredged material from ship channel
CS	Shoreline Prot.	5a	Holly Beach shoreline protection
CS	Chenier Rest.	416	Chenier restoration: Grand Chenier
CS	Chenier Rest.	510a	Chenier restoration: Blue Buck Ridge
CS	Chenier Rest.	510b	Chenier restoration: Hackberry Ridge
CS	Chenier Rest.	510d	Chenier restoration: Front Ridge
Merm	Marsh Creation	127c3	Marsh creation at east Pecan Island
Merm	Marsh Creation	306a1	Marsh creation at Rainey marsh (SW portion)
Merm	Marsh Creation	47a1	Marsh creation using dredged material south of Hwy 82
Merm	Marsh Creation	47a2	Marsh creation using dredged material south of Hwy 82
Merm	Marsh Creation	47c1	Marsh creation using dredged material south of Hwy 82
Merm	Shoreline Prot.	16b	Fortify spoil banks of GIWW and Freshwater Bayou
Merm	Shoreline Prot.	6b1	Gulf shore protection: Calc River to Freshwater Bayou
Merm	Shoreline Prot.	6b2	Gulf shore protection: Calc River to Freshwater Bayou
Merm	Shoreline Prot.	6b3	Gulf shore protection: Calc River to Freshwater Bayou
Merm	Chenier Rest.	416	Chenier restoration: Grand Chenier ridge
Merm	Chenier Rest.	509c	Chenier restoration: Bill Ridge
Merm	Chenier Rest.	509d	Chenier restoration: Cheniere au Tigre
Merm	Chenier Rest.	510d	Chenier restoration: Front Ridge

Concerns exist that a future break of the eroding Gulf of Mexico shoreline into deteriorating interior marshes would create a new tidal pass, and would result in harmful salinity increases within interior marshes. Depending upon the location of such shoreline breaches, the resulting impacts could have ecosystem scale impacts. To avoid such impacts, shoreline protection and marsh creation/restoration measures have been proposed in strategic locations where such scenarios appear more likely.

Serious water quality problems exist in the upper Calcasieu estuary where industrial discharges have resulted in the contamination of upper basin marshes and waterbottoms with dioxins, polychlorinated biphenyls and heavy metals. Should non-structural protection measures occur in those environments, those contaminants might be resuspended thereby allowing tidal action and rainfall runoff to then distribute the contaminants to other portions of the system.

Study area chenier ridges were historically forested. Residential and agricultural development has resulted in the clearing of most of the formerly forested areas. Mining of sand has also

resulted in additional impacts to the chenier forests and to the chenier landforms. In addition to impeding storm surges, forested cheniers provide important stopover habitat for trans-Gulf neotropical migratory songbirds, many of which have experienced population declines in recent decades.

EVALUATION METHODOLOGY

Hundreds of flood prone structures within the study area were identified. Five or six of those structures were located adjacent to wetlands. Rather than construct earthen berms around those buildings, flood protection will be provided by constructing sheetpile structures around those buildings. As a result, no impacts to wetlands and associated fish and wildlife habitats would occur as a result of providing non-structural flood protection.

To evaluate the initial array of ecosystem restoration alternatives, several methodologies were used. Wetland acreage benefits associated with the proposed hydrology/salinity control structures were determined using the Wetland Morphology, Eco-Hydrology, and Vegetation models developed for evaluating the 2012 State Master Plan to provide a scientifically sound and defensible way to estimate the comprehensive benefits of those measures (Meselhe et al. 2013, Couvillion et al. 2013, and Visser et al. 2013). In general, the H&S measures carried forward in the study were those that had larger-scale benefits. Recognizing the complexity of those measures and the need for more robust assessments, the Calcasieu Ship Channel salinity control measure and the Cameron-Creole Spillway measure are not part of the Recommended Plan, but instead are recommended for further study to better assess their benefits/impacts.

For measures having a smaller area of impact, and for measures not expected to affect hydrologic processes, a contractor utilized the Wetland Value Assessment (WVA) methodology to determine benefits for ecosystem restoration measures (benefits in Average Annual Habitat Units [AAHUs]). In addition to AAHUs, the WVA methodology also allows for the calculation of net wetland acreage benefits at the end of the project's 50-year life (future with project acreage minus future without project acreage). Net acres for marsh creation/restoration measures were determined using typical spreadsheet methods and standard assumptions (created marshes lost at 50 percent of the background rate). Shoreline protection net acreage was also determined using spreadsheet methods and the assumption that Gulf shoreline protection features reduced background loss rate 50 percent while interior protection features reduced loss rates 100 percent.

POTENTIAL SIGNIFICANT IMPACTS

Construction of non-structural protection berms and/or sheetpile protection structures is not expected to result in impacts to wetlands, nor would they provide any benefits to wetlands or associated fish and wildlife resources.

Wetland benefits in AAHUs and net wetland acres (future with project acres minus future without project acres at the end of the 50-year project life) for each wetland restoration

alternative are summarized in Table 6. Those net acreage values have been used as the benefit metric to compute the cost per benefit values (i.e., cost per year 50 net acreage) used to develop the Recommended Plan. After modifications to the plan as discussed above, the estimated net marsh acreage and AAHU benefits of the Recommended Plan measures are provided in Table 7.

Implementation of the Recommended Plan would result in a net marsh gain at the end of the 50-year project life of 14,035 acres (12,781 acres of brackish marsh and 1,254 acres of saline marsh).

Table 6. Predicted benefits of ecosystem restoration alternatives.

Alternative	Alternative Description	Acres Created	Acres Nourished	Total Acres	Net Acres	AAHU's
1	**Large Integrated Restoration Across Basins**				**31,960**	**17,898**
	Marsh Creation	20,149	5,522	25,671	17,807	8,726
	Shoreline Protection				6,614	1,939
	Hydro & Salinity Control				6,126	6,695
	Chenier Reforestation			1,413	1,413	538
2	**Moderate Integrated Restoration**				**28,077**	**14,905**
	Marsh Creation	16,059	3,306	19,365	13,820	6,916
	Shoreline Protection				4,847	1,559
	Hydro & Salinity Control				7,997	5,892
	Chenier Reforestation			1,413	1,413	538
3	**Moderate Integrated Restoration w/ Gum Cove**				**21,849**	**14,223**
	Marsh Creation	16,059	3,306	19,365	13,820	6,916
	Shoreline Protection				4,847	1,559
	Hydro & Salinity Control				1,769	5,210
	Chenier Reforestation			1,413	1,413	538
4	**Entry Salinity Control Focus**				**20,577**	**9,785**
	Marsh Creation	8,579	4,026	12,605	8,714	4,194
	Shoreline Protection				1,314	268
	Hydro & Salinity Control				9,136	4,785
	Chenier Reforestation			1,413	1,413	538
5	**Interior Perimeter Control Focus**				**12,129**	**5,238**
	Marsh Creation	8,579	4,026	12,605	8,714	4,194
	Shoreline Protection				1,314	268
	Hydro & Salinity Control				688	238
	Chenier Reforestation			1,413	1,413	538
6	**Marsh & Shoreline Focus**				**24,449**	**14,937**
	Marsh Creation	20,149	5,522	25,671	17,807	8,726
	Shoreline Protection				4,895	1,559
	Hydro & Salinity Control				334	4,114
	Chenier Reforestation			1,413	1,413	538

Table 7. Estimated benefits and costs of Recommended Plan measures.

Measure Number	Marsh Restoration Measure Name	Basin	Net Benefits (acres)	Benefits (AAHU)	Initial Construction Costs
3a1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	Calcasieu	454	191	66,593,748
3c1	Beneficial Use of Dredged Material from Calcasieu Ship Channel	Calcasieu	1,324	607	168,194,346
47a1	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	895	272	105,234,982
47a2	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	1,218	381	97,348,440
47c1	Marsh Restoration Using Dredged Material South of Highway 82	Mermentau	1,135	353	95,372,834
124c	Marsh Creation at Mud Lake	Calcasieu	1,228	500	112,219,520
124d	Marsh Creation at Mud Lake	Calcasieu	168	4	28,882,160
127c3	Marsh Restoration at Pecan Island	Mermentau	735	241	61,662,041
306a1	Rainey Marsh Restoration Southwest Portion (Christian Marsh)	Mermentau	743	151	75,885,692
	Totals		*7,900*	*2,700*	*811,393,763*
Measure Number	**Shoreline Protection Measure Name**	**Basin**	**Net Benefits (acres)**	**Benefits (AAHU)**	**Initial Construction Costs**
5a	Holly Beach Shoreline Stabilization – Breakwaters	Calcasieu	26	56	144,044,021
6b1	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	2,140	625	198,480,921
6b2	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	1,583	466	145,876,561
6b3	Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou	Mermentau	1,098	312	115,270,890
16b	Fortify Spoil Banks of the GIWW and Freshwater Bayou	Mermentau	1,288	279	36,018,600
	Totals		*6,135*	*1,738*	*639,690,993*
Measure Number	**Chenier Reforestation**	**Basin**	**Net Benefits (acres)**	**Benefits (AAHU)**	**Initial Construction Costs**
CR	Chenier Reforestation	Calcasieu	1,132	442	196,778
CR	Chenier Reforestation	Mermentau	282	96	49,523
	Totals		*1413*	*538*	*246,301*

Table 8. Summary of Recommended Plan acreage benefits by habitat type.

Summary of Calcasieu Basin Marsh Creation Benefits							
Measure Number	Basin	Location	Marsh Type	Acres Created	Acres Nourished	Total Acres	Net Benefits (acres)
3a1	Calcasieu	GIWW	Brackish	599	-	599	454
3c1	Calcasieu	SE Calcasieu Lake	Brackish	1,347	734	2,081	1,324
124c	Calcasieu	Mud Lake	Saline	1,077	708	1,837	1,228
124d	Calcasieu	West Cove	Brackish	159	448	607	168
Saline Marsh Total				**1,077**	**708**	**1,837**	**1,228**
Brackish Marsh Total				**2,105**	**1,182**	**3,287**	**1,946**
Calcasieu Basin Total				**3,182**	**1,890**	**5,124**	**3,174**
Summary of Mermentau Basin Marsh Creation Benefits							
Measure Number	Basin	Location	Marsh Type	Acres Created	Acres Nourished	Total Acres	Net Benefits (acres)
47a1	Mermentau	Grand Chenier	Brackish	933	88	1,021	895
47a2	Mermentau	Grand Chenier	Brackish	1,297	126	1,423	1,218
47c1	Mermentau	Grand Chenier	Brackish	1,304	4	1,308	1,135
127c3	Mermentau	Freshwater Bayou	Brackish	832	62	894	735
306a1	Mermentau	Freshwater Bayou	Brackish	627	1,269	1,896	743
Brackish Marsh Total				**4,993**	**1,549**	**6,542**	**4,726**
Calcasieu & Mermentau Brackish Marsh Creation Total				**7,098**	**2,731**	**9,829**	**6,672**
Calcasieu & Mermentau Saline Marsh Creation Total				**1,077**	**708**	**1,837**	**1,228**
Calcasieu & Mermentau All Marsh Creation Total				**8,175**	**3,439**	**11,666**	**7,900**

Summary of Shoreline Marsh Protection Benefits				
Measure Number	Basin	Location	Marsh Type	Net Benefits (acres)
5a	Calcasieu	Holly Beach	Saline	26
6b1	Mermentau	Rockefeller Refuge	Brackish	2,140
6b2	Mermentau	Rockefeller Refuge	Brackish	1,583
6b3	Mermentau	Rockefeller Refuge	Brackish	1,098
16b	Mermentau	Freshwater Bayou	Brackish	1,288
Gulf of Mexico - Brackish Marsh Total				**4,821**
Gulf of Mexico - Saline Marsh Total				**26**
Freshwater Bayou - Brackish Marsh Total				**1,288**
Total Shoreline Protection Total				**6,135**

Summary of Chenier Reforestation Benefits		
Measure Number	Basin	Net Benefits (acres)
	Calcasieu	1,132
	Mermentau	282
Chenier Reforestation Total		**1,414**

TOTAL Marsh Net Benefits	
Brackish (acres)	Saline (acres)
12,781	**1,254**
Total	**14,035**

The Recommended Plan would not only restore productive fish and wildlife habitat, but because of their strategic locations, those measures may also provide unquantified indirect protection benefits to adjacent marshes and shallow open water habitats. Additionally, the chenier reforestation measures would restore 1,414 acres of forested chenier habitat. These reforestation measures would substantially increase the acreage of critically important stop-over habitat for trans-Gulf migrating neotropical songbirds, many of which have experienced recent population declines. The proposed marsh creation, shoreline protection and chenier reforestation measures,

would also serve to dampen storm surges and protect communities located north of the coastal marshes.

FISH AND WILDLIFE CONSERVATION MEASURES

The President's Council on Environmental Quality defined the term mitigation in the National Environmental Policy Act regulations to include:

a) avoiding the impacts altogether by not taking a certain action or parts of an action;
b) minimizing impacts by limiting the degree or magnitude of the action and its implementation;
c) rectifying the impacts by repairing, rehabilitating, or restoring the affected environment;
d) reducing or eliminating the impacts over time by preservation and maintenance operations during the life of the action; and,
e) compensation for the impacts by replacing or providing substitute resources or environments.

The Service's mitigation policy (Federal Register, Volume 46, Number 15, pages 7656-7663, January 23, 1991) provides guidance to help ensure that the level of mitigation recommended by the Service is consistent with the value and scarcity of the fish and wildlife resources involved. In keeping with that policy, the Service usually recommends that losses of high-value habitats which are becoming scarce be avoided or minimized to the greatest extent possible. Unavoidable losses of such habitats should be fully compensated by replacement of the same kind of habitat value; this is called in-kind mitigation. The mitigation planning goals and associated Service recommendations should be based on the four categories, as shown in Table 9.

Table 9. U. S. Fish and Wildlife Service Resource Categories.

FWS Resource Categories
Resource Category 1 - Habitat to be impacted is of high value for evaluation species and is unique and irreplaceable on a national basis or in the ecoregion section. The mitigation goal for this Resource Category is that there should be no loss of existing habitat value.
Resource Category 2 - Habitat to be impacted is of high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the ecoregion section. The mitigation goal for habitat placed in this category is that there should be no net loss of in-kind habitat value.
Resource Category 3 - Habitat to be impacted is of high to medium value for evaluation species and is relatively abundant on a national basis. FWS's mitigation goal here is that there be no net loss of habitat value while minimizing loss of in-kind habitat value.
Resource Category 4 - Habitat to be impacted is of medium to low value for evaluation species. The mitigation goal is to minimize loss of habitat value.

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Bottomland hardwood forests, bald cypress swamps, and coastal marshes are considered by the Service to be aquatic resources of national importance due to their increasing scarcity and high habitat value for fish and wildlife within Federal trusteeship (i.e., migratory waterfowl, wading birds, other migratory birds, threatened and endangered species, and interjurisdictional fisheries). Therefore, the Service recommends that unavoidable losses of those habitats should be compensated via in-kind replacement.

Based on current project plans, there would be no net adverse impacts to the above-mentioned aquatic resources of national importance and hence, no need to mitigate for adverse impacts. The proposed ecosystem restoration measures would instead, increase the quantity of those valuable habitats.

SERVICE POSITION AND RECOMMENDATIONS

Although the proposed ecosystem restoration measures will provide a substantial benefit to wetlands and associated fish and wildlife resources, future design details of certain measures could nevertheless have some unintended adverse impacts to adjoining wetlands and/or fish and wildlife resources. The recommendations provided below address ways to avoid such unintended impacts and to improve fish and wildlife habitat quality in and adjacent to those restoration areas. Therefore, the Service supports implementation of the Recommended Plan provided the following recommendations are included as part of the plan.

Because submerged aquatic vegetation provides food for migratory waterfowl, and provides high quality nursery habitat for estuarine dependent fisheries (Castellanos and Rozas 2001, and Kanouse et al. 2006), the open water areas targeted for marsh creation measures should avoid areas of dense submerged aquatic vegetation to the greatest degree possible.

Marsh Creation south of Grand Chenier (measures 47a1, 47a2, and 47c1):
These proposed marsh creation measures would convert over 2,000 acres of existing shallow open water to solid marsh. Because those open water areas provide habitat for waterfowl and estuarine fisheries, we recommend that some of those open water areas not be filled to maintain aquatic habitat (i.e., ponds) used by fisheries and waterfowl.

Because the slurried fill material will come from the Gulf of Mexico, the salinity of the effluent may be very high. If that water is trapped within adjoining marshes or within the fill areas, evapotranspiration during summer and/or droughts could cause damage to adjoining marsh vegetation and/or reduce vegetative colonization of fill areas. To avoid such impacts, we recommend the engineers ensure that adequate channels exist to provide drainage/water exchange, and avoid ponding of Gulf water effluent within or adjacent to the fill areas. Similarly, any ponds or enclosed non-fill areas should have drainage channels (existing or man-made) to carry away Gulf water effluent and avoid concentration of salts.

To the greatest degree possible, sediment pumping should be conducted during non-growing season periods to reduce possible salinity impacts on adjoining vegetation. If this would require

mobilization and demobilization of the sediment pipeline at the beach crossing during months when piping plover are present, the Service does not believe that this would be a problem given limited extent of that activity, and the other proposed measures to reduce or avoid impacts to plovers.

The proposed pipeline route utilizes an existing north-south canal for much of its length. To pump into eastern and western extremes of the designated fill area, the pipeline route should depart from that designated route only within the proposed fill area, and should be routed through open water areas, to avoid impacting existing marshes.

Marsh Creation along Freshwater Bayou Canal (measures 127c3 and 306a1):
The proposed fill areas are strategically located adjacent to Freshwater Bayou Canal to isolate the canal from interior marshes, to preclude canal related hydrology impacts from impacting interior marshes and waters. Currently, the plans would have the fill areas drain into interior marshes away from Freshwater Bayou Canal. Because the slurried sediment will be obtained from the near shore Gulf of Mexico, the adjacent intermediate marshes and open water areas might be harmed by the saltwater effluent draining from the fill areas. To minimize that impact, the Service recommends that the effluent be drained into Freshwater Bayou Canal and not the interior marshes. After construction, dewatering, and saltwater drainage from the fill areas has been completed, those drainage routes should be plugged and drainage of the fill areas should be redirected into interior marshes.

If a containment dike is constructed adjacent to the Freshwater Bayou Canal, the Service would recommend that it not be degraded after construction so that it can help to maintain the desired hydrologic isolation of the canal from the interior marshes.

Marsh Creation near Mud Lake (measures 124c and 124d):
Measure 124c would convert over 1,900 acres of existing shallow open water to solid marsh. Because those open water areas provide habitat for waterfowl and estuarine fisheries, we recommend that some of those open water areas should not be filled to maintain aquatic habitat (i.e., ponds) used by fisheries, waterfowl, and other wildlife.

Because the slurried fill material will come from the Gulf of Mexico, the salinity of the effluent may be very high. If that water is trapped within adjoining marshes or within the fill areas, evapotranspiration during summer and/or droughts could cause damage to adjoining marsh vegetation and/or reduce vegetative colonization of fill areas. To avoid such impacts, we recommend the engineers ensure that adequate channels exist to provide drainage/water exchange, and avoid ponding of Gulf water effluent within or adjacent to the fill areas. Similarly, any ponds or enclosed non-fill areas should have drainage channels (existing or man-made) to carry away Gulf water effluent and avoid concentration of salts.

The proposed containment dikes along the western and southeastern fill area boundaries may block existing drainage routes for marshes adjacent to the fill area. Should construction of containment dikes create unintentional impoundments, evapotranspiration may increase the salinity of effluent water discharged into those drainage-impaired marshes during the summer

and/or droughts. To avoid potential saltwater impacts and impaired drainage impacts, we recommend weir boxes along those sections of dike be eliminated unless the presence of unimpeded drainage routes can be documented.

Measure 124d would create approximately 149 acres of marsh along the southern edge of West Cove. Because of oil field board roads located south of the proposed fill area, the fill area and marshes south of the fill area must drain northward via several small canals, into West Cove. To prevent ponding impacts to marshes south of the fill area, we recommend the designs for the containment dikes should avoid closing both of those canals.

Portions of measure 124d are located on Sabine National Wildlife Refuge, and portions of measure 3c1 (marsh creation along the eastern rim of Calcasieu Lake) are located on Cameron Prairie National Wildlife Refuge. Internal policy precludes the Corps from constructing projects on federal lands. Rather than deleting these measures from the Recommended Plan and potentially losing the critical landscape functions these marshes provide, the Corps is recommending that funding for the construction of these restoration projects be given to the Service. For the Service to construct those measures, the funding should include costs for the necessary surveys, engineering and design, and inspection costs, in addition to direct construction costs.

Cameron-Creole Spillway (measure74a):
The stated design of this structure differs substantially from that found in the 2012 Louisiana Comprehensive Master Plan for a Sustainable Coast (Master Plan). The Service would prefer a design that would allow for greater operational flexibility than the proposed spillway which would have an invert elevation of +2.0 ft NAVD1988. Although the Service supports the Master Plan concept for this measure, details regarding design and operation of this measure are not yet sufficient to authorize this measure under this study. According to staff working to determine benefits (Ken Duffy email correspondence Feb. 2015), the modeling methods used to assess this measure were not sufficient to capture anticipated flood reduction benefits. Consequently, the Service recommends that an independent feasibility assessment of this feature be conducted and that the design should include lower invert elevations and provide greater operational flexibility than that described under this study. Such a design may also provide more benefits if it could be used to discharge excess water when stages are less than +2.0 feet NAVD1988.

The proposed ecosystem restoration measures will create and protect areas of strategically important marshes. However, implementation of some restoration measures could result in some minor adverse impacts. To avoid and/or reduce those project-related adverse impacts to fish and wildlife resources, and to enhance the desired ecosystem benefits, the Service provides the following general recommendations:

1. To the greatest degree practical, borrow pits for construction of marsh creation measures should be located to avoid and minimize direct and indirect impacts to vegetated wetlands. Borrow pit construction should also avoid the following:
    a. avoid inducing wave refraction/diffraction erosion of existing shorelines
    b. avoid inducing slope failure of existing shorelines

c. avoid submerged aquatic vegetation
d. avoid increased saltwater intrusion
e. avoid excessive disturbance to area water bottoms
f. avoid inducing hypoxia

2. Marsh creation measures should avoid, to the degree practical, areas of dense submerged aquatic vegetation.

3. The Corps should monitor ecosystem restoration features to document the degree of success achieved. We recommend the Service and other interested natural resource agencies be included in developing those monitoring criteria and in the review of subsequent monitoring information and reports.

4. The Corps should obtain a right-of-way from the Service prior to conducting any work on Sabine or Cameron Prairie National Wildlife Refuges, in conformance with Section 29.21-1, Title 50, Right-of-Way Regulations. Issuance of a right-of-way will be contingent on a determination that the proposed work will be compatible with the purposes for which the Refuge was established.

5. All planning, design, or other construction-related activities (e.g., surveys, geotechnical borings, etc.) conducted on National Wildlife Refuges (NWRs) will require the Corps to obtain a Special Use Permit from the Refuge Manager of the Southwest Louisiana Refuge Complex. We recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact the Refuge Manager (337/598-2216 or SWLRComplex@fws.gov) for further information on compatibility of proposed ecosystem restoration measures, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

6. The Corps should contact the Louisiana Department of Wildlife and Fisheries prior to conducting any work on Rockefeller Refuge (337-491-2593).

7. We recommend the Corps continue to coordinate with the Service throughout planning and construction to ensure that the proposed project does not impact waterbird nesting colonies, threatened or endangered species, or species that may be listed in the future.

8. We recommend the Corps coordinate with the Service and other interested natural resource agencies when developing detailed plans regarding restoration measures, especially during the Preliminary Engineering and Design Phase (PED) and construction phase, for measures where specific recommendations have been provided below.

9. To the greatest degree possible, sediment pumping should be conducted during non-growing season periods to reduce possible salinity impacts on adjoining vegetation.

Service recommendations regarding specific ecosystem restoration measures are provided below:

10. Marsh creation measures south of Grand Chenier (47a1, 47a2, and 47c1)
    a. Combined, these measures would convert over 2,000 acres of existing shallow open water to solid marsh. We recommend that some of those open water areas not be filled to maintain aquatic habitat (i.e., ponds) used by fisheries, waterfowl, and other wildlife.
    b. To avoid saltwater entrapment impacts, the engineers are encouraged to design channels to provide drainage/water exchange, and avoid ponding of Gulf water effluent within or adjacent to the fill areas. Similarly, we recommend any ponds or enclosed non-fill areas have drainage channels (existing or man-made) to carry away Gulf water effluent and avoid concentration of salts.
    c. To pump into eastern and western extremes of the designated fill area, the pipeline route should depart from that designated route only within the proposed fill area, and should be routed through unvegetated open water areas, to avoid impacting existing marshes.

11. Marsh creation along Freshwater Bayou Canal (measures 127c3 and 306a1)
    a. To avoid saltwater effluent impacts, we recommend the effluent be drained toward Freshwater Bayou Canal and not into the interior marshes. After construction, once saltwater drainage from the fill areas has been completed, those drainage routes should be plugged and drainage of the fill areas should be redirected into interior marshes.
    b. If a containment dike is constructed adjacent to the Freshwater Bayou Canal, the Service recommends that it not be degraded after construction so that it can help to maintain the desired hydrologic isolation of the interior marshes from the canal.

12. Marsh creation near Mud Lake (measure 124c)
    a. This measure would convert over 1,900 acres of existing shallow open water to solid marsh. We recommend that some of those open water areas not be filled to maintain aquatic habitat (i.e., ponds) used by fisheries and waterfowl.
    b. To avoid saltwater entrapment impacts, the engineers are encouraged to design channels to provide drainage/water exchange, and avoid ponding of Gulf water effluent within or adjacent to the fill areas. Similarly, we recommend any ponds or enclosed non-fill areas have drainage channels (existing or man-made) to carry away Gulf water effluent and avoid concentration of salts.
    c. The proposed containment dikes along the western and southeastern fill area boundaries may block existing drainage routes for marshes adjacent to the fill area. To avoid potential saltwater entrapment impacts and impaired drainage impacts, we recommend weir boxes along those sections of dike be eliminated unless the presence of unimpeded drainage routes can be documented.

13. Marsh creation near West Cove (measure 124d)

a. To prevent ponding impacts and saltwater entrapment impacts to marshes south of the fill area, we recommend the containment dike designs avoid closing both canals that provide drainage for the fill area and adjacent marshes.
b. If funding is provided to the Service to construct this or other measures located on National Wildlife Refuges, that funding should include funding necessary to cover the necessary administration, engineering, and design work.

This final report is submitted in fulfillment of the requirements of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and constitutes the final report of the Secretary of the Interior as required by Section 2(b) of that Act. This report has incorporated comments made by the National Marine Fisheries Service (see Appendix A) on our draft Coordination Act Report dated February 26, 2015. No comments on our February 2015 draft Coordination Act Report were received from the Louisiana Department of Wildlife and Fisheries.

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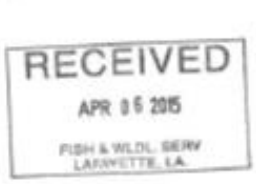
APPENDIX A

National Marine Fisheries Service comments on the Feb 2016 Revised Draft Coordination Act Report



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

March 31, 2015 F/SER46/LA:jk
225/389-0508

Mr. Jeffrey Weller, Field Supervisor
Louisiana Field Office
U.S. Fish and Wildlife Service
646 Cajundome Blvd., Suite 400
Lafayette, Louisiana 70506

Dear Mr. Weller:

The NOAA's National Marine Fisheries Service (NMFS) has received the revised draft Fish and Wildlife Coordination Act Report (Report) for the "Southwest Coastal Louisiana Feasibility Study." The purpose of the study was to evaluate alternatives which provide storm damage reduction and ecosystem restoration measures within the 4,700 square mile study area in Louisiana's Chenier plain, encompassing Cameron, Calcasieu, and Vermilion Parishes. The Tentatively Selected Plan (TSP) is a combination of non-structural storm surge protection measures and an array of different types of ecosystem restoration features. The TSP for the non-structural storm surge protection features were not covered in detail in this Report. The TSP for the ecosystem restoration features include one hydrology/salinity control measure, nine marsh creation measures, five shoreline protection measures, and eight chenier restoration measures.

The NMFS has reviewed the Report and concurs with its recommendations. However, the Essential Fish Habitat (EFH) section of the Report (pages 10-11) lists incorrect managed species potentially found in the project area. The species and life stages should up updated to reflect the attached list. The Report also cites a 1998 generic amendment of the Fishery Management Plans as providing detailed information on federally managed fisheries and their EFH. The document was updated in 2005 and that year should be cited in this section of the Report. Additionally, page 14 of the report should list Ms. Kelly Shotts (727-551-5603) as the NMFS Protected Resources Division contact concerning aquatic marine threatened or endangered species.

We appreciate the opportunity to review and comment on this Report.

Sincerely,

Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

Enclosure

c:
NOD, Varnado
F/SER4, Dale, Rolfes
F/SER46, Swafford
Files

EFH Requirements for Species Managed by the Gulf of Mexico Fishery Management Council: Ecoregion 4, Mississippi River Delta (South Pass) to Freeport, TX.

Species	Life Stage	System[1]	EFH
Brown shrimp	juvenile	E	<18 m; SAV, sand/shell/soft bottom; emergent marsh, oyster reef
White shrimp	larvae/postlarvae	M/E	<82 m; pelagic, soft bottom, emergent marsh
	juvenile	E	<50 m; soft bottom, emergent marsh
Red drum	larvae/postlarvae	E	all estuaries plankton; SAV, sand/shell/soft bottom, emergent marsh
	juvenile	M/E	GOM <5 m Vermilion Bay & E; all estuaries SAV, sand/shell/soft/hard bottom, emergent marsh
	adults	M/E	GOM 5-46 m Vermilion Bay & E; all estuaries SAV, sand/shell/soft/hard bottom, emergent marsh
Lane snapper	larvae	EM	4-132 m; reefs, SAV
	juvenile	EM	<20 m; SAV, mangrove, reefs, sand/shell/soft bottom
	adults	EM	4-132 m; shoal-banks
King mackerel	juvenile	M	<9m; pelagic
Vermilion snapper	juvenile	M	1-25 m; hard bottom
Gray snapper	adult	EM	1-180 m; emergent marsh, soft bottom, hard bottom, sand shell, shoal-banks
Cobia	adult/juvenile	M	1-300 m; pelagic
Greater amberjack	adult/juvenile	M	1-360 m; pelagic, drift algae
Atlantic sharpnose shark	neonate/juvenile/adult	M	All nearshore and offshore waters Freeport Tx, to the mouth of the Mississippi River
Scalloped hammerhead	neonate	M	All nearshore waters to 30 fathoms; Galveston Bay, Vermilion Bay to West Bay, Tx
Bull shark	neonate	M	Estuarine and nearshore waters Freeport to mouth of Sabine Lake; nearshore waters off west Cameron Parish

[1] E=estuarine, M=marine

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

December 3, 2013

Colonel Richard L. Hansen
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Hansen:

Please reference the ongoing Southwest Coastal Louisiana Feasibility Study currently being finalized by the New Orleans District Corps of Engineers (Corps). The Fish and Wildlife Service (FWS) provided you with a draft Coordination Act Report (CAR) dated November 2013. After we submitted our draft CAR, the Tentatively Selected Plan (TSP) was modified to remove all storm surge protection levees from the array of measures designed to provide storm surge protection for study area communities. Consequently, the Service is providing this Supplemental CAR to address this change and update our recommendations. This supplemental report is submitted in partial fulfillment of the requirements of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). Neither this Supplemental Report, nor our November 2013 draft CAR constitutes the final report of the Secretary of the Interior as required by Section 2(b) of that Act. This Supplemental CAR has been provided to the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service. Their comments on these reports will be incorporated into our final report.

On November 26, 2013, my staff was informed that the Corps had decided to remove all structural protection levee features from the TSP. This is the third change to the TSP that has occurred since the Service began preparing our draft CAR. Not only have these changes required additional time on the part of our staff, but these changes reveal that the Corps' new planning method has resulted in the identification of a TSP before all the necessary information was available. Moreover, the Service is concerned that in the haste to proceed rapidly through the planning process, this new project planning method may result in the rejection of some alternatives and the selection of others without sufficient information, including details on proposed measures which are needed to understand and quantify the environmental benefits and impacts. Therefore, we request that our concerns about this new method be presented to the appropriate policy makers for their consideration.

In our November 2013 draft CAR, the Service identified a number of planning deficiencies with

the proposed storm surge protection levees and the inability to properly assess their associated impacts to fish and wildlife. Now that the TSP has been modified to eliminate those proposed levees, the Service hereby updates the recommendations contained in our November 2013 draft CAR to revoke all those recommendations (i.e. recommendations 1 through 5) that reference the proposed storm surge protection levees. All the remaining recommendations and comments remain valid and should be addressed by the Corps to fulfil the requirements of the Fish and Wildlife Coordination Act.

Thank you for the opportunity to update our comments. The above findings and recommendations do not constitute the final report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act. Please contact Mr. Ronny Paille of this office (337/291-3117) if you require additional information.

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

cc: EPA, Dallas, TX
NMFS, Baton Rouge, LA
Southwest Louisiana National Wildlife Refuges Complex, Bell City, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CMD), Baton Rouge, LA
LA Office of Coastal Protection and Restoration, Baton Rouge, LA

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
November 5, 2013

Colonel Richard L. Hansen
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Hansen:

Attached is the Draft Fish and Wildlife Coordination Act Report on the tentatively selected plan for the Southwest Coastal Louisiana Feasibility Study, Louisiana. That study is evaluating alternatives for providing hurricane protection and storm damage reduction and related purposes in Cameron, Calcasieu, and Vermilion Parishes.

This draft report is transmitted under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and is being coordinated with the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service. Comments by those agencies will be incorporated to our final report.

Should your staff have any questions regarding the enclosed draft report, please have them contact Ronny Paille of this office at 337/291-3117.

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Field Office

Attachment
cc: SW Louisiana Refuges, Bell City, LA
NMFS, Baton Rouge, LA
EPA, Dallas, TX
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
OCPR, Baton Rouge, LA

Southwest Coastal Louisiana Feasibility Study

DRAFT
FISH AND WILDLIFE COORDINATION ACT REPORT

PROVIDED TO
NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA

PREPARED BY

RONALD PAILLE
SENIOR FISH AND WILDLIFE BIOLOGIST

U.S. FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
LAFAYETTE, LOUISIANA

NOVEMBER 2013

EXECUTIVE SUMMARY

The Corps of Engineers (Corps) was requested to conduct the Southwest Coastal Louisiana Feasibility Study (SWLA Study) via Resolution Docket 2747 adopted on December 7, 2005, by the U.S. House of Representatives Committee on Transportation and Infrastructure. That Docket specifically requested the Secretary of the Army, in accordance with section 110 of the River and Harbors Act, to "survey the coast of Louisiana in Cameron, Calcasieu, and Vermilion Parishes with particular reference to the advisability of providing hurricane protection and storm damage reduction and related purposes to include the feasibility of constructing an armored 12-foot levee along the Gulf Intracoastal Waterway."

Numerous measures to provide storm damage reduction and ecosystem restoration measures were evaluated within the study area. Those measures included construction of levees designed to provide hurricane storm surge protection (including the armored 12-foot levee described above), protection and restoration of coastal wetlands and unique natural ecosystem features (such as cheniers), construction of shoreline protection projects (for navigation canals, interior lakes and bays, and the Gulf of Mexico), and implementation of non-structural protection measures such as structure relocations and buyouts.

The initial list of proposed project measures was derived from existing large-scale coastal protection and ecosystem restoration plans (e.g., the Louisiana Coastal Protection and Restoration Plan [LACPR], the Louisiana Coastal Area Ecosystem Restoration Study Report [LCA], and the Louisiana's Comprehensive Master Plan for a Sustainable Coast [State Master Plan 2012]), public comments received during the project scoping process, and recommendations provided by local representatives and natural resource agencies during the initial planning phase of the project. The initial list of potential project measures was reduced to a more focused and achievable final list of measures based on criteria that were approved by an interagency project delivery team.

The final list of measures was assembled into 6 possible protection levee alternatives and 6 ecosystem restoration alternatives, all of which were evaluated for cost effectiveness. The Lake Charles Eastbank levee, together with non-structural protection measures in select locations, was chosen as the protection measures for inclusion in the Tentatively Selected Plan (TSP). Restoration Alternative 4 (Entry Salinity Control Alternative) was initially chosen as the most cost effective of the comprehensive plans and was included in the TSP. However, subsequent consideration resulted in modifying alternative 4 to eliminate the Sabine Pass and Calcasieu Ship Channel salinity control structures (measures 48 and 7, respectively), and to add the shoreline protection measures on the Gulf shore at Rockefeller Refuge (measures 6B1, 6B2, and 6B3).

In addition to providing hurricane storm surge protection in developed portions of the project area, implementation of the TSP would restore, enhance, and protect substantial areas of coastal marsh and forested chenier habitat. Because many design details regarding the proposed surge protection levees are yet to be developed, additional planning work must be conducted before impacts can be fully determined. Similarly, the proposed ecosystem restoration measures need additional planning work and interagency coordination to finalize estimated benefits and impacts

with any degree of certainty. To complete needed planning of project features, to reduce and avoid project-related adverse impacts to fish and wildlife resources, and to enhance the desired ecosystem benefits, the Fish and Wildlife Service provides the following recommendations:

1. The Corps should conduct further planning of the proposed protection levee to reduce and avoid impacts to wetlands and forest habitats. Additional levee planning work should also include the development of measures to avoid interrupted drainage impacts in a manner that reduces or avoids impacts to wetlands and forested habitats. The additional planning work should be coordinated with the Service and other interested natural resource agencies. Any pump stations needed for drainage of the protected area should be designed to discharge into wetlands to reduce adverse effects of discharging runoff directly into open water bodies.

2. The Corps should also determine where levee borrow material will be obtained.

3. To the greatest degree practical, borrow pits for construction of proposed levee and marsh creation measures should be located to avoid and minimize direct and indirect impacts to vegetated wetlands. Efforts should be made to further reduce those direct impacts by hauling in fill material, using sheetpile for the levee crest, deep soil mixing, or other alternatives. Borrow pit construction should also avoid the following:
   a. avoid inducing wave refraction/diffraction erosion of existing shorelines
   b. avoid inducing slope failure of existing shorelines
   c. avoid submerged aquatic vegetation
   d. avoid increased saltwater intrusion
   e. avoid excessive disturbance to area water bottoms
   f. avoid inducing hypoxia

4. Once levee planning has been completed, the Corps should revise estimates of direct and indirect impacts to wetlands and forested habitats, including impacts associated with acquisition of borrow material. That work should be conducted in cooperation with the Service and other interested natural resource agencies.

5. The Corps should conduct a Hazardous, Toxic and Radioactive Waste (HTRW) assessment of tidally influenced levee construction locations and subaqueous marsh creation borrow sites. If those HTRW assessments indicate that contamination exceeds National Oceanic and Atmospheric Administration screening levels, then alternative locations should be considered, or, explanation of the containment methods that would allow levee construction should be provided to the Service and other interested natural resource agencies.

6. For ecosystem restoration measures not being used to mitigate construction impacts, the Service recommends that the Corps conduct monitoring of those features to

document the degree of success achieved. The Service and other interested natural resource agencies should be involved in developing those monitoring criteria and in the review of subsequent monitoring information and reports. For mitigation features, the Service also recommends that all interested natural resource agencies be involved in the planning of project features, monitoring plans, development of success criteria, and adaptive management plans. In addition, all mitigation plans should address the 12 mitigation requirements in Appendix A.

7. The Corps should obtain a right-of-way from the Service prior to conducting any work on Sabine or Cameron Prairie National Wildlife Refuges, in conformance with Section 29.21-1, Title 50, Right-of-Way Regulations. Issuance of a right-of-way will be contingent on a determination that the proposed work will be compatible with the purposes for which the Refuge was established.

8. All construction or maintenance activities (e.g., surveys, land clearing, etc.) on National Wildlife Refuges (NWRs) will require the Corps to obtain a Special Use Permit from the Refuge Manager of the Southwest Louisiana Refuge Complex; furthermore, all activities on NWRs must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact the Refuge Manager (337/598-2216 or SWLRComplex@fws.gov) for further information on compatibility of proposed ecosystem restoration measures, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

9. The Corps should contact the Louisiana Department of Wildlife and Fisheries prior to conducting any work on Rockefeller Refuge (337-491-2593).

10. The Corps should continue to coordinate with the Service throughout planning and construction to ensure that the proposed project does not impact waterbird nesting colonies, and threatened or endangered species that may be listed in the future.

Given that the design and evaluation of most project features has been at a programmatic level, the Service cannot fulfill its Fish and Wildlife Coordination Act (FWCA)(48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) responsibilities at this time. Therefore, this draft report is presented in partial fulfillment of that act and does not constitute the final report of the Secretary of Interior as required by Section 2(b) of the FWCA. To complete those assessments, we will require additional funding during the project's pre-construction engineering and design phase. Estimates of those funding needs should be coordinated in advance with the Service, and should be based on the extent of remaining work and the nature and complexity of issues associated with the remaining planning/design issues.

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INTRODUCTION

The Southwest Coastal Louisiana Feasibility Study (SWLA Study) was authorized by Resolution Docket 2747 adopted on December 7, 2005, by the U.S. House of Representatives Committee on Transportation and Infrastructure. That Docket specifically requested the Secretary of the Army, in accordance with section 110 of the River and Harbors Act, to "survey the coast of Louisiana in Cameron, Calcasieu, and Vermilion Parishes with particular reference to the advisability of providing hurricane protection and storm damage reduction and related purposes to include the feasibility of constructing an armored 12-foot levee along the Gulf Intracoastal Waterway." Investigation of area ecosystem restoration measures was authorized via the Water Resources Development Act of 2007 (Title VII, Louisiana Coastal Area program, Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study).

The study area is located within Louisiana's Chenier Plain which is characterized by lakes, bayous, wetlands, cheniers, and coastal beaches. The Mermentau Basin and the Calcasieu/Sabine Basin are the two major hydrologic basins within the Chenier Plain. There are numerous communities within the study area including Abbeville, Cameron, Delcambre, Erath, Gueydan, Hackberry, Kaplan, Lake Arthur, Lake Charles, and Sulphur. Although the approved Southwest Coastal Louisiana Feasibility Study authorization is restricted to Calcasieu, Cameron, and Vermilion Parishes, several project alternatives occurring beyond those parishes were considered because of their anticipated effects on the project area.

Numerous project measures and groups of measures were evaluated. Surge protection alternatives included alternative levee alignments (including the armored 12-foot levee described above), as well as non-structural alternatives. Ecosystem restoration alternatives included various combinations of salinity control/reduction measures, strategic marsh creation measures, strategically located shoreline protection measures, and restoration/reforestation of cheniers.

This report provides a preliminary analysis of the impacts of the Tentatively Selected Plan (TSP) on fish and wildlife resources. The TSP is a combination of structural and non-structural storm surge protection measures, and an array of different types of ecosystem restoration features. The Service conducted a cursory assessment of direct impacts associated with construction of proposed levee alternatives. Because details regarding drainage of the protected area have not yet been developed, this impact assessment is considered preliminary and likely to change. The analysis of ecosystem restoration benefits was conducted by a contracted consulting firm. Because planning details for many of those measures have not yet been developed, and because specifics of those measures have not been made available to the Service and interested natural resource agencies, the Service considers the benefit and impact assessments as preliminary. Since information needed to fully assess project benefits and impacts is not yet available, this draft report is submitted in partial fulfillment of the requirements of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of that Act. This draft report has been provided to the Louisiana Department of Wildlife and Fisheries and the National Marine Fisheries Service. Their comments on this report will be incorporated into our final

report.

DESCRIPTION OF STUDY AREA

The study area, which encompasses Calcasieu, Cameron, and Vermilion Parishes, is typically termed the Chenier Plain of Louisiana. The Chenier Plain encompasses the southwestern Louisiana coastal zone from Freshwater Bayou west of Vermilion Bay to Sabine Lake near the Texas-Louisiana border. Cheniers are relict beach ridges that generally parallel the Gulf shoreline, and derive their name from the Cajun word "chene" meaning oak, because oaks are the dominant tree species on the crests of the higher chenier ridges (Penland et al. 1989). Because chenier elevations are higher than the surrounding marshes, they often serve as hydrologic barriers, with varying levels of effectiveness, between saline marshes to the south and freshwater marshes to the north (Corps 2008). The two hydrologic basins encompassed by the study area are the Mermentau and the Calcasieu-Sabine Basins (Figure 1).

Mermentau Basin

The Mermentau River Basin is located between Freshwater Bayou Canal to the east and that segment of Louisiana Highway 27 east of Calcasieu Lake. The Basin encompasses an area of about 4.2 million acres and contains productive agricultural lands and a variety of natural environments (Corps 1999). The Mermentau Basin is divided into two sub-basins, the Lakes and Chenier Subbasins (Figure 1), both of which occur within the feasibility study boundary. North of the Lakes Sub-basin lies uplands beyond the study boundary and covers an area of 3,683 mi^2 of predominantly agricultural land (Gammill et al. 2002). The principal agricultural products in this region are rice and crawfish, which both require ample supplies of fresh water typically provided via the Corps' management of the Mermentau Basin Project (Corps 1999).

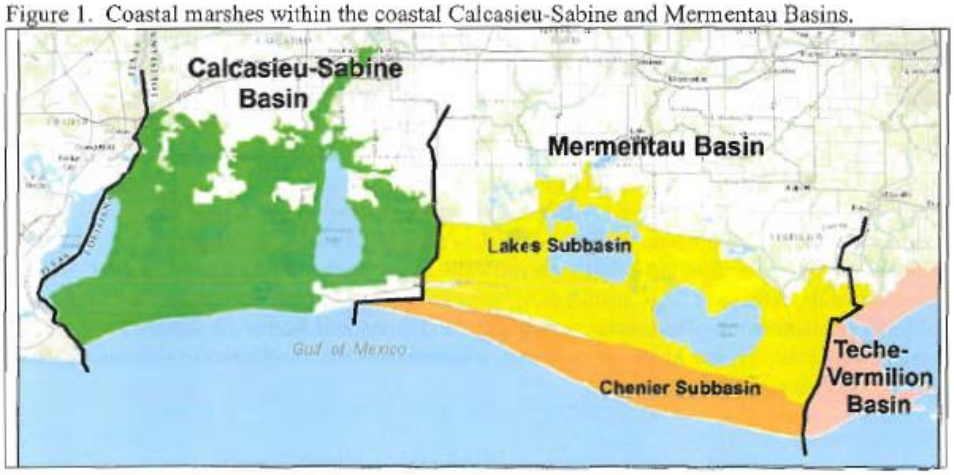
The Lakes Sub-basin is located roughly between the Gulf Intracoastal Waterway (GIWW) and Louisiana Highway 82, and historically functioned as a low-salinity brackish estuary (Corps 2008). Construction of navigation channels, locks, and water control structures has altered the historical north-south river and tidal-driven hydrology and shifted it to an east-west system that drains through the GIWW. The Corps' locks and water control structures that are located along the perimeter of the Lakes Sub-basin regulate both salinity and water level so that the Lakes Sub-basin now functions more as a freshwater reservoir and less as the low-salinity estuary that it was prior to these alterations (Gammill et al. 2002). The demand for a reliable fresh water supply for agricultural use was the primary reason for the development of the Mermentau Basin Project (Corps 1999).

The Mermentau Basin Project involves the operation and management of five navigation locks and control structures: (1) the Calcasieu Lock located on the Gulf Intracoastal Waterway (GIWW) near the intersection of Louisiana Highway 384, (2) the Leland Bowman Lock situated on the GIWW near Intracoastal City, (3) the Freshwater Bayou Lock located on the Freshwater Bayou Canal approximately one mile north of the Gulf of Mexico, (4) the Catfish Point Control Structure located on the southwest side of the basin where the Mermentau River exits Grand Lake, and (5) the Schooner Bayou Control Structure located on the east side of the basin in the

old Intracoastal Waterway between Freshwater Bayou and White Lake. The target water level inside the basin is 2.0 feet above mean low Gulf and the five Corps structures are operated in concert to maintain this level and preclude saltwater intrusion (Corps 1999).

The Chenier Sub-basin is located south of the Lakes Sub-basin, between Louisiana Highway 82 and the Gulf of Mexico. Approximately one-third of this sub-basin is comprised of the State-owned and operated Rockefeller Wildlife Refuge. The Chenier Sub-basin is characterized by tidally influenced salt marshes, though hydrology throughout much of the area is managed through impoundments that range in size from hundreds to thousands of acres. The purpose of that management is to control salinity in order to reduce wetland losses and/or sustain recreational and agricultural endeavors (Corps 2008).

Figure 1. Coastal marshes within the coastal Calcasieu-Sabine and Mermentau Basins.



Calcasieu-Sabine Basin

The Calcasieu-Sabine Basin extends from Sabine Lake and River eastward to the Louisiana Highway 27 segment east of Calcasieu Lake. The Calcasieu-Sabine Basin consists of two semi-distinct sub-basins, the Calcasieu River Basin and the Sabine River Basin. When the GIWW was built in the 1920s, it breached the Gum Cove Ridge which had historically formed a partial north-to-south oriented hydrologic barrier between the Calcasieu and Sabine Lake systems. That breach, in combination with several smaller canals, now facilitates water exchange between the sub-basins, and has exacerbated saltwater intrusion problems in the marshes adjacent to the GIWW. The typical water-movement scenario is that south winds push salt water into Calcasieu Lake, westward through the GIWW, and across the Gum Cove Ridge breach. This water is eventually swept down the Sabine River and into Sabine Lake. Currently, salt water that is pushed into Calcasieu Lake remains there because there is little back flow from the Lake. Without the Gum Cove Ridge breach, the current semi-circular flow patterns would not exist, and lake levels would rise more modestly, thus reducing the volume of seawater entering Calcasieu Lake (Lopez et al. 2008).

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The widening and deepening (to -40 feet deep by 400 feet wide) of the Calcasieu River and Pass Ship navigation channel (referred to as the Calcasieu Ship Channel [CSC]), as well as the removal of the channel mouth bar, has increased saltwater and tidal intrusion into the Calcasieu-Sabine Basin, resulting in marsh loss, tidal export of organic marsh substrate, and an overall shift to more saline habitats in the region. In 1968, the Corps completed construction of the Calcasieu River Saltwater Barrier on the Calcasieu River north of the City of Lake Charles. This barrier minimizes the flow of salt water into the upper reaches of the Calcasieu River to protect agricultural water supplies (Gammill et al. 2002). The Corps-maintained Calcasieu Lock, located east of the CSC on the GIWW near its intersection with Louisiana Highway 384, is operated to prevent saltwater intrusion into the Mermentau Basin as part of the Corps' Mermentau Basin Project.

The Sabine River has a drainage area of approximately 9,325 square miles and is the dominant influence across most of the Calcasieu-Sabine Basin in moderating salinity and tidal fluctuations. Sabine Pass was first dredged for navigation in 1880, and has been progressively deepened to its present depth of -40 feet. The Sabine-Neches Canal (later to become the Sabine-Neches Waterway) was constructed in the early 1900s. That channel not only facilitates saltwater intrusion into the area, it also funnels freshwater inflows more directly to the gulf, largely bypassing the adjacent marshes in Louisiana and Texas. A feasibility analysis has been conducted to deepen and widen the Sabine-Neches Ship Channel, but construction has yet to be initiated due to lack of funding. Saltwater intrusion in the Neches River has, in the past, necessitated the release of large quantities of water from the Sam Rayburn Reservoir to prevent saltwater contamination of industrial, agricultural, and municipal freshwater supply for Beaumont, Texas. To remedy those problems, a permanent saltwater barrier in the Neches River at Beaumont was constructed in 2003.

FISH AND WILDLIFE RESOURCE CONDITIONS

Existing Fish and Wildlife Habitats

The Chenier Plain consists of open water ponds and lakes, cheniers, gulf shorelines, and freshwater, intermediate, brackish, and saline marsh (Giron and Perez 2009). Marshes within Louisiana's Chenier Plain began forming about 3,000-4,000 years ago during periods when the Mississippi River occupied a more westerly course (Gosselink et al.1979). Expansive mud flats were created by large quantities of Mississippi River sediment that periodically accreted along the Gulf shoreline. When the river would shift to a more easterly location, erosion would rework the gulf shoreline to form beach ridges parallel to shore (Gammill et al. 2002). These ridges, consisting mainly of sand and shell, were typically higher in elevation than surrounding marshes and were colonized by live oaks (*Quercus virginiana*). Early explorers called the ridges "cheniere," a French word meaning "place of oaks" (Kniffen and Hilliard 1988). Over time, a series of Gulf of Mexico shoreline transgressions and regressions caused by periodic shifting of the Mississippi channel from east to west resulted in the shore-parallel ridge and swale topography that dominates Louisiana's Chenier Plain today (Gammill et al. 2002). Despite substantial hydrologic alterations, wetlands of the Chenier Plain continue to support nationally

significant fish and wildlife resources. They provide important habitat for various species of plants, fish and wildlife, and they serve as ground water recharge areas, provide storage areas for storm and flood waters, serve as natural water filtration areas, provide protection from wave action, erosion, and storm damage, and provide various consumptive and non-consumptive recreational opportunities. Predominant habitats and their associated fish and wildlife values are described below.

Forested Habitat

The four major forest types within the study area include swamp, bottomland hardwood, pine-oak forests, and upland chenier forest. Swamps are generally dominated with baldcypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), swamp red maple (*Acer rubrum* var. *drummondii*), and various understory plant species. Coastal swamp forests typically occupy the area between fresh marshes and areas of higher elevation, including the transition zones between bottomland hardwood forests on riverine interdistributary ridges and lower elevation marshes. Healthy cypress swamps occur in fresh water areas experiencing minimal daily tidal action and where the salinity range does not normally exceed 2 parts per thousand (ppt). Salinities of 3 ppt or higher may cause significant stress and mortality of baldcypress. However, short-term exposure to such salinities may be tolerated if it does not penetrate into and persist in the soil (Corps 2009).

Bottomland hardwood forests occur primarily along the floodplains and distributary ridges of the various bayous and rivers within northern portions of the study area. Common tree species include sugarberry (*Celtis laevigata*), water oak (*Quercus nigra*), live oak, nuttall oak (*Quercus nuttallii*), overcup oak (*Quercus lyrata*), bitter pecan (*Carya aquatica*), black willow (*Salix nigra*), American elm (*Ulmus americana*), swamp red maple, box elder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), and baldcypress (Corps 2009).

The suppression of fire within area pine flatwoods has resulted in the conversion of forests to pine-oak forests. These pine-oak forests are generally found on poorly drained flats and depressional areas north of the GIWW and predominantly around the cities of Sulphur and Lake Charles. Common tree species include slash pine (*Pinus elliottii*), longleaf pine (*Pinus palustris*), water oak, laurel oak (*Quercus laurifolia*), sweet bay (*Magnolia virginiana*), sweetgum (*Liquidambar styraciflua*), rough-leaf dogwood (*Cornus drummondii*), and wax myrtle (*Myrica cerifera*). These former pine flatwood communities may also contain a very diverse herbaceous community that can include many state rare species (Corps 2009).

A unique feature of the Chenier Plain is the chenier ridge habitat that formed on abandoned beach ridges. These ancient beaches, composed primarily of sand and shell, were stranded behind prograding shorelines built during periods of sedimentation fed by the Mississippi River. Common tree species on cheniers include live oak, sugarberry, swamp red maple, sweetgum, and water oak. Red mulberry (*Morus rubra*), toothache-tree (*Zanthoxylum clava-herculis*), and sweet acacia (*Acacia farnesiana*) also occur on these ridges (Corps 2009). Cheniers are important storm surge buffers, often serving as hydrologic barriers that limit saltwater intrusion into interior marshes (Corps 2008). Wooded habitats on the cheniers are critically important stopover habitat for neotropical songbirds migrating across the Gulf (Moore and Simons 1992, Moore 1999).

Scrub-Shrub Habitat

Scrub-shrub habitat within the study area often occupies a zone where marshes transition into slightly higher elevation habitats. Scrub shrub habitats are found along bayou ridges and on dredged material embankments, and areas typically bordered by marsh, swamp, or bottomland hardwoods. In saline areas, scrub-shrub communities are dominated by black mangrove (*Avicennia germinans*) on flooded saltmarsh edges, or by marsh elder (*Iva frutescens*) and Eastern baccharis (*Baccharis halimifolia*) on low ridges, bayou banks, and spoil banks and other disturbed areas. Brackish scrub-shrub wetlands are also dominated by eastern baccharis and marsh elder, although wax myrtle (*Morella cerifera*, formerly *Myrica cerifera*) is common on low ridges, bayousides, and spoilbanks as well. Typical scrub-shrub vegetation in intermediate and fresh areas includes elderberry (*Sambucus canadensis*), wax myrtle, buttonbush (*Cephalanthus occidentalis*), rattlebox (*Sesbania drummondii*), Drummond red maple (*Acer rubrum var. drummondii*), Chinese tallow tree (*Sapium sebiferum*), marsh elder, and eastern baccharis. Dwarf palmetto (*Sabal minor*) and prickly pear cactus (*Opuntia spp.*) are common in the understory of Chenier/maritime forest. Yaupon (*Ilex vomitoria*), dwarf palmetto, swamp privet (*Forestiera acuminata*) and Virginia willow (*Itea virginica*) also occur in thickets and the understory of swamps and bottomland hardwood forests (Corps 2009). Those habitats often support a variety of wildlife, depending on local conditions; they provide nesting and feeding sites for wading birds, songbirds and other birds, and wildlife escape cover.

Fresh Marsh

Freshwater marshes are quite heterogeneous, with local species composition governed by frequency and duration of flooding, micro-topography, substrate, current flow and salinity. This marsh type is typically dominated by maidencane, bulltongue, spikerushes, pennywort (*Hydrocotyle* sp.), elephant-ear (*Colocasia esculenta*) and alligatorweed (*Alternanthera philoxeroides*). Other common plants are bullwhip, giant cutgrass (*Zizaniopsis miliacea*), fourchette (*Bidens laevis*) and cattail (*Typha* sp.). Fresh marshes are often very diverse with different species of grasses and broad-leaved annuals waxing and waning throughout the growing season. Chabreck (1972) documented 93 plant species occurring in the fresh marshes of coastal Louisiana. In some areas, fresh marshes consist of nearly pure stands of maidencane. Aquatic plants commonly found in fresh marsh waters are duckweed (*Lemna minor*), coontail (*Ceratophyllum demersum*), Eurasian watermilfoil, southern naiad, water hyacinth (*Eichornia crassipes*), pondweeds (*Potamogeton* spp.), white waterlily (*Nymphaea odorata*), elodea (*Elodea canadensis*), hydrilla (*Hydrilla verticillata*), water celery, water shield (*Brasenia shreberi*), fanwort (*Cabomba caroliniana*), American lotus (*Nelumbo lutea*), and several invasive species of *Salvinia*. Fresh marsh salinity rarely exceeds 2 ppt, with a year-round range of approximately 0.5-1 ppt.

Canal-induced saltwater intrusion has drastically reduced the extent of fresh marsh that historically existed within the Calcasieu-Sabine Basin (Figure 2). However, fresh marsh remains the dominant marsh type within the upper Lakes Sub-basin of the Mermentau Basin (Figure 3).

Figure 2. Marsh types (2007) within the Calcasieu-Sabine Basin.

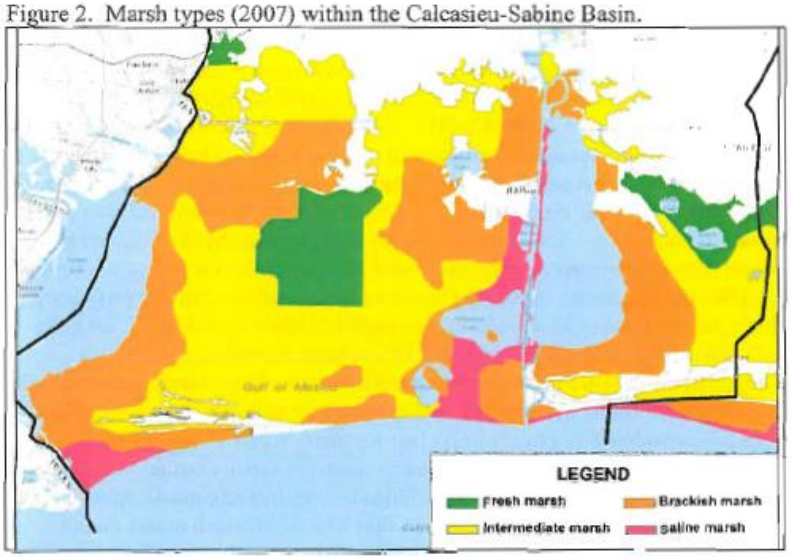
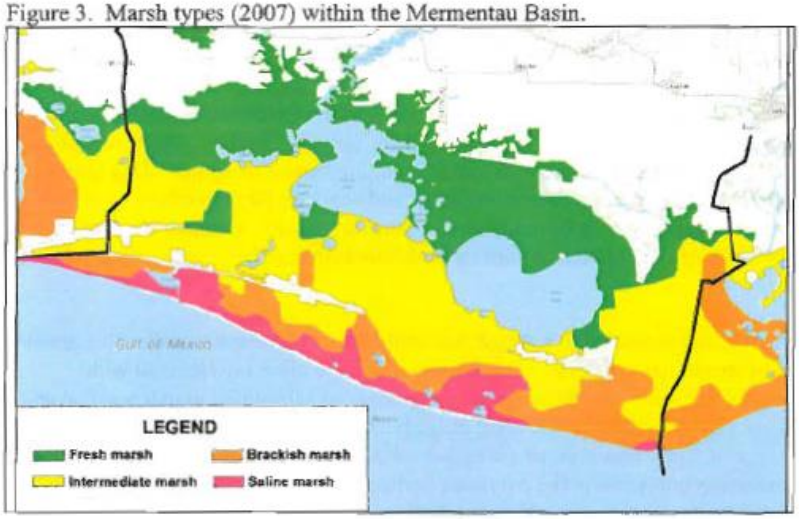


Figure 3. Marsh types (2007) within the Mermentau Basin.



Freshwater marshes support extremely high densities migratory waterfowl and other wildlife. However, because of saltwater intrusion, freshwater marshes have undergone the highest rate of reduction in acreage of any of the marsh type in Louisiana over the past few decades.

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Intermediate Marsh

Intermediate marsh may occur when annual salinity averages 3 to 4 ppt; but often intermediate marsh salinities may be fresh for much of the year with higher salinity conditions occurring during the late summer and early fall. Chabreck's (1972) identification of 54 species of plants in intermediate marsh indicates that plant species richness is relatively high. The intermediate marsh can be difficult to identify, as it sometimes may appear less as transitional zone between brackish and fresh marshes. Marshhay cordgrass or bulltongue (*Sagittaria lancifolia*) is usually the dominant or co-dominant species. These are commonly accompanied by three-cornered grass, roseau or common reed (*Phragmites australis*), seashore paspalum (*Paspalum vaginatum*), coastal waterhyssop (*Bacopa monnieri*), bullwhip (*Schoenoplectus californicus* formerly *Scirpus californicus*), Walter's millet (*Echinochloa walteri*), sawgrass (*Cladium jamaicense*), deer pea (*Vigna luteola*), rush (*Eleocharis sp.*), dwarf spikerush (*Eleocharis parvula*), and fragrant flatsedge (*Cyperus odoratus*). Aquatic plant species found in intermediate marsh waters include widgeongrass, Eurasian watermilfoil, water celery, and southern naiad (*Najas guadalupensis*). Intermediate marshes are considered extremely important for many wildlife species, such as alligators and wading birds, and serve as important nursery areas for larval marine organisms. Although still a common natural community type in Louisiana, intermediate marsh appears to be declining in aerial extent, which has been attributed to a shift toward brackish marsh due to increased salinity levels. Visser et al. (2000), expanding on previous studies by Penfound and Hathaway (1938) and Chabreck (1970), classified intermediate marsh in the Chenier Plain as a combination of *Cladium jamaicense* (sawgrass), *Spartina patens* (saltmeadow cordgrass), and *Schoenoplectus californicus* (California bulrush).

Intermediate marsh occurs within the more interior portions of the Calcasieu-Sabine Basin where exposure to saltwater intrusion is lessened by distance from saltwater sources. Intermediate marsh may have an irregular tidal regime, with salinity ranging from 3 to 10 ppt. This marsh type is very important to many species of avian wildlife and supports large numbers of wintering waterfowl. It is also critical nursery habitat to larval marine organisms. Gradual changes in salinity conditions can cause this habitat to shift towards brackish marsh.

Brackish Marsh

Inland from salt marsh, and subjected to reduced tidal influence, is brackish marsh. This marsh type is dominated by marsh-hay cordgrass. Brackish marshes are often interspersed with numerous small ponds and water channels and have experienced substantial marsh breakup and degradation in recent years. Salinity levels often range between 0.5 to 5.0 ppt and average salinity is in the range of 8 ppt, however, much higher salinities may occur periodically. In the brackish marsh, marshhay cordgrass is the dominant herbaceous species. Saltgrass, three-cornered grass (*Schoenoplectus americanus*, formerly *Scirpus olneyi*), smooth cordgrass, black needlerush, and leafy three-square (*Schoenoplectus maritimus* formerly *Scirpus maritimus*) are often co-dominant or common in this zone. It should be noted that some of these species also occur in saline marsh, but the order of dominance differs. Chabreck (1972) identified forty species of plants in brackish marsh. Aquatic plants that commonly occur in brackish marsh waters include widgeon grass, Eurasian watermilfoil (*Myriophyllum spicatum*), water celery (*Vallisneria americana*), and horned pondweed (*Zannichellia palustris*). Visser et al. (2000)

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classified brackish marsh in the Chenier Plain as a combination of *Spartina patens* (saltmeadow cordgrass), *Schoenoplectus americanus* (chairmaker's bulrush), *Schoenoplectus robustus* (sturdy bulrush).

Brackish marshes occur predominantly along the borders of Calcasieu and Sabine Lakes. Brackish marshes are extremely important as nurseries for fish and shellfish. Wading birds, muskrats and shorebirds are also common in such areas.

Saline Marsh

Salt marshes usually receive regular tidal inundation and occur in the most saline zones along the Gulf of Mexico shoreline and adjacent to the Calcasieu Ship Channel. Smooth cordgrass *(Spartina alterniflora)* is the dominant plant in this marsh type, and often forms near-monotypic stands. Herbaceous vegetation of the saline marsh is typically dominated by smooth cordgrass intermixed with saltgrass (*Distichlis spicata*), marshhay cordgrass, black needlerush (*Juncus roemerianus*), and saltwort (*Batis maritima*). Chabreck (1972) identified 12 species of emergent vegetation typically associated with this marsh type. Within the described marsh zones, many ponds and lakes support submerged and/or floating-leafed aquatic vegetation (SAV). Aquatic vegetation is rare in saline waters along the Louisiana coast (Chabreck, 1972). However, widgeon grass (*Ruppia maritima*) may occur in open water areas of saline marshes bordering on the brackish marsh zone and in saline areas where tidal flow has been decreased by structures or other changes in hydrology. Average salinity is approximately 16 ppt. Relative to other marsh types, salt marsh typically supports fewer terrestrial vertebrates although some species like Seaside Sparrows and Clapper Rails are common (Corps 2009). Salinity levels may range from 5.0 to 18 ppt, however, salinities may occasionally be lower or higher.

Saline marsh habitat exists in the project area closest to the Gulf of Mexico beach rim and along the Lower Lake (i.e., river miles (RMs) 5 to 12) and Calcasieu Pass (i.e., RMs 0 to 5) portions of the Calcasieu Ship Channel. Saline marsh is a regularly tidally-flooded habitat having least plant diversity.

Open Water

Small ponds and shallow open water areas associated with each of the above marsh plant communities are scattered throughout the project area. Some of the more defined open water areas include Lake Charles, Prien Lake, Moss Lake, and Calcasieu Lake along the ship channel. Black Lake, Browns Lake, and Mud Lake are open water areas occurring west of the ship channel. Willow Lake and Sweet Lake occur east of the ship channel.

Submerged Aquatic Vegetation Habitat

Some protected shallow open water habitats within the project area support submerged aquatic vegetation (SAV). Prior to Hurricane Rita concentrations of SAVs densities up to 80 percent coverage occurred within Cameron Prairie National Wildlife Refuge (NWR) and those concentrations are expected to return (personal communication with NWR personnel 2007). Project area SAV habitats may include areas of widgeon grass, duckweeds, coontail, bladderworts, watermilfoil, hydrilla, mermaidweeds, and pondweeds. As these aquatic plants die, their decomposition by bacteria and fungi contribute to the food web by providing detritus

for many aquatic invertebrates. SAVs are very important to wildlife and are utilized by many duck species.

Developed Lands

Developed areas are located on the higher elevations of the Pleistocene terrace along the GIWW and around the Lake Charles area and are typically well drained. They include agricultural lands and commercial and residential developments. Levees are also included in this category. Levees are frequently mowed, and, as such, provide poor wildlife habitat. Some levees are vegetated with an assortment of scrub/shrub species including marsh elder, eastern baccharis, Chinese tallow tree, common reed, and goldenrod. These higher-elevation areas may provide low-to-moderate-value habitat for terrestrial wildlife, including some migratory bird species.

Existing Fishery Resources

The project-area wetlands and associated shallow waters provide nursery and feeding habitat for recreationally and commercially important estuarine-dependent fishes and shellfishes (e.g., red drum, black drum, Atlantic croaker, spot, sand seatrout, spotted seatrout, southern flounder, Gulf menhaden, striped mullet, blue crab, white shrimp and brown shrimp). Commercial shrimp harvests have been positively correlated with the area of tidal emergent wetlands (Turner 1977 and 1982). Future commercial harvests of shrimp and other fishes and shellfishes would likely be adversely impacted by continued losses in estuarine marsh habitat (Turner 1982). Portions of the project area also provide habitat for freshwater fishes that can tolerate low-salinity conditions, including largemouth bass, bluegill, warmouth, gars, freshwater drum, blue catfish and channel catfish.

Salt and brackish marshes serve as nursery areas for myriads of larval and juvenile shrimp, crabs, redfish, seatrout, Gulf menhaden, etc., and greatly enhance the production of marine organisms. Vegetation production rates in estuarine marshes are extremely high, providing an abundance of detritus to support the estuarine food web.

Much of the existing project area-wetlands are subject to permitted structural management that varies from semi-impounded to completely impounded marsh. The majority of the water control structures within the semi-impounded management areas are supposed to be operated to allow ingress and egress of estuarine fishery organisms, especially brown shrimp and white shrimp, except during drawdowns, periods of high salinity, or waterfowl seasons. Unmanaged coastal wetlands are of particular importance due to their relative scarcity within the Calcasieu-Sabine Basin.

Essential Fish Habitat

Estuarine wetlands and associated shallow waters within the project area have been identified as Essential Fish Habitat (EFH) for both postlarval, juvenile and sub-adult stages of brown shrimp, white shrimp, and red drum, as well as the adult stages of those species in the nearshore and offshore reaches. EFH in the nearshore, marine-portion of the project area and in the lower

portions of the estuary has also been designated for the following species and their associated life stages: lane snapper, larvae and juvenile life stages; dog snapper, juvenile life stage; and bonnethead shark, juvenile life stage. EFH requirements vary depending upon species and life stage. Categories of EFH in the project area include estuarine emergent wetlands, estuarine water column, submerged aquatic vegetation, and estuarine water bottoms. Detailed information on Federally managed fisheries and their EFH is provided in the 1998 generic amendment of the Fishery Management Plans for the Gulf of Mexico, prepared by the Gulf of Mexico Fishery Management Council (GMFMC). That generic amendment was prepared in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), (P.L. 104-297). Estuarine-dependent species such as those listed above also serve as prey for other species managed under the MSFCMA by the GMFMC (e.g., red drum, mackerels, snappers, and groupers) and highly migratory species (e.g., billfishes and sharks) managed by the NOAA-Fisheries.

Existing Wildlife Resources

The project area supports an array of productive coastal habitats, dominated by intermediate and brackish marshes and associated shallow estuarine waters. The project-area wetlands and adjacent shallow waters, as well as the chenier ridges, support numerous federal-trust wildlife resources, including migratory birds, threatened and endangered species, and various federal and private land holdings that are held or managed to benefit those species.

The chenier and coastal forest habitats associated with the project area provide nesting habitat for songbirds (e.g., the mockingbird, yellow-billed cuckoo, brown thrasher and northern parula), as well as stopover areas for trans-Gulf migrating songbirds. Other avian species found in project area's forested habitats include the American woodcock, common yellow-shafted flicker, belted kingfisher, and several species of raptors (e.g., red-tailed hawk and red-shouldered hawk). Wading bird colonies containing species such as anhinga, great egret, and great blue heron typically occur in wooded wetland and scrub-shrub habitat.

Mammals associated with the project area forested habitats include game species such as eastern cottontail, swamp rabbit, white-tailed deer, and gray and fox squirrels; commercially important furbearers such as river otter, muskrat, and nutria; and other mammal species such as striped skunk, coyote, nine-banded armadillo, and Virginia opossum. Smaller mammals such as the cotton rat, marsh rice rat, and white-footed mouse serve as forage for both mammalian and avian carnivores.

Reptiles which utilize study-area forested habitats include the ground skink, five-lined skink, green anole, and western ribbon snake, and numerous other species. Some of the amphibians expected to be found in study-area forested habitats including small-mouthed salamander, green treefrog, bullfrog, and southern leopard frog.

Wildlife expected to utilize the study-area estuarine marshes include wading birds (e.g., herons, egrets, ibises, and roseate spoonbills), rails, migratory waterfowl (e.g., green-winged teal, blue-

winged teal, mottled duck, gadwall, American widgeon, and lesser scaup), raptors, and songbirds. Brackish marshes having abundant submerged aquatic vegetation often support large numbers of puddle ducks. Shorebirds utilizing estuarine marshes include killdeer, American avocet, black-necked stilt, American oystercatcher, common snipe, and various other species. Seabirds include white pelican, brown pelican, black skimmer, herring gull, laughing gull, and several species of terns. Other nongame birds such as boat-tailed grackle, red-winged blackbird, seaside sparrow, olivaceous cormorant, belted kingfisher, and sedge wren also utilize estuarine marshes.

Estuarine marsh wildlife also includes swamp rabbit, nutria, muskrat, mink, river otter, raccoon, white-tailed deer, and coyote. Reptiles are limited primarily to the American alligator in intermediate and brackish marshes, and the diamond-backed terrapin and gulf salt marsh snake in brackish and saline marshes. Juvenile sea turtles may seasonally utilize bays and saline marsh ponds in the lower Calcasieu Estuary.

Threatened and Endangered Species

Federally listed threatened or endangered species that occur within the study area include the piping plover (*Charadrius melodus*), the whooping crane (*Grus americana*), the West Indian manatee (*Trichechus manatus*), and several species of sea turtles which have also been known to occur in the southern portion of Calcasieu Lake. The red knot (*Calidris canutus rufa*) is proposed for federal listing as a threatened species and the Sprague's pipet (*Anthus spragueii*) is a candidate species for federal listing as a threatened or endangered species

The piping plover, federally listed as a threatened species, as well as its designated critical habitat, occur along the Louisiana coast. Piping plovers winter in Louisiana, and may be present for 8 to 10 months annually. They arrive from the breeding grounds as early as late July and remain until late March or April. Piping plovers feed extensively on intertidal beaches, mudflats, sand flats, algal flats, and wash-over passes with no or very sparse emergent vegetation; they also require unvegetated or sparsely vegetated areas for roosting. Roosting areas may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather. In most areas, wintering piping plovers are dependent on a mosaic of sites distributed throughout the landscape, because the suitability of a particular site for foraging or roosting is dependant on local weather and tidal conditions. Plovers move among sites as environmental conditions change; and studies have indicated that they generally remain within a 2-mile area. Major threats to this species include the loss and degradation of habitat due to development, disturbance by humans and pets, and predation.

On July 10, 2001, the Service designated critical habitat for wintering piping plovers (Federal Register Volume 66, No. 132). Their designated critical habitat identifies specific areas that are essential to the conservation of the species. The primary constituent elements for piping plover wintering habitat are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support those habitat components. Constituent elements are found in geologically dynamic coastal areas that contain intertidal beaches and flats (between annual low tide and annual high tide), and associated dune systems and flats above annual high tide. Important components (or primary constituent

elements) of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting plovers. If implementation of the proposed action has the potential to directly or indirectly affect the piping plover or its critical habitat, further consultation with this office will be necessary.

The red knot (*Calidris canutus rufa*), proposed for federal listing as a threatened species, is a medium-sized shorebird about 9 to 11 inches (23 to 28 centimeters) in length with a proportionately small head, small eyes, short neck, and short legs. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. Legs are typically dark gray to black, but sometimes greenish in juveniles or older birds in non-breeding plumage. Non-breeding plumage is dusky gray above and whitish below. The red knot breeds in the central Canadian arctic but is found in Louisiana during spring and fall migrations and the winter months (generally September through March).

During migration and on their wintering grounds, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Observations along the Texas coast indicate that red knots forage on beaches, oyster reefs, and exposed bay bottoms, and they roost on high sand flats, reefs, and other sites protected from high tides. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. Coquina clams (*Donax variabilis*), a frequent and often important food resource for red knots, are common along many gulf beaches. Major threats to this species along the Gulf of Mexico include the loss and degradation of habitat due to erosion, shoreline stabilization, and development; disturbance by humans and pets; and predation. If implementation of the proposed action has the potential to directly or indirectly affect the red knot or its habitat, further consultation with this office will be necessary.

Beginning in 2010, the Louisiana Department of Wildlife and Fisheries, in cooperation with the U.S. Fish and Wildlife Service and the U.S. Geological Survey, began efforts to establish a nonmigratory flock of whooping cranes (*Grus americana*) into historic southwestern Louisiana habitat on the state-owned White Lake Wetlands Conservation Area in Vermilion Parish, Louisiana. This reintroduced population was designated as a nonessential experimental population (NEP) under section 10(j) of the Endangered Species Act of 1973 (ESA), as amended. A NEP population is a reintroduced population believed not to be essential for the survival of the species, but important for its full recovery and eventual removal from the endangered and threatened list. These populations are treated as "threatened" species except that the ESA's section 7 consultation regulations (requiring consultation with the U.S. Fish and Wildlife Service to reduce adverse impacts from Federal actions) do not apply (except where the species occurs within National Parks or National Wildlife Refuges) and critical habitat cannot be designated. The only natural wild population of the endangered whooping crane remains vulnerable to extirpation through a natural catastrophe or contaminant spill, due primarily to its limited wintering distribution along the Texas gulf coast.

The Sprague's pipit (*Anthus spragueii*), is a candidate species for federal listing as a threatened or endangered species. Candidate species are those taxa for which the Service has on file sufficient information regarding biological vulnerability and threat(s) to support issuance of a

proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions. Sprague's pipit is a small (4 to 6 inches in length) passerine bird with a plain buffy face, a large eye-ring, and buff and blackish streaking on the crown, nape, and under parts. It winters in Louisiana, arriving from its northern breeding grounds in September and remaining until April. Migration and wintering ecology of this species is poorly known, but Sprague's pipit exhibits a strong preference for open grassland (i.e., native prairie) with native grasses of intermediate height and thickness, and it avoids areas with too much shrub encroachment. Its use of an area is dependent upon habitat conditions. This species is a ground feeder and forages mainly on insects but will occasionally eat seeds.

There is currently no requirement under the Endangered Species Act for consultation regarding project impacts on candidate species. In the interest of conserving the Sprague's pipit, we encourage you to avoid project activities that would adversely affect this species or its habitat. Should it be federally listed as threatened or endangered in the future, however, further consultation on project impacts to this species could then be necessary.

West Indian manatees, federally listed as an endangered species, occasionally enter Lakes Pontchartrain and Maurepas, and associated coastal waters and streams during the summer months (i.e., June through September). Manatees 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.

All contract personnel associated with the project should be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. All construction personnel are responsible for observing water-related activities for the presence of manatee(s). 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).)

The National Marine Fisheries Service (NMFS) is responsible for aquatic marine threatened or endangered species. Please contact Eric Hawk (727/570-5312) in St. Petersburg, Florida, for

information concerning this and other sea turtle species in their aquatic environment.

Wildlife Management Areas and Parks

Sabine NWR is comprised of 124,511 acres of coastal marsh west of the Calcasieu Lake, and its primary management objective is to preserve a large area of coastal wetlands for wintering and migrating waterfowl from both the Mississippi and Central Flyways. This refuge is also a major nursery area for many estuarine-dependent marine species as well as being the home for alligators and other reptiles, mammals, and numerous wading, water and marsh birds. Cameron Prairie NWR is located east of Calcasieu Lake. Two units (i.e., the Gibbstown and East Cove units) compose this refuge and provide fresh marsh and brackish to saline marsh habitats to support alligators, cottonmouth snakes, white-tailed deer, rabbits, roseate spoonbills, and more than 200 other birds, as well as shrimp, crabs, and many species of fish. Lacassine NWR is located in the Mermentau Basin, northwest of Grand Lake, and is very heavily used by wintering waterfowl. Should proposed project activities directly or indirectly effect those NWRs, please contact Mr. Don Voros, the Southwest Louisiana National Wildlife Refuge Complex Leader (337-598-2216), to obtain a Compatible-Use Determination, and to ascertain the need for a Special Use Permit that may be required should work be conducted on that NWR. The Rockefeller Wildlife Refuge, owned and operated by the Louisiana Department of Wildlife and Fisheries is located south of Grand Chenier in the Mermentau Basin. This 76,000-acre refuge consists of numerous tidal marsh management units operated to provide habitat for wintering migratory waterfowl. Project activities on Rockefeller Refuge should be coordinated with the Refuge manager (337-491-2593).

Future Fish and Wildlife Resources

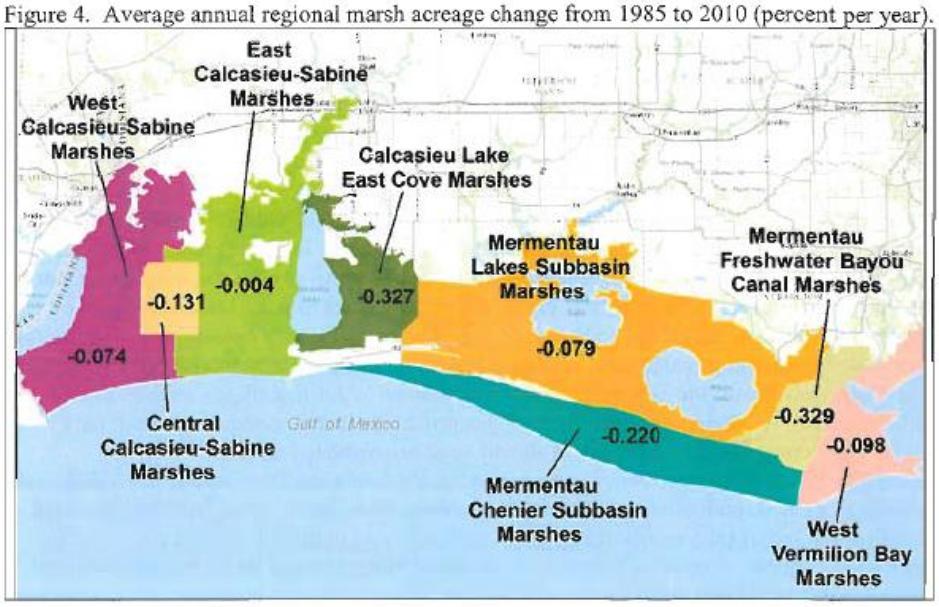
Loss of coastal marshes is the primary problem affecting study area fish and wildlife resources. Satellite land acreage data (1985-2010) from the U.S. Geological Survey (USGS) was plotted and linear regressions were used to calculate average annual loss rates in percent of 1985 acres per year. Regression derived acreages were aggregated to generate regional loss rates (Figure 4).

Throughout the study area, an average of 930 acres has been lost per year from 1985 to 2010 (Table 1). Hurricane Rita (2005) and Hurricane Ike (2008) caused substantial marsh losses and have likely driven marsh loss rates higher than the rates that existed prior to those storms.

Table 1. Average annual marsh acres lost (1985 to 2010).

Calcaiseu-Sabine Basin				Mermentau Basin	
West Cal-Sab Marshes	Central Cal-Sab Marshes	East Cal-Sab Marshes	East Calcasieu Lake Marshes	Merm. Lakes Subbasin Marshes	Merm. Chenier Subbasin Marshes
-119	-39	-5	-197	-231	-338
			-361		-569

Figure 4. Average annual regional marsh acreage change from 1985 to 2010 (percent per year).



Marsh loss within the West Calcasieu-Sabine marshes is the result of recent rapid losses in the Cameron Meadows Oil and Gas Field north of Johnsons Bayou. Observations suggest that the marsh in this area has drowned and no cause is plausible other than mineral extraction related subsidence and associated drowning of marsh vegetation. Without the recent losses in that area, the regional loss rate would actually be positive (no land loss). Central and East Calcasieu-Sabine regions were relatively stable until impacted by Rita and Ike. Recent marsh creation and dredged material disposal efforts have partially offset hurricane related losses in that east region. Marshes east of Calcasieu Lake and throughout the Mermentau Basin were also adversely impacted by these recent hurricanes.

A major cause of marsh loss in the Calcasieu-Sabine Basin has been saltwater intrusion caused by the construction and enlargement of the Calcasieu River and Pass navigation channel, the GIWW, and the Sabine Neches Waterway (LCWCRTF 1998). Those deep-draft channels increased salinity levels throughout the estuary. The increased salinity stressed fresh and intermediate marsh vegetation, contributing to plant death and ultimately conversion of those marshes to shallow open water. Those hydrology changes resulted in the rapid conversion of interior low-salinity marshes to open water and brackish marshes. Once those losses had occurred, loss rates decreased as the most vulnerable areas had become open water. However, saltwater intrusion continues to impact sensitive low-salinity marsh areas during drought-induced high salinity periods.

Prior to Hurricanes Rita and Ike, the Lakes Subbasin marshes and other study area marshes were relatively stable. However, significant study area marsh loss occurred prior to 1985
Other Mermentau Basin problems include shoreline erosion along the Gulf of Mexico, which is greatest in the vicinity of Rockefeller Refuge where 30 to 40 feet per year is lost to the Gulf (van Beek and Meyer-Arendt 1982 and Williams et al. 1992).

Shoreline erosion is also a problem along the shores of large lakes such as Calcasieu Lake, Sabine Lake, Grand Lake, and White Lake. Ship wakes and wind waves are the predominant mechanism of erosion causing the Calcasieu Ship Channel to widen at an average of 7.5 feet per year in this reach (Fischenich 2004).

Using tide gage data from the Sabine Pass tide gage and U.S. Army Corps of Engineers methods, a subsidence rate of 3.9 mm/year has been calculated and is assumed to be the rate affecting the entire study area. The combination of subsidence and sea level rise is called submergence or relative sea level rise. Submergence causes marshes to become inundated with higher water levels, stressing most non-fresh marsh plants and leading to plant death and conversion of marshes to open water. Other major causes of study-area marsh loss include altered hydrology, storm events, and developments including the direct and indirect impacts of dredge and fill activities (LCWCRTF 1998).

Wetland losses result in increasing acreage of open water. Continued wetland losses are expected to cause significant declines in coastal fish and shellfish production and in the study area's carrying capacity for migratory waterfowl, wading birds, other migratory birds, alligators, furbearers, and game mammals such as white-tailed deer and swamp rabbit. Wetland losses will also reduce storm surge protection of developed lands, and will likely contribute to water quality degradation associated with excessive nutrient inputs.

Aside from marsh loss, salt water intrusion has converted fresh marsh habitats to more brackish communities. Marshes not hydrologically managed will continue to provide habitat for more salt tolerant species. Because of continued saltwater intrusion, habitat quantity and quality for freshwater fishes, waterfowl, alligators, and more freshwater-tolerant estuarine species (i.e., Gulf menhaden, white shrimp) will continue to decrease throughout most of this area. Habitat quantity will increase for species such as brown shrimp, spotted seatrout, and black drum, which prefer brackish and saline conditions (LCWCRTF 1999). However, continued degradation of those brackish and saline marshes may reduce production of those fish and shellfish.

DESCRIPTION OF ALTERNATIVES AND RECOMMENDED PLAN

Project goals are to provide hurricane protection and ecosystem restoration that improves ecosystem sustainability. Specific planning objectives were identified to solve the problems by taking advantage of opportunities (Table 2).

Table 2. Protection and restoration planning objectives.

Objective No.	Objective Description
1	Reduce the risk of damages and losses from hurricane and storm surge flooding in southwest Louisiana
2	Manage tidal flows in southwest coastal Louisiana to improve drainage and prevent salinity from exceeding 2 ppt for fresh marsh and 6 ppt for intermediate marsh
3	Increase wetland productivity in southwest coastal Louisiana in fresh and intermediate marshes to maintain function by reducing the time water levels exceed marsh surfaces.
4	Reduce shoreline erosion and stabilize canal banks in southwest coastal Louisiana areas to protect adjacent wetlands.
5	Restore landscapes, including marsh, shoreline, and cheniers in southwest coastal Louisiana, to maintain their function as wildlife habitat and improve their ability to serve as protective barriers

Storm surge protection alternatives were developed to protect the communities of Lake Charles/Sulphur and Abbeville/Erath/Delcambre (Figures 5, 6, and 7). Each of those alignments was evaluated at levee heights to protect against 0.5 percent, 1.0 percent, and 2.0 percent annual chance of occurrence storms. In addition to those traditional levee alternatives, non-structural alternatives consisting of buyouts and elevating flood prone structures have also been evaluated throughout the study area.

The only protection levee alignment with a benefit/cost ratio greater than one is the Lake Charles Eastbank alignment. In the Abbeville/Erath/Delcambre area, all of the alternative levee alignments had a benefit/cost ratio less than one. Consequently, the Lake Charles Eastbank alignment has been selected for inclusion in the TSP along with non-structural measures also determined to be most cost effective (Figure 8).

Ecosystem restoration measures were classified into either hydrology/salinity control measures, marsh creation measures, shoreline protection measures, chenier restoration/reforestation, or oyster reef restoration measures (to improve wetland hydrology). The hydrology/salinity control measures consist of water control structures and/or navigation locks at Sabine Pass and Calcasieu Pass to reduce saltwater intrusion into the estuary, or control structures to reduce marsh flooding and saltwater intrusion from Calcasieu Lake into interior marshes. Marsh creation and shoreline protection measures were strategically located to protect areas where erosion and marsh loss could result in the establishment of new channels connecting the Gulf of Mexico with interior marshes. Candidate measures were screened based on cost effectiveness, and only the most cost effective measures were retained.

Figure 5. Lake Charles/Sulphur area alternative levee alignments.

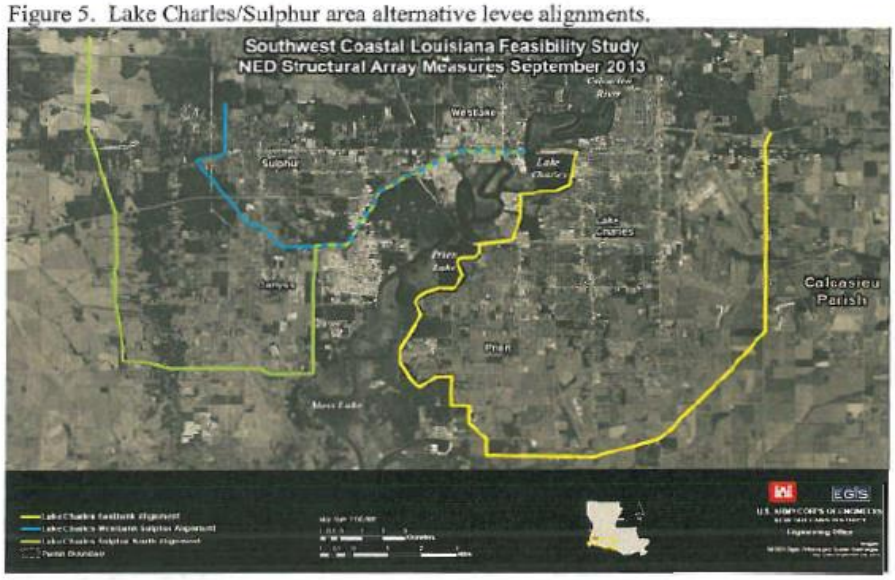


Figure 6. Abbeville/Erath/Delcambre area alternative levee alignments.

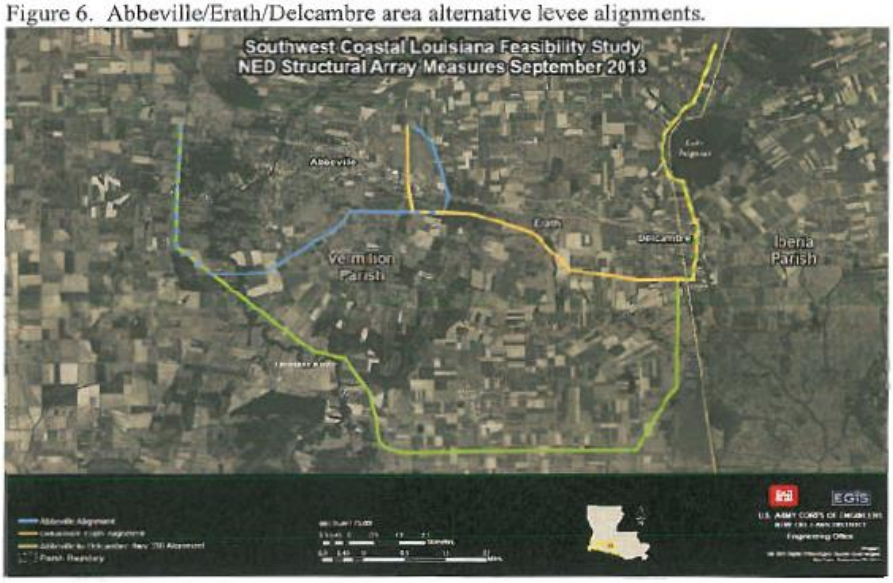


Figure 8. Map of non-structural protection reaches included in the TSP.

The retained measures were then combined to create an array of restoration alternatives (Table 3). Alternative 1, the Large Integrated Restoration across Basins plan, incorporates all hydrology/salinity control measures, except the Gum Cove Ridge control structure, plus the full array of marsh creation and shoreline protection features, plus all chenier restoration features. Alternative 2, the Moderate Integrated Restoration plan, is similar to Alternative 1 except that it has a reduced number of marsh creation and shoreline protection features. Alternative 3, the Moderate Integrated Restoration Plan with Gum Cove, is identical to Alternative 2 except that it includes the Gum Cove Ridge water control structure. Alternative 4, the Entry Salinity Control plan, includes the water control structures that regulate exchange with the Gulf (this includes the Catfish Point structure), plus a lesser number of marsh creation and shoreline protection features compared to Alternatives 2 and 3. Chenier restoration is included in this and all alternatives. Alternative 5 is similar to Alternative 4 except that Alternative 5, the Interior Perimeter Control plan, includes hydrology/salinity control measures that are limited to the interior perimeter control structures (including the Catfish Point structure and the Gum Cove Ridge structure). Chenier restoration is included in Alternative 5. Alternative 6, the Marsh and Shoreline plan, includes the same interior perimeter hydrology/salinity control measures, minus the Gum Cove control structure, and it includes all marsh creation measures, most of the shoreline protection measures, and all chenier restoration measures.

Table 3. Ecosystem restoration alternatives evaluated.

Alternative Number	Alternative Description
1	Large Integrated Restoration Across Basins
2	Moderate Integrated Restoration
3	Moderate Integrated Restoration w/ Gum Cove
4	Entry Salinity Control Focus
5	Interior Perimeter Control Focus
6	Marsh & Shoreline Focus

Restoration Alternative 4 (Entry Salinity Control Alternative), minus the Calcasieu Pass control structure, was initially chosen as the most cost effective of the comprehensive plans and was included in the TSP. However, subsequent consideration resulted in modifying alternative 4 to eliminate the Sabine Pass salinity control structure (measure 48) and to add the shoreline protection measures on the Gulf shore at Rockefeller Refuge (measures 6B1, 6B2, and 6B3. TSP measures in the Calcasieu-Sabine and the Mermentau Basins are illustrated in Figures 9 and 10, respectively, and listed in Table 4.

Table 4. Restoration measures comprising the TSP.

Basin	Measure Type	Measure Number	Measure Description
CS	Oyster Reef	604	Preservation of historic Sabine oyster reefs
CS	Hydrology	74a	Cameron spillway structure at east Calcasieu Lake
CS	Marsh Creation	124c	Marsh creation at Mud Lake
CS	Marsh Creation	124d	Marsh creation at Mud Lake
CS	Marsh Creation	3a1	Beneficial use of dredged material from ship channel
CS	Marsh Creation	3c1	Beneficial use of dredged material from ship channel
CS	Shoreline Prot.	5a	Holly Beach shoreline protection
CS	Chenier Rest.	416	Chenier restoration: Grand Chenier
CS	Chenier Rest.	510a	Chenier restoration: Blue Buck Ridge
CS	Chenier Rest.	510b	Chenier restoration: Hackberry Ridge
CS	Chenier Rest.	510d	Chenier restoration: Front Ridge
Merm	Hydrology	13	Freshwater retention sill on Little Pecan Bayou
Merm	Marsh Creation	127c3	Marsh creation at east Pecan Island
Merm	Marsh Creation	306a1	Marsh creation at Rainey marsh (SW portion)
Merm	Marsh Creation	47a1	Marsh creation using dredged material south of Hwy 82
Merm	Marsh Creation	47a2	Marsh creation using dredged material south of Hwy 82
Merm	Marsh Creation	47c1	Marsh creation using dredged material south of Hwy 82
Merm	Shoreline Prot.	16b	Fortify spoil banks of GIWW and Freshwater Bayou
Merm	Shoreline Prot.	6b1	Gulf shore protection: Calc River to Freshwater Bayou
Merm	Shoreline Prot.	6b2	Gulf shore protection: Calc River to Freshwater Bayou
Merm	Shoreline Prot.	6b3	Gulf shore protection: Calc River to Freshwater Bayou
Merm	Chenier Rest.	416	Chenier restoration: Grand Chenier ridge
Merm	Chenier Rest.	509c	Chenier restoration: Bill Ridge
Merm	Chenier Rest.	509d	Chenier restoration: Cheniere au Tigre
Merm	Chenier Rest.	510d	Chenier restoration: Front Ridge

FISH AND WILDLIFE CONCERNS IN THE PROJECT AREA

Major fish and wildlife resource concerns in the study area include ecosystem-wide hydrologic alterations associated with construction of major navigation channels within the study area and the resulting loss of coastal marsh and the conversion of fresher marshes to more saline habitats. Marsh loss due to shoreline erosion along the Gulf of Mexico is also a problem. The Service is also concerned with water-quality degradation from agricultural and urban run-off, and industrial discharges, into upper Calcasieu Basin waterbodies. Forested areas that once provided habitat for neotropical migrants have suffered extensive losses and continue to be lost to development and sea level rise and subsidence.

The coastal marshes of the Calcasieu-Sabine Basin have been identified by the North American Waterfowl Management Plan (NAWMP), Gulf Coast Joint Venture, as a key waterfowl wintering area. The Gulf Coast is the terminus of the Central and Mississippi Flyways and is

therefore one of the most important waterfowl areas in North America, providing both wintering and migration habitat for significant numbers of the continental duck and goose populations that use both flyways. Aside from being a key waterfowl wintering area, the Chenier Plain provides important year round habitat for over 90 % of the continental population of mottled ducks and serves as a key breeding area for whistling ducks. The goal of the NAWMP, Chenier Plain Initiative is to provide wintering and migration habitat for significant numbers of dabbling ducks, diving ducks, and geese (especially lesser snow and greater white-fronted), as well as year-round habitat for mottled ducks. Because wintering waterfowl prefer fresh and intermediate marshes, and because navigation projects have contributed to substantial reductions in those preferred waterfowl habitats, measures to reduce salinity levels would have a positive impact of waterfowl habitat quantity, quality, and usage.

To counter saltwater intrusion effects resulting from the construction and enlargement of the Calcasieu Ship Channel, and to restore former low-salinity habitats, the U.S. Fish and Wildlife Service installed three water control structures on Sabine National Wildlife Refuge (in 1981) to regulate saltwater intrusion entering marshes west of Calcasieu Lake. Similarly, the U.S. Department of Agriculture's Cameron-Creole Watershed East Cove Unit project (completed in 1989) was constructed to regulate water levels and reduce saltwater intrusion impacts in the fresh and intermediate marsh habitats in the marshes east of Calcasieu Lake. Operation of these water control structures to rectify ecosystem alterations may at times interrupt ingress and egress of estuarine-dependent fish and shellfish, resulting in unintended fisheries impacts. Proposed hydrology restoration measures could also result in additional fisheries impacts. Those impacts could be reduced through water control structure operation plans designed to accommodate fisheries needs to the greatest degree possible, while still achieving salinity control goals.

Concerns exist that a future break of the eroding Gulf of Mexico shoreline into deteriorating interior marshes would create a new tidal pass, and would result in harmful salinity increases within interior marshes. Depending upon the location of such shoreline breaches, the resulting impacts could have ecosystem scale impacts. To avoid such impacts, shoreline protection and marsh creation measures have been proposed in strategic locations where such scenarios appear more likely.

Water quality impacts associated with urban and agriculture runoff are ubiquitous concerns that are difficult to address. However, designing all intercepted drainage pump stations to discharge into wetlands may provide some reduction of those impacts. Borrow canals dredged for levee construction could enhance delivery rates of runoff to wetlands and aggravate such impacts. A more serious concern exists where the proposed levee would be constructed in marshes and waterbottoms contaminated with dioxins, polychlorinated biphenyls and heavy metals. Construction activities might resuspend those contaminants allowing tidal action and rainfall runoff to then distribute the contaminants to other portions of the system.

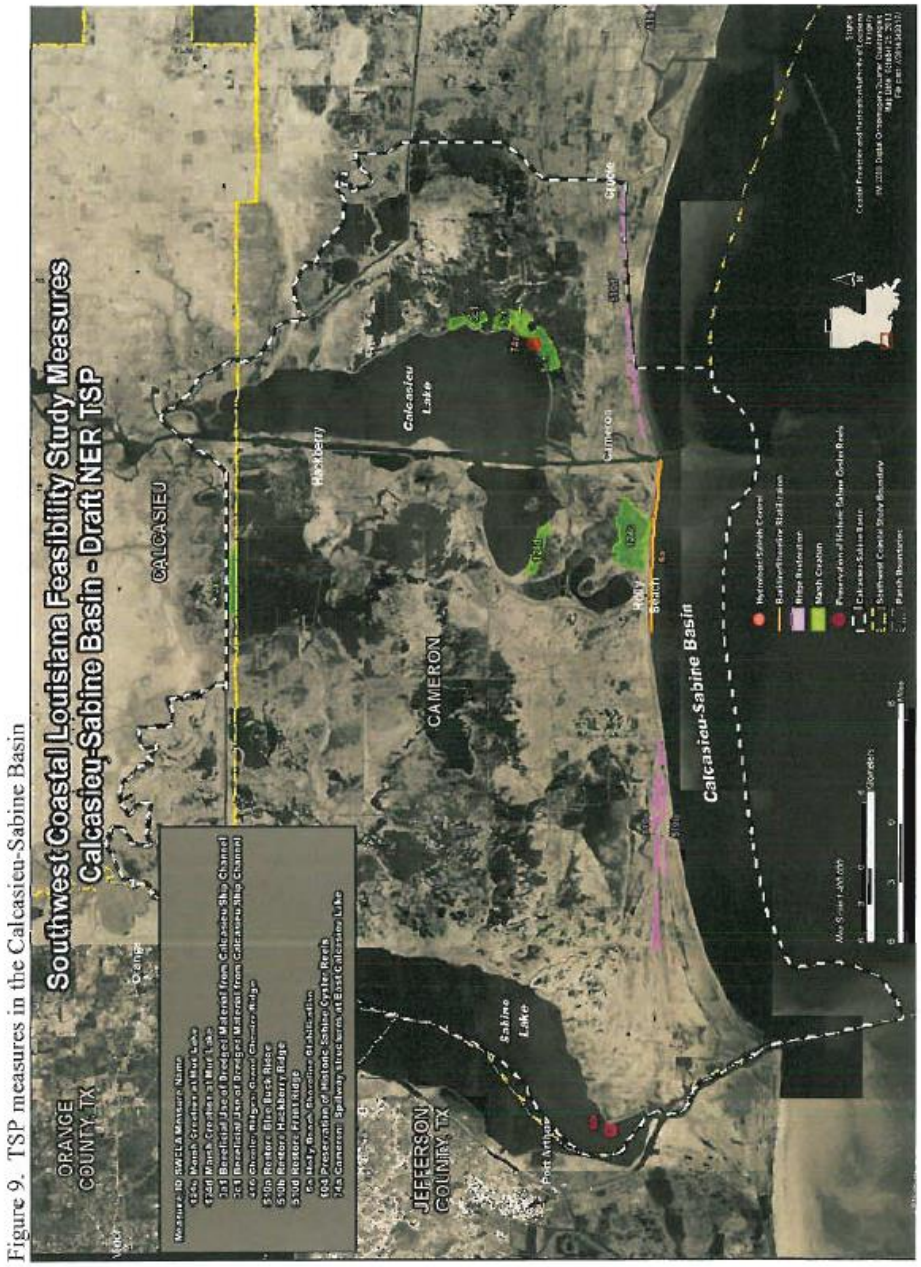


Figure 9. TSP measures in the Calcasieu-Sabine Basin

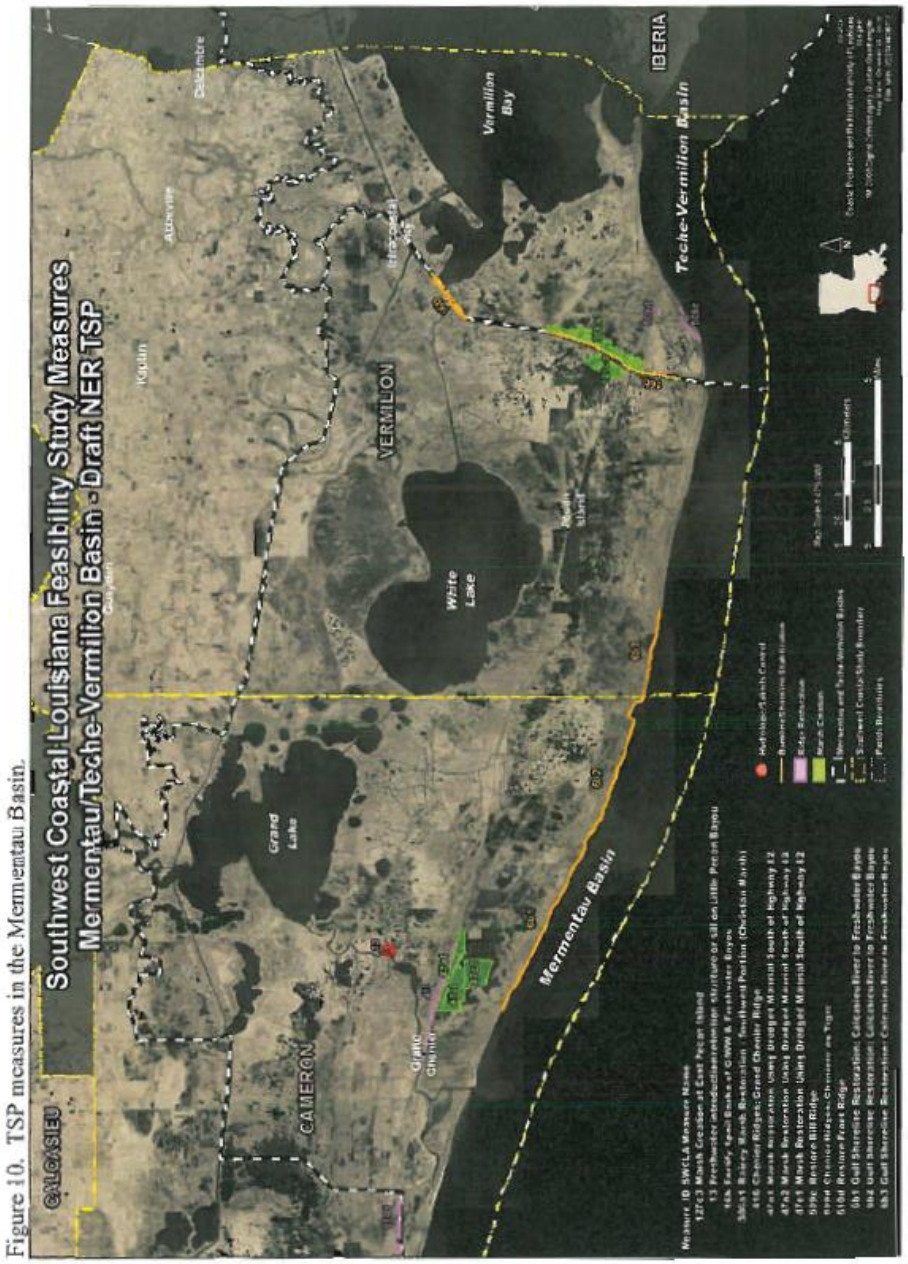


Figure 10. TSP measures in the Mermentau Basin.

Study area chenier ridges were historically forested. Residential and agricultural development has resulted in the clearing of most of the formerly forested areas. Mining of sand has also resulted in additional impacts to the chenier forests and to the chenier landforms. In addition to impeding storm surges, forested cheniers provide important stopover habitat for trans-Gulf neotropical migratory songbirds. Proposed measures to restore forested chenier habitats would benefit those migratory species, many of which have experienced population declines in recent decades.

EVALUATION METHODOLOGY

Levee construction impacts were determined by overlaying levee footprint shapefiles on Bing imagery (dated March 2010 to January 2011). After field inspection of impacted areas (September 3, 2013) to confirm habitat types impacted, the acreage of impacted fish and wildlife habitats was digitized and summarized.

The contractor utilized the Wetland Value Assessment (WVA) methodology to determine benefits for environmental restoration measures (benefits in Average Annual Habitat Units [AAHUs]). However, given the preliminary design status of the proposed restoration measures and the compressed study schedule, the Service has instead focused on the contractor's estimated net wetland acreage benefits at the end of the project's 50-year life (future with project acreage minus future without project acreage). Net acres for marsh creation measures were determined using typical spreadsheet methods and standard assumptions (created marshes lost at 50 percent of the background rate). Shoreline protection net acreage was also determined using spreadsheet methods and the assumption that Gulf shoreline protection features reduced background loss rate 50 percent while interior protection features reduced loss rates 100 percent.

Wetland acreage benefits associated with the proposed hydrology/salinity control structures were determined using the Wetland Morphology, Eco-Hydrology, and Vegetation models developed for evaluating the 2012 State Master Plan to provide a scientifically sound and defensible way to estimate the comprehensive benefits of those measures (Meselhe et al. 2013, Couvillion et al. 2013, and Visser et al. 2013). Because those measures were already analyzed using these models as part of the 2012 State Master Plan formulation, those results were used to screen proposed H&S measures. In general, the H&S measures carried forward in the study were those that had larger-scale benefits, i.e., those that helped maintain greater than 500 net acres as determined by the Master Plan models.

POTENTIAL SIGNIFICANT IMPACTS

The resulting preliminary direct construction impacts to marsh and forested areas are provided below for each levee alignment (Table 5). TSP impacts for the Lake Charles Eastbank levee alignment include 23.04 acres of bottomland hardwoods, 6.4 acres of intermediate marsh, 22.16 acres of brackish marsh, and approximately 383.97 acres of non-wetland forest.

Table 5. Preliminary direct levee construction impacts to wetlands and forested habitats.

Habitat Type	Lake Charles Sulphur South Alignment (acres)	Lake Charles Westbank Sulphur Alignment (acres)	Lake Charles Eastbank Alignment (acres)	Abbeville to Delcambre Hwy 330 Alignment (acres)	Abbeville Alignment (acres)	Delcambre Erath Alignment (acres)
Pine Plantation	0.00	0.00	39.71	0.00	0.00	0.00
Dry Pine-Oak	161.88	54.92	99.66	0.00	0.00	0.00
Dry Hardwoods	0.00	0.00	0.00	12.78	19.41	7.13
Hydric Pine-Oak	216.76	0.00	284.31	0.00	0.00	0.00
Bottomland Hardwoods	0.00	0.00	23.04	16.63	13.80	4.20
Brackish Marsh	27.79	19.40	22.16	0.00	0.00	0.00
Intermediate Marsh	0.00	0.00	6.40	0.00	0.00	0.00
Swamp	0.00	0.00	0.00	0.00	0.00	45.64
Wetland TOTAL	27.79	19.40	51.60	16.63	13.80	49.83

Construction impacts to non-forested agriculture, residential, industrial, or pasture areas have not been determined. The impacted acreages do not include impacts associated with excavation for borrow material. Some levee reaches may block existing drainage ditches and bayous. As a result, levee construction may cause interrupted drainage impacts to developed property and/or adjacent wetlands. For example, in southwestern Lake Charles, near Graywood Plantation Drive, approximately 2.6 acres of brackish marsh would be impounded if drainage structures are not included to maintain tidal hydrology (Figure 11). Additional marsh impoundment impacts may occur in that area, but those impacts cannot be accurately determined because the planning of levee features has not advanced sufficiently. Tidal marshes, forested wetlands, and other forest habitats might also be impounded if drainage structures are not included to provide drainage and maintain tidal hydrology during non-storm periods. Impoundment impacts might range from destroying these habitats to lesser impacts that would reduce habitat quality. Measures to alleviate such indirect impacts have not been developed, nor have such indirect construction impacts been fully determined.

Although ecosystem restoration measures were evaluated using several different methodologies, net wetland acreage (future with project acres minus future without project acres at the end of the 50-year project life) was computed within each methodology (Table 6). Those net acreage values have been used as the benefit metric to compute the cost per benefit values (i.e., cost per year 50 net acreage) used to select the TSP.

Figure 11. Marshes that might be impounded near Gray Plantation Drive.

Table 6. Predicted benefits of ecosystem restoration alternatives.

Alternative	Alternative Description	Acres Created	Acres Nourished	Total Acres	Net Acres	AAHU's
1	**Large Integrated Restoration Across Basins**				**31,960**	**17,898**
	Marsh Creation	20,149	5,522	25,671	17,807	8,726
	Shoreline Protection				6,614	1,939
	Hydro & Salinity Control				6,126	6,695
	Chenier Reforestation			1,413	1,413	538
2	**Moderate Integrated Restoration**				**28,077**	**14,905**
	Marsh Creation	16,059	3,306	19,365	13,820	6,916
	Shoreline Protection				4,847	1,559
	Hydro & Salinity Control				7,997	5,892
	Chenier Reforestation			1,413	1,413	538
3	**Moderate Integrated Restoration w/ Gum Cove**				**21,849**	**14,223**
	Marsh Creation	16,059	3,306	19,365	13,820	6,916
	Shoreline Protection				4,847	1,559
	Hydro & Salinity Control				1,769	5,210
	Chenier Reforestation			1,413	1,413	538
4	**Entry Salinity Control Focus**				**20,577**	**9,785**
	Marsh Creation	8,579	4,026	12,605	8,714	4,194
	Shoreline Protection				1,314	268
	Hydro & Salinity Control				9,136	4,785
	Chenier Reforestation			1,413	1,413	538
5	**Interior Perimeter Control Focus**				**12,129**	**5,238**
	Marsh Creation	8,579	4,026	12,605	8,714	4,194
	Shoreline Protection				1,314	268
	Hydro & Salinity Control				688	238
	Chenier Reforestation			1,413	1,413	538
6	**Marsh & Shoreline Focus**				**24,449**	**14,937**
	Marsh Creation	20,149	5,522	25,671	17,807	8,726
	Shoreline Protection				4,895	1,559
	Hydro & Salinity Control				334	4,114
	Chenier Reforestation			1,413	1,413	538

The TSP (see Table 4) is comprised of measures which differ somewhat from those within restoration alternative 4. Estimated acreage benefits of the TSP are provided in Table 7.

Table 7. Estimated benefits of the TSP.

Measure Type	Benefits
Marsh Creation	Net acres = 8714 (create 8579 ac and nourish 4026 acres)
Shoreline Prot.	Net acres = 5509 (266,884 linear feet of protection)
Hydrology	Net acres = 6092 (East Calc. Lake Spillway, Little Pecan Bayou sill)
Chenier Rest.	Reforest 1413 acres

FISH AND WILDLIFE CONSERVATION MEASURES

The President's Council on Environmental Quality defined the term mitigation in the National environmental Policy Act regulations to include:

a) avoiding the impacts altogether by not taking a certain action or parts of an action;
b) minimizing impacts by limiting the degree or magnitude of the action and its implementation;
c) rectifying the impacts by repairing, rehabilitating, or restoring the affected environment;
d) reducing or eliminating the impacts over time by preservation and maintenance operations during the life of the action; and,
e) compensation for the impacts by replacing or providing substitute resources or environments.

The Service's mitigation policy (Federal Register, Volume 46, Number 15, pages 7656-7663, January 23, 1991) provides guidance to help ensure that the level of mitigation recommended by the Service is consistent with the value and scarcity of the fish and wildlife resources involved. In keeping with that policy, the Service usually recommends that losses of high-value habitats which are becoming scarce be avoided or minimized to the greatest extent possible. Unavoidable losses of such habitats should be fully compensated by replacement of the same kind of habitat value; this is called in-kind mitigation. The mitigation planning goals and associated Service recommendations should be based on the four categories, as shown in Table 8.

Table 8. U. S. Fish and Wildlife Service Resource Categories.

FWS Resource Categories
Resource Category 1 - Habitat to be impacted is of high value for evaluation species and is unique and irreplaceable on a national basis or in the ecoregion section. The mitigation goal for this Resource Category is that there should be no loss of existing habitat value.
Resource Category 2 - Habitat to be impacted is of high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the ecoregion section. The mitigation goal for habitat placed in this category is that there should be no net loss of in-kind habitat value.
Resource Category 3 - Habitat to be impacted is of high to medium value for evaluation species and is relatively abundant on a national basis. FWS's mitigation goal here is that there be no net loss of habitat value while minimizing loss of in-kind habitat value.
Resource Category 4 - Habitat to be impacted is of medium to low value for evaluation species. The mitigation goal is to minimize loss of habitat value.

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Bottomland hardwood forests and coastal marshes are considered by the Service to be aquatic resources of national importance due to their increasing scarcity and high habitat value for fish and wildlife within Federal trusteeship (i.e., migratory waterfowl, wading birds, other migratory birds, threatened and endangered species, and interjurisdictional fisheries). Therefore, the Service recommends that unavoidable losses of those habitats should be compensated via in-kind replacement. Because of schedule constraints, habitat quality assessments could not be conducted and only acreages of impacted habitats are available at this time (see Table 4).

Dry (non-hydric soil) hardwoods, dry (non-hydric soil) pine-oak forest, and hydric soil pine-oak forest habitats impacted by levee construction are considered to be relatively abundant. These are assumed to be Resource Category 3 habitats and impacts to such habitats may be mitigated out of kind, but mitigation should consist of some type of forested habitat. The 1,413 acres of proposed chenier reforestation would likely provide more than adequate compensation for impacted Resource Category 3 forest habitats provided that the chenier reforestation is successful. However, the restored chenier habitats will not likely provide sufficient wetland characteristics to mitigate impacts to hydric soil bottomland hardwoods. Consequently, the Service recommends that impacted bottomland hardwood forests be mitigated through a mitigation bank or through other means.

Construction of the proposed protection levee is anticipated to directly impact 28.56 acres of emergent marsh. Indirect levee impacts to marsh and bottomland hardwoods are likely to occur, but the acreage is not yet known. The 8,579 acres of proposed marsh creation would likely provide more than enough mitigation to compensate for both the direct and indirect marsh impacts. However, the proposed marsh creation measures must also address the need to mitigate the marsh impacts in kind (by habitat type). If the proposed marsh creation measures sufficiently address the in-kind requirements, provide a sufficient quantity of compensation, and if the mitigation is successful, then the proposed marsh creation measures may mitigate the unavoidable impacts associated with levee construction.

SERVICE POSITION AND RECOMMENDATIONS

Because the study schedule has precluded detailed planning and interagency input regarding the proposed levee alignments and ecosystem restoration measures, it is likely that further planning and/or agency and public review may result in modifications to those alignments and proposed restoration measures. The Service recommends that levee alignment modifications be made to further reduce impacts to wetlands and forested habitats, and to avoid or reduce indirect impacts to such habitats through interrupted drainage. To avoid interrupted drainage impacts, additional measures such as runoff collection canals and drainage structures through the levee will be needed to maintain drainage of the protected area. The addition of those drainage measures will likely increase costs and project-related wetland impacts. The Service recommends that the Corps solicit input from the Service and other interested natural resources agencies regarding levee alignment modifications to reduce wetland impacts and to develop features to provide drainage of protected areas. Because borrow locations have not yet been identified, borrow

impacts cannot be determined. Additional environmental review and clearance for the borrow sites should be sought once those sites have been determined.

Discharge of polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dioxins/furans, heavy metals, and other hazardous compounds into Bayou D'Inde, Bayou Verdine, and the upper Calcasieu River has impacted the upper Calcasieu River estuary adjacent to the proposed TSP protection levee feature. Dredging and site preparation associated with levee construction in those areas may resuspend contaminants and increase their bioavailability to fish and shellfish which provide an important food source for other fish, alligators, wading birds, and other migratory birds and wildlife.

The Service recommends that the project sponsors conduct a Hazardous, Toxic and Radioactive Waste (HTRW) assessment of tidally influenced levee construction locations and subaqueous marsh creation borrow sites. If those HTRW assessments indicate that contamination exceeds NOAA screening levels, then alternative locations should be considered, or, special procedures (e.g., use sediment curtains, etc.) should be implemented to reduce or prevent contaminant re-suspension and dispersal into important downstream fish and wildlife habitats.

For the proposed marsh creation measures, details regarding containment dike location and design, fill elevation, spill box locations, dike degradation protocols, vegetative planting protocols, and other details have not yet been made available to the Service or other interested resource agencies. The Service requests that the Corps work with the Service and interested natural resource agencies to finalize those planning details.

Because submerged aquatic vegetation provides food for migratory waterfowl, and provides high quality nursery habitat for estuarine dependent fisheries (Castellanos and Rozas 2001, and Kanouse et al. 2006), the open water areas targeted for marsh creation measures should avoid areas of dense submerged aquatic vegetation to the greatest degree possible.

Details regarding other ecosystem restoration features such as shoreline protection measures have not yet been provided to the Service. The Service requests that the Corps work with the Service and interested natural resource agencies to finalize those planning details. To understand and concur with the estimated benefits for the installation and operation of the proposed salinity control structures, the assumptions used and an explanation of the modeling methods should be provided to the Service and other interested natural resource agencies.

Ecosystem restoration measures could potentially mitigate all project-related direct and indirect construction impacts. For the restoration measures selected to provide mitigation, the Service recommends that the Corps address the 12 mitigation planning requirements (Appendix A) for each selected mitigation feature.

To determine if mitigation measures have been successful, the Service recommends that the Corps utilize the final mitigation performance protocols developed for the Hurricane Storm Damage Risk Reduction Study. For ecosystem restoration measures not being used to mitigate construction impacts, the Service recommends that the Corps conduct monitoring of those

features to document the degree of success achieved. The Service and other interested natural resource agencies should be involved in developing those monitoring criteria and in the review of subsequent monitoring information and reports.

Because many design details regarding the proposed surge protection levees are yet to be developed, additional planning work must be conducted before impacts can be fully determined. Similarly, the proposed ecosystem restoration measures need additional planning work and interagency coordination to finalize estimated benefits and impacts with any degree of certainty. To complete needed planning of project features, to reduce and avoid project-related adverse impacts to fish and wildlife resources, and to enhance the desired ecosystem benefits, the Service provides the following recommendations:

1. The Corps should conduct further planning of the proposed protection levee to reduce and avoid impacts to wetlands and forest habitats. Additional levee planning work should also include the development of measures to avoid interrupted drainage impacts in a manner that reduces or avoids impacts to wetlands and forested habitats. The additional planning work should be coordinated with the Service and other interested natural resource agencies. Any pump stations needed for drainage of the protected area should be designed to discharge into wetlands to reduce adverse effects of discharging runoff directly into open water bodies

2. The Corps should also determine where levee borrow material will be obtained.

3. To the greatest degree practical, borrow pits for construction of proposed levee and marsh creation measures should be located to avoid and minimize direct and indirect impacts to vegetated wetlands. Efforts should be made to further reduce those direct impacts by hauling in fill material, using sheetpile for the levee crest, deep soil mixing, or other alternatives. Borrow pit construction should also avoid the following:
    a. avoid inducing wave refraction/diffraction erosion of existing shorelines
    b. avoid inducing slope failure of existing shorelines
    c. avoid submerged aquatic vegetation
    d. avoid increased saltwater intrusion
    e. avoid excessive disturbance to area water bottoms
    f. avoid inducing hypoxia

4. Once levee planning has been completed, the Corps should revise estimates of direct and indirect impacts to wetlands and forested habitats, including impacts associated with acquisition of borrow material. That work should be conducted in cooperation with the Service and other interested natural resource agencies.

5. The Corps should conduct a Hazardous, Toxic and Radioactive Waste (HTRW) assessment of tidally influenced levee construction locations and subaqueous marsh creation borrow sites. If those HTRW assessments indicate that contamination exceeds NOAA screening levels, then alternative locations should be considered, or, explanation

of the containment methods that would allow levee construction should be provided to the Service and other interested natural resource agencies.

6. For ecosystem restoration measures not being used to mitigate construction impacts, the Service recommends that the Corps conduct monitoring of those features to document the degree of success achieved. The Service and other interested natural resource agencies should be involved in developing those monitoring criteria and in the review of subsequent monitoring information and reports. For mitigation features, the Service also recommends that all interested natural resource agencies be involved in the planning of project features, monitoring plans, development of success criteria, and adaptive management plans. In addition, all mitigation plans should address the 12 mitigation requirements in Appendix A.

7. The Corps should obtain a right-of-way from the Service prior to conducting any work on Sabine or Cameron Prairie National Wildlife Refuges, in conformance with Section 29.21-1, Title 50, Right-of-Way Regulations. Issuance of a right-of-way will be contingent on a determination that the proposed work will be compatible with the purposes for which the Refuge was established.

8. All construction or maintenance activities (e.g., surveys, land clearing, etc.) on National Wildlife Refuges (NWRs) will require the Corps to obtain a Special Use Permit from the Refuge Manager of the Southwest Louisiana Refuge Complex; furthermore, all activities on NWRs must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact the Refuge Manager (337/598-2216 or SWLRComplex@fws.gov) for further information on compatibility of proposed ecosystem restoration measures, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

9. The Corps should contact the Louisiana Department of Wildlife and Fisheries prior to conducting any work on Rockefeller Refuge (337-491-2593).

10. The Corps should continue to coordinate with the Service throughout planning and construction to ensure that the proposed project does not impact waterbird nesting colonies, and threatened or endangered species that may be listed in the future.

Given that the design and evaluation of most project features has been at a programmatic level, the Service cannot fulfill its Fish and Wildlife Coordination Act (FWCA)(48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) responsibilities at this time. Therefore, this draft report is presented in partial fulfillment of that act and does not constitute the final report of the Secretary of Interior as required by Section 2(b) of the FWCA. To complete those assessments, we will require additional funding during the project's pre-construction engineering and design phase.

Estimates of those funding needs should be coordinated in advance with the Service, and should be based on the extent of remaining work and the nature and complexity of issues associated with the remaining planning/design issues.

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APPENDIX A

TWELVE REQUIRMENTS FOR MITIGATION PLANNING
(from the U.S. Army Corps of Engineers & EPA 2008 Final Mitigation Rule in the FEDERAL REGISTER Vol. 73, No. 70, April 10, 2008)

Twelve Requirements for a Compensatory Mitigation Plan

1. Objectives. A description of the resource type(s) and amount(s) that will be provided, the method of compensation (restoration, establishment, preservation etc.), and how the anticipated functions of the mitigation project will address watershed needs.

2. Site selection. A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the mitigation project site.

3. Site protection instrument. A description of the legal arrangements and instrument including site ownership, that will be used to ensure the long-term protection of the mitigation project site.

4. Baseline information. A description of the ecological characteristics of the proposed mitigation project site, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other characteristics appropriate to the type of resource proposed as compensation. The baseline information should include a delineation of waters of the United States on the proposed mitigation project site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site.

5. Determination of credits. A description of the number of credits to be provided including a brief explanation of the rationale for this determination.
   - For permittee-responsible mitigation, this should include an explanation of how the mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity.
   - For permittees intending to secure credits from an approved mitigation bank or in-lieu fee program, it should include the

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number and resource type of credits to be secured and how these were determined.

6. Mitigation work plan. Detailed written specifications and work descriptions for the mitigation project, including: the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water; methods for establishing the desired plant community; plans to control invasive plant species; proposed grading plan; soil management; and erosion control measures. For stream mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical channel cross-sections), watershed size, design discharge, and riparian area plantings.

7. Maintenance plan. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

8. Performance standards. Ecologically-based standards that will be used to determine whether the mitigation project is achieving its objectives.

9. Monitoring requirements. A description of parameters monitored to determine whether the mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting monitoring results to the DE must be included.

10. Long-term management plan. A description of how the mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management.

11. Adaptive management plan. A management strategy to address unforeseen changes in site conditions or other components of the mitigation project, including the party or parties responsible for implementing adaptive management measures.

12. Financial assurances. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

Other information. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

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SOUTHWEST COASTAL LOUISIANA
REVISED INTEGRATED DRAFT FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex H

U.S. Fish and Wildlife Service Scoping / Planning Aid Letter /

Coastal Barrier Resources Act Determination

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
October 9, 2009

Colonel Alvin B. Lee
District Engineer
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Lee:

Please reference your September 29, 2009, letter requesting our participation as a cooperating agency for the Southwest Coastal Louisiana Protection and Restoration Feasibility Study that would be conducted by the U.S. Army Corps of Engineers (Corps). The study, which would involve the preparation of an environmental impact statement (EIS), would investigate the feasibility of providing Federal hurricane protection and storm damage reduction, as well as restoring and protecting fish and wildlife habitat, in portions of Calcasieu, Cameron, and Vermilion Parishes. The study would include the development of alternative plans (which may incorporate both structural and nonstructural components), identification of significant environmental resources, assessment of beneficial and adverse impacts, and formulation of compensatory mitigation measures, if necessary. The U.S. Fish and Wildlife Service (Service) has reviewed the information provided, and offers the following comments in accordance with the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Corps and the Service have formally committed to work together to conserve, protect, and restore fish and wildlife resources while ensuring environmental sustainability of our Nation's water resources under the January 22, 2003, Partnership Agreement for Water Resources and Fish and Wildlife. Accordingly, the Service would be pleased to serve as a cooperating agency in developing the EIS for the proposed project in accordance with applicable NEPA/Council on Environmental Quality guidance. Our participation will be specifically limited to: 1) participating in meetings and field trips to obtain baseline information on project-area fish and wildlife resources; 2) evaluating the proposed project's impacts to wetlands and associated fish and wildlife resources, and assisting in the development of measures to avoid, minimize, and/or compensate for those impacts; and 3) providing technical assistance in the development of a Biological Assessment describing the impacts of the proposed activity to federally listed threatened or endangered species and/or their critical habitat.

We appreciate the opportunity to assist the Corps during the planning of the proposed feasibility study. If you require further assistance in this matter, please contact Mr. David Soileau, Jr. (337/291-3109) of this office.

Sincerely,

for James F. Boggs
Supervisor
Louisiana Field Office

United States Department of the Interior
FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

March 27, 2009

Colonel Alvin B. Lee
District Engineer
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Lee:

The U.S. Fish and Wildlife Service (Service) has reviewed the Department of the Army, Corps of Engineers (Corps), Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (DEIS) for the Southwest Coastal Louisiana Feasibility Study for Calcasieu, Cameron, and Vermilion Parishes, Louisiana. The NOI was published in the Federal Register (Volume 74, No. 38, pg. 8920) on February 27, 2009 (Department of Interior No. ER09/0228). The study was authorized by a resolution adopted by the United States House of Representatives (House) Committee on Transportation and Infrastructure on December 7, 2005. The Fish and Wildlife Service (Service) submits the following comments in accordance with the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 et seq.), the Migratory Bird Treaty Act (MBTA, 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Corps is conducting a study to determine the feasibility of providing Federal hurricane protection and storm damage reduction for portions of Calcasieu, Cameron, and Vermilion Parishes. A specific focus of that study, which is explicitly mentioned in the above-referenced House Committee resolution, will include an evaluation of the feasibility of constructing an armored 12-foot-high levee along the Gulf Intracoastal Waterway. However, numerous other levee alignments and project alternatives are under consideration, including those that would involve a variety of structural, non-structural, and coastal restoration components.

DESCRIPTION OF FISH AND WILDLIFE RESOURCE CONDITIONS

Most of the fish and wildlife habitat within the proposed study area exists as fresh, intermediate, brackish, and saline marshes. There are numerous rivers, bayous, canals, ponds, lakes, and other open water areas within those marshes that would also be affected by the proposed project. The study-area marshes and cheniers provide habitat for a variety of migratory game and non-game birds such as mallard, gadwall, American wigeon, common pintail, black rail, yellow rail, and little blue heron. Those non-game species have exhibited substantial population declines

over the last 30 years, primarily as the result of habitat loss and fragmentation. Numerous reptiles and amphibians inhabit the marshes, bayous, and ponds of the study area including lesser siren, three-toed amphiuma, Gulf Coast toad, eastern narrow-mouthed toad, spring peeper, green treefrog, cricket frog, bullfrog, American alligator, common snapping turtle, alligator snapping turtle, diamondback terrapin, red-eared slider, painted turtle, Mississippi mud turtle, stinkpot, various water snakes, western ribbon snake, speckled kingsnake, and the western cottonmouth. The study area wetlands also help to reduce the impact of storm surges on more inland habitats and infrastructure, and aid in water quality maintenance by reducing excessive dissolved nutrient levels and removing suspended sediments. They provide plant detritus to surrounding estuarine waters, thereby substantially contributing to the detritus-based food web that supports the productivity of commercially and recreationally important fisheries. Brackish and saline marshes support estuarine-dependent (i.e., inter-jurisdictional) fishes and shellfishes (e.g., red drum, Atlantic croaker, Gulf menhaden, blue crab, brown shrimp, and white shrimp). Fresh and intermediate marshes of the study area provide habitat for mammals such as raccoon, mink, and swamp rabbit, and support many commercially and recreationally important fishes such as largemouth bass, black crappie, sunfishes, catfishes, freshwater drum, buffalos, and gars. The numerous cheniers located throughout the proposed project area provide important stopover habitat for as many as 250 species of neotropical migratory songbirds, including a variety of warblers, tanagers, orioles, thrushes, vireos, and grosbeaks.

Most development within the southern portions of the study area is located immediately adjacent to major state highways in the area including Louisiana Highways 82, 27, and 14. The most significant residential, commercial, and industrial developments are within, and immediately surrounding, the cities of Lake Charles and Abbeville. Various types of agriculture, such as sugarcane, rice, crawfish, and livestock production, are also present within the study area.

Threatened and Endangered Species

Federally listed as a threatened species, the piping plover (*Charadrius melodus*), as well as its designated critical habitat, occur along the Louisiana coast. Piping plovers winter in Louisiana, and may be present for 8 to 10 months annually. They arrive from the breeding grounds as early as late July and remain until late March or April. Piping plovers feed extensively on intertidal beaches, mudflats, sand flats, algal flats, and wash-over passes with no or very sparse emergent vegetation; they also require unvegetated or sparsely vegetated areas for roosting. Roosting areas may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather. In most areas, wintering piping plovers are dependent on a mosaic of sites distributed throughout the landscape, because the suitability of a particular site for foraging or roosting is dependant on local weather and tidal conditions. Plovers move among sites as environmental conditions change, and studies have indicated that they generally remain within a 2-mile area. Major threats to this species include the loss and degradation of habitat due to development, disturbance by humans and pets, and predation.

On July 10, 2001, the Service designated critical habitat for wintering piping plovers (Federal Register Volume 66, No. 132). Their designated critical habitat identifies specific areas that are essential to the conservation of the species. The primary constituent elements for piping plover wintering habitat are those habitat components that support foraging, roosting, and sheltering and

the physical features necessary for maintaining the natural processes that support those habitat components. Constituent elements are found in geologically dynamic coastal areas that contain intertidal beaches and flats (between annual low tide and annual high tide), and associated dune systems and flats above annual high tide. Important components (or primary constituent elements) of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting plovers. Should the proposed project directly or indirectly affect the piping plover or its critical habitat, further consultation with this office will be necessary.

Federally listed as an endangered species, brown pelicans (*Pelecanus occidentalis*) are currently known to nest on Rabbit Island in Calcasieu Lake. Pelicans change nesting sites as habitat changes occur. In spring and summer, nests are built in mangrove trees or other shrubby vegetation, although ground nesting may also occur. Brown pelicans feed along the Louisiana coast in shallow estuarine waters, using sand spits and offshore sand bars as rest and roost areas. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance. Should the proposed project directly or indirectly affect brown pelicans, further consultation with this office will be necessary.

Endangered and threatened sea turtles forage in the nearshore waters, bays and sounds of Louisiana. The National Marine Fisheries Service (NMFS) is responsible for aquatic marine threatened or endangered species. Please contact Eric Hawk (727/824-5312) at the NMFS Regional Office in St. Petersburg, Florida, for information concerning those species in the aquatic environment. When sea turtles leave the aquatic environment and come onshore to nest, however, the Service is responsible for consultation. Accordingly, we recommend that you contact this office if your activities would occur on beach areas during the sea turtle nesting season (depending on the species in question).

Other Federal Trust Species

Forested portions of the study area may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species on August 8, 2007. Bald eagles nest in Louisiana from October through mid-May. Eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water. Eagles also winter, and infrequently nest, in mature pine trees near large lakes. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants (i.e., organochlorine pesticides and lead).

Breeding bald eagles occupy "territories" that they will typically defend against intrusion by other eagles, and that they likely return to each year. A territory may include one or more alternate nests that are built and maintained by the eagles, but which may not be used for nesting in a given year. Potential nest trees within a nesting territory may, therefore, provide important alternative bald eagle nest sites. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest. Nest sites typically include at least one perch with a clear view of the water or area where the eagles usually forage. Shoreline trees or snags located near large waterbodies provide the visibility and accessibility needed to locate aquatic prey. Bald

eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during this critical period may lead to nest abandonment, cracked and chilled eggs, and exposure of small young to the elements. Human activity near a nest late in the nesting cycle may also cause flightless birds to jump from the nest tree, thus reducing their chance of survival.

Although the bald eagle has been removed from the List of Endangered and Threatened Species, it continues to be protected under the MBTA and the BGEPA. The Service developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the BGEPA. A copy of the NBEM Guidelines is available at: http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf. Those guidelines recommend: (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. On-site personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. A copy of that determination should be provided to this office. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting such consultations. Should you need further assistance interpreting the guidelines or performing an on-line project evaluation, please contact this office.

The proposed project would be located in an area where colonial nesting waterbirds may be present. Colonies may be present that are not currently listed in the database maintained by the Louisiana Department of Wildlife and Fisheries (LDWF). That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new, comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect proposed work sites for the presence of undocumented nesting colonies during the nesting season. To minimize disturbance to colonial nesting birds, the following restrictions on activity should be observed:

1. For colonies containing nesting brown pelicans, all activity occurring within 2,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 15 through March 31). Nesting periods vary considerably among Louisiana's brown pelican colonies, however, so it is possible that this activity window could be altered based upon the dynamics of the individual colony. The LDWF Fur and Refuge Division should be contacted to obtain the most current information about the nesting chronology of individual brown pelican colonies.

2. For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15; exact dates may vary within this window depending on species present).

3. For colonies containing nesting gulls, terns, and/or black skimmers, all activity occurring within 650 feet of a rookery should be restricted to the non-nesting period (i.e., September 16 through April 1; exact dates may vary within this window depending on species present).

In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

Publicly and Privately Managed Areas

Publicly owned and/or managed lands within the current study area include three National Wildlife Refuges (Sabine, Cameron Prairie, and Lacassine) managed by the Service, the Rockefeller Wildlife Refuge, State Wildlife Management Area, and Rockefeller Refuge Mitigation Bank managed by LDWF, and the Sam Houston Jones State Park managed by the Office of State Parks.

Lands within the study area that managed by non-governmental organizations include the Little Pecan Island Preserve and the Persimmon Gully Mitigation Bank managed by The Nature Conservancy, and the Paul J. Rainey National Audubon Society Preserve managed by the National Audubon Society.

Privately owned and/or managed lands within the current study area include the Gum Cove, Fresh Marsh, Choupique, and Houston River Mitigation Banks (managed by Stream Properties, Inc.), the Bryan Farms Mitigation Bank (managed by Krauss and Managan Timber Company), the Simon and Delaney Mitigation Bank (managed by Mr. Chris Simon), and No Hope Farms Mitigation Bank (managed by Mr. Carl Nabours). There are also two privately owned Wetlands Reserve Program tracts (administered by the Natural Resources Conservation Service) within the study area (Contract #66-7217-9-3386 and Contract #66-7217-1-3616 in Vermilion Parish) that are encumbered by perpetual conservation easements.

Should proposed project alternatives entail work within or adjacent to, or would potentially alter the hydrology of, any of these managed properties, then the respective owner and manager should be contacted. Also, work proposed to occur on National Wildlife Refuge (NWR) lands would require a compatibility determination as mandated by the National Wildlife Refuge System Administration Act of 1966, as amended. (The amended act is now known as the National Wildlife Refuge System Improvement Act of 1997 [16 U.S.C. 668dd]). The Act states that refuge officials (through delegation of authority from the Secretary of the Interior) shall not initiate or permit a new use of a refuge unless the Secretary has determined that it is a compatible use. A compatible use is defined as any use of a refuge that will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of that refuge.

Federal agencies proposing a project that includes features on a NWR are encouraged to contact the refuge staff early in the planning process. Point of contact for the Service's Southwest Louisiana National Wildlife Refuge Complex is Mr. Don Voros, Project Leader (337) 598-2216. Additional activities (e.g., surveys, soil borings, etc.) that may need to occur on the NWR during the planning process may require a Special Use Permit from the Service; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work/investigations on a NWR.

Estuarine wetlands and associated shallow waters within the project area have been identified as Essential Fish Habitat (EFH). EFH requirements vary depending upon species and life stage. Categories of EFH in the project area include estuarine emergent wetlands, estuarine water column, submerged aquatic vegetation, and estuarine water bottoms. Detailed information on Federally managed fisheries and their EFH is provided in the 1998 generic amendment of the Fishery Management Plans for the Gulf of Mexico, prepared by the Gulf of Mexico Fishery Management Council (GMFMC). That generic amendment was prepared in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA); (P.L. 104-297). Recommendations to minimize and/or avoid impacts to EFH should be developed in coordination with the NMFS.

A portion of the study area lies within units of the Coastal Barrier Resources System. The Coastal Barrier Resources Act (CBRA) restricts Federal expenditures that effectively encourage development of coastal barriers. Coordination with this office should be undertaken to ensure that any proposed project feature is in compliance with the CBRA.

POTENTIAL SIGNIFICANT IMPACTS

Depending on the selected project features, construction of the proposed hurricane protection project has the potential to result in the direct loss of valuable coastal habitats including marsh, swamp, and bottomland hardwood wetlands (including cheniers); those habitats may also sustain losses from secondary impacts related to hydrologic changes in the study area. Developmental pressure on study area wetlands would likely increase should such areas be enclosed by storm-surge protection levees. Reduced water exchange between wetlands enclosed within and those excluded from leveed systems could reduce water quality within the study area by eliminating or reducing the filtering capacity of those wetlands. Wetland habitat losses would reduce populations of resident fish and wildlife, reduce important wintering habitat for waterfowl and other migratory birds, and reduce nursery habitat and detritus input important to the maintenance of estuarine-dependent fish and shellfish production.

PROBLEMS, OPPORTUNITIES, AND PLANNING OBJECTIVES

The most significant fish and wildlife related problem in the study area and throughout coastal Louisiana is the rapid loss of valuable wetland habitat. Since the 1930s, Louisiana has lost over 1,900 square miles of coastal wetlands; and an additional 24 square miles are being lost every

year (Louisiana Department of Natural Resources' *Coastal Restoration Annual Project Reviews: December 2005*). The two major hurricanes of 2005 (Katrina and Rita) have significantly contributed to those coastal wetland losses, and their effects have exceeded all such changes in coastal Louisiana from the last 13 years of hurricanes combined, including Hurricanes Andrew (1992) and Lili (2002) (U.S. Geological Survey's *USGS Reports Latest Land-Water Changes for Southeastern Louisiana, February 2006*). As a result of the high rate of land loss and the national significance of coastal Louisiana wetlands, several programs (e.g., Americas Wetlands, Coast 2050, the Coastal Wetlands Planning, Protection, and Restoration Act, the Louisiana Coastal Area Ecosystem Restoration Study, the Coastal Impact Assistance Program [CIAP], and the Louisiana Comprehensive Hurricane Protection and Restoration Study) are being planned or implemented to restore and protect Louisiana's coastal wetland ecosystems. Many of the goals of those restoration programs and those of the current coastal hurricane protection study are interrelated and necessitate an integrated solution. Projects should be designed in collaboration with one another to ensure that a system-wide solution for coastal flood protection and restoration for the study area is achieved.

Water quality deterioration may be minimized by preserving remaining wetlands via limiting urban expansion and associated pollution discharges into wetlands. To that end, in order to discourage further wetland loss, any proposed hurricane protection levees should be located landward of the wetland/non-wetland interface. Should some wetlands be unavoidably enclosed within the levee, the integrity of present hydrologic regimes should be maintained via installation of water control structures in the levee to ensure adequate water circulation. Preservation of enclosed wetlands could be ensured via the purchase of non-development easements or local flood zoning ordinances. Furthermore, any pumping stations associated with the project should not discharge directly into canals or other open water bodies, but rather into wetland systems that can assimilate those nutrients being discharged.

The need for borrow necessary to complete proposed hurricane protection levees may exceed local availability. Often, the searches for levee-building material have been conducted on a project-by-project basis, and have led to the selection of the least-expensive and easiest sources for borrow material, which are usually located within wetlands adjacent to the proposed levee. Use of such on-site sources that adversely impact wetlands is frequently inconsistent with coastal restoration efforts, and is counterproductive to attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem.

In order to address the above problems and opportunities, the Service recommends that the following planning objectives and constraints be included in any further planning of hurricane protection features for the study area:

1. Avoid and/or minimize impacts to wetlands and fish and wildlife habitat in the study area.

2. The Service's priority selection process for borrow material outlined in our August 7, 2006, letter to the Corps regarding the Greater New Orleans Hurricane and Storm Damage Risk Reduction Project should be utilized.

3. Coordinate with the LCA Plan near-term restoration planning team, CWPPRA member-agencies, CIAP representatives, and any other pertinent coastal restoration entities to ensure consistency with the objectives of the projects that may have already been constructed, that are proposed for construction, or that have been identified in planning efforts to occur within the subject study area.

4. Avoid impacts to threatened and endangered species and their habitat.

FISH AND WILDLIFE CONSERVATION MEASURES

Implementation of the proposed hurricane protection plan could potentially have significant direct impacts on fish and wildlife resources. Of equal concern is the potential for loss, via future development, of fish and wildlife habitat enclosed by levees constructed as a result of the plan. The Service believes that project plans can be designed to mitigate those negative impacts.

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Policy Act regulations to include: (a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments.

If the enclosure of wetlands within the proposed levee is necessary to provide for storm surge protection, mechanisms for protecting enclosed wetlands and for compensating habitat value losses associated with levee construction should be developed. Preservation of enclosed wetlands may be accomplished by installing water control structures in the levee that could be operated to ensure adequate water exchange. Further, protection of enclosed wetlands from future development could be ensured via purchase of non-developmental easements. Compensation for wetland habitat value losses associated with levee construction would likely involve acquisition and/or restoration of in-kind wetland habitats. Detailed mitigation needs will be determined in the feasibility stage.

1. Mitigate impacts to wetlands by:

    a. Incorporating hurricane protection features (e.g., floodwalls, etc.) that would minimize impacts to fish and wildlife habitat;

    b. Requiring that hurricane protection levees are located landward of the wetland/non-wetland interface, and limiting hurricane protection to existing urban developments;

    c. Requiring that borrow material for levee construction be taken from non-forested, non-wetland areas (the Service's priority selection process for borrow material should be utilized);

d. Installing an adequate number of water-control structures in hurricane protection levees that enclose wetlands to maintain normal water exchange and preclude wetland drainage (such structures should be closed only in advance of tropical storms);

e. Acquiring non-development easements on enclosed wetlands to ensure their continued use as floodwater storage areas and to preclude any secondary development;

f. Incorporating water quality improvements by routing urban runoff through enclosed wetlands and discharging any pumped water into floodside wetlands;

g. Ensuring adequate internal drainage exists within the leveed area to prevent levees from compounding existing flooding problems, thus leading to future flood control projects with a resulting loss of wetlands and fish and wildlife resources; and,

h. Implementing measures to compensate for unavoidable losses of wetland habitat values.

2. Avoid impacts to endangered or threatened species and their habitats.

3. Avoid impacts to other Federal trust fish and wildlife resources such as bald eagles and colonial nesting waterbirds.

4. Avoid impacts to public lands, if feasible. If not feasible, coordination with agencies managing the public lands that would be impacted by the proposed project should occur throughout the planning process.

5. Ensure compliance with CBRA where applicable.

FISH AND WILDLIFE COORDINATION ACTIVITIES FOR THE FEASIBILITY STAGE

The following data will be needed to enable the Service to conduct a detailed analysis of project impacts on fish and wildlife resources and to formulate measures to mitigate any losses to those resources.

1. Identification of all alternatives to be considered, including detailed project plans (e.g., a written description and map) for those alternatives.

2. An estimate of current, future-with, and future-without-project development and land loss rates within the project area(s), presented in 10-year intervals, to be impacted by alternatives being considered.

3. Identification of habitats, by type and acreage, to be impacted by various alternatives being considered. That data should also be presented in 10-year intervals.

We look forward to assisting the Corps in the documentation of existing conditions, development of alternatives, and assessment of effects of project alternatives on Federal trust resources during the subsequent feasibility study. Should you have any questions regarding our comments, please contact David Soileau, Jr. (337/291-3109) of this office.

Sincerely,

for James F. Boggs
Supervisor
Louisiana Field Office

cc: DOI, OEPC, Washington, D.C. (Attn.: Loretta Sutton)
DOI, OEPC, Albuquerque, NM (Attn.: Steven Spencer)
FWS, BAP & HC (ERT), Arlington, VA (Attn.: Stefanie Nash)
FWS, Atlanta, GA (Attn.: Jeff Weller)
COE, CEMVN-PM-RS, Attention: Sandra Stiles, New Orleans, LA
EPA, Dallas, TX
NMFS, Baton Rouge, LA
LDWF, Baton Rouge, LA (Attn.: Kyle Balkum)
LDWF, Natural Heritage Program, Baton Rouge, LA

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

April 7, 2016

Ms. Joan M. Exnicios
Chief, Environmental Planning Branch
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Exnicios:

Thank you for your April 4, 2016, letter regarding the Corps of Engineers' National Ecosystem Restoration (NER) Plan. The NER Plan (CM-4 Small Integrated Restoration) focuses on stabilizing perimeter geomorphology and consists of 49 ecosystem restoration features recommended for construction (9 marsh restoration features; 35 chenier reforestation features and 5 shoreline protection features). The shoreline protection features include the construction of breakwaters at multiple locations of the Gulf of Mexico shoreline from Calcasieu River to Freshwater Bayou, as well as Holly Beach located in Cameron and Vermilion Parishes, Louisiana. Your letter requested the U. S. Fish and Wildlife Service's determination, pursuant to the Coastal Barrier Resource Act (CBRA) of 1982 (96 Stat. 1653, as amended; 16 U.S.C. 3501 et seq.), as to whether those activities would fall within an exemption to the limitation on Federal expenditures. The purposes of the CBRA are "to minimize the loss of human life, wasteful expenditures of Federal revenues, and the damage to fish, wildlife, and other natural resources associated with the coastal barriers along the Atlantic and Gulf Coast…" 16 U.S.C. § 3501(b). Section 3505 of CBRA provides exceptions to the prohibition of Federal expenditures that would have the effect of supporting coastal barrier development. The CBRA generally prohibits the expenditure of Federal funds that would encourage development on coastal barriers.

The proposed restoration features occur within System Units S08, LA-07, LA-08P, S10, LA-10 and S11. Section 3505 (a)(6)(A) provides that such expenditures are exempt for "Projects for the study, management, protection, and enhancement of fish and wildlife resources and habitats, including acquisition of fish and wildlife habitats, and related lands, stabilization projects for fish and wildlife habitats, and recreational projects." Section 206.344 (c) states that there would be Federal financial limitations to carry out "... any project to prevent erosion of, or to otherwise stabilize, an inlet, shoreline, or inshore area, except that such assistance and expenditures may be made available on units designated pursuant to Section 4 on the maps numbered S01 through S08 and LA-07 for purposes other than encouraging development and, in all units in cases where an emergency threatens life, land, and property immediately adjacent to that unit."

The Coastal Barrier Improvement Act of 1990 created a new category of lands known as "Otherwise Protected Areas" (OPAs). These areas pertain to coastal barriers held for conservation or recreation, such as national wildlife refuges, state and county parks, etc. According to our records, part of the project occurs within the state's Rockefeller Wildlife Refuge, which is a designated OPA associated with System Unit LA-08P. The only prohibition within OPAs is Federal Flood Insurance, and therefore, CBRA limitations on federal expenditures do not apply to this project.

Because the project is consistent with the purposes of the CBRA and falls within the exemptions stated above, we have determined that the proposed federal action would be exempt from the limitations of the CBRA, and therefore, eligible for Federal expenditures.

We appreciate the opportunity to provide this determination. If you have any questions regarding our comments, please contact Ms. Amy Trahan (337/291-3126).

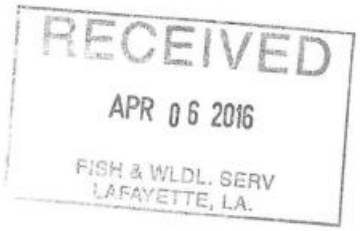
Sincerely,

for Brad Rieck
Acting Field Supervisor
Louisiana Ecological Services Office

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NEW ORLEANS DISTRICT
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

April 4, 2016

Regional Planning and Environment
Division South, Environmental Planning Branch



Mr. Brad Rieck
Acting Field Supervisor
U.S. Fish and Wildlife Service
646 Cajoundome Blvd. Suite 400
Lafayette, LA 70506

Dear Mr. Rieck:

The US Army Corps of Engineers, New Orleans District (CEMVN) is preparing to go to a Civil Works Review Board (CWRB) for the Southwest Coastal Louisiana Integrated Final Feasibility Report and Environmental Impact Statement (SWC) April 21, 2016. The recommended plan for the SWC study includes a National Economic Development plan (NED) and a National Ecosystem Restoration (NER) plan.

The NER Plan (CM-4 Small Integrated Restoration) focuses on stabilizing perimeter geomorphology and consists of 49 ecosystem restoration features recommended for construction (9 marsh restoration features; 35 chenier reforestation features and 5 shoreline protection features). The shoreline protection features include the construction of breakwaters at multiple locations of the Gulf of Mexico shoreline from Calcasieu River to Freshwater Bayou, as well as Holly Beach. These proposed breakwaters are within units covered under the Coastal Barrier Resources Act (CBRA) which is administered by the U.S. Fish and Wildlife Service.

The CBRA generally prohibits federal expenditures with CBRS units on projects that prevent erosion of or to otherwise stabilize shorelines (See 16 USC 3504). In order to spend Federal funds on proposed breakwaters, they have to fall within an exception to the limitation on Federal expenditures as expressed in 16 USC 3505. CEMVN would like to consult with your office under 16 USC 3503(a) to seek a determination that the proposed breakwaters within the CBRA units fall within an exception to the limitation on Federal expenditures.

To meet the CWRB review date, we need a letter from your office advising that the proposed breakwater meets an exception under 16 USC 3505(a). If you would like to discuss, have questions or need additional information, please contact Dr. William Klein at (505) 862-2540.

Sincerely,

Sandra Stiles for
Joan M. Exnicios
Chief, Environmental Planning Branch

SOUTHWEST COASTAL LOUISIANA
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex I

Technical, Institutional, and Public Significance of Relevant Resources

Resource	Institutionally Significant	Technically Significant	Publicly Significant
Soils, Water bottoms, Prime and Unique Farmlands	Council on Environmental Quality (CEQ) memorandum dated August 11, 1980, entitled "Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act (NEPA)"; Executive Order 11990 - Protection of Wetlands; Agriculture and Food Act of 1981 (Public Law 97-98) containing the Farmland Protection Policy Act (PL 97-98; 7 U.S.C. 4201 *et seq.*).	Technically significant in determining soils engineering and environmental suitability, based on their physical and chemical properties, for proposed activities. Water bottoms are technically significant because the estuarine bottom sediment characteristics (water bottoms) benthic organismal distribution and is an integral component of the benthic boundary layer.	Significant to the public for determining suitability of construction capabilities, agriculture suitability, and suitability for septic tank type disposal of sanitary waste.
Hydrology	NEPA of 1969; Clean Water Act of 1972; Storm damage Control Act of 1944; Coastal Barrier Resources Act of 1982; Rivers and Harbors Act of 1899; River and Harbor and Storm damage Control Act of 1970; Watershed Protection and Storm damage Prevention Act of 1954; Submerged Lands Act of 1953; Coastal Zone Management Act of 1972; Safe Drinking Water Act of 1974; Estuary Protection Act of 1968; Resource Conservation and Recovery Act of 1976; Comprehensive Environmental Response, Compensation and Liability Act of 1980; Executive Order 11988 Floodplain Management.	Civil Works water resources development projects typically impact (positively or negatively) the interrelationships and interactions between water and its environment.	Publicly significant because the public demands clean water, hazard-free navigation, and protection of estuaries and floodplain management.
Water Quality	Clean Water Act of 1972; Pollution Prevention Act of 1990, the Safe Drinking Water Act of 1974; Water Resources Planning Act of 1965.	Technically significant to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.	Publicly significant because of the desire for clean water and water-related activities such as boating, swimming, fishing, and as a source of potable water.
Coastal Shorelines	Coastal Barrier Resources Act of 1982; Coastal Zone Management Act of 1972; Endangered Species Act of 1973; Estuary Protection Act of 1968l Fish and Wildlife Coordination Act of 1958; Migratory Bird Conservation Act of 1929; Migratory Bird Treaty Act of 1918; Endangered Species Act of 1973; Fish and Wildlife Conservation Act of 1980; Magnuson-Stevens Fishery Conservation and Management Act of 1976.	Technically significant because they are a critical element of the Gulf coastal barrier habitats.	Publicly significant because of the high priority that the public places on their aesthetic, recreational, and commercial value.
Vegetation Resources	Coastal Barrier Resources Act of 1982; Coastal Zone Management Act of 1972; Emergency Wetlands Resources Act of 1986; Estuary Protection Act of 1968; Fish and Wildlife Conservation Act of 1980; Fish and Wildlife Coordination Act of 1958; NEPA of 1969; North American Wetlands Conservation Act of 1989; the Water Resources Development Acts of 1976, 1986, 1990, and 1992; Executive Order 13186 - Migratory Bird Habitat Protection.	Technically significant because they are a critical element of the barrier shoreline habitats. Vegetation resources serve as the basis of productivity, contribute to ecosystem diversity, provide various habitat types for fish and wildlife, and are an indicator of the health of coastal habitats.	Publicly significant because of the high priority that the public places on their aesthetic, recreational, and commercial value.
Wildlife Resources	NEPA of 1969; Coastal Zone Management Act of 1972; Estuary Protection Act of 1968; Fish and Wildlife Coordination Act of 1958; Migratory Bird Conservation Act of 1929; Migratory Bird Treaty Act of 1918; Endangered Species Act of 1973; Fish and Wildlife Conservation Act of 1980; North American Wetlands Conservation Act of 1989; Executive Order 13186 - Migratory Bird Habitat Protection; Marine Mammal Protection Act of 1972.	Technically significant because they are a critical element of the barrier shoreline ecosystem, they are an indicator of the health of various coastal habitats, and many wildlife species are important recreation and commercial resources.	Publicly significant because of the high priority that the public places on their aesthetic, recreational, and commercial value.

Aquatic Resources	National Environmental Policy Act of 1969; Coastal Zone Management Act of 1972; Estuary Protection Act of 1968.	Technically significant because plankton provide a major, direct food source for animals in the water column and in the sediments; are responsible for at least 40 percent of the photosynthesis occurring on the earth; important for their role in nutrient cycling; plankton productivity is a major source of primary food-energy for most estuarine systems throughout the world; and phytoplankton production is the major source of autochthonous organic matter in most estuarine ecosystems (Day et al. 1989).	Publicly significant because plankton constitute the lowest trophic food level for many larger organisms important to commercial and recreational fishing. There is also public health concern with noxious plankton blooms (red and brown tides) that produce toxins, and large-scale blooms can lead to hypoxic conditions, which can result in fish kills.
Fisheries	Fish and Wildlife Coordination Act of 1958; Endangered Species Act of 1973; Magnuson-Stevens Fishery Conservation and Management Act of 1976; Coastal Zone Management Act of 1972; Estuary Protection Act of 1968.	Technically significant because they are a critical element of many valuable freshwater and marine habitats, they are an indicator of the health of various freshwater and marine habitats, and many fish species are important commercial resources.	Publicly significant because of the high priority that the public places on their esthetic, recreational, and commercial value. Fisheries resources in the project area include marine and estuarine finfish and shellfish.
Essential Fish Habitat	Magnuson-Stevens Fishery Conservation and Management Act of 1976.	Technically significant because it includes those waters and substrate necessary to Federally-managed fish species for spawning, breeding, feeding or growth to maturity.	Publicly significant because of the high value that the public places on seafood and the recreational and commercial opportunities it provides.
Threatened and Endangered Species	Endangered Species Act of 1973; Marine Mammal Protection Act of 1972; Bald Eagle Protection Act of 1940.	Technically significant because the status of such species provides an indication of the overall health of an ecosystem.	Publicly significant because of the desire of the public to protect them and their habitats.
Cultural and Historic Resources	National Historic Preservation Act of 1966; Abandoned Shipwreck Act of 1987; Archeological Resources Protection Act of 1979; National Environmental Policy Act of 1969.	Technically important because of their association or linkage to past events, to historically important persons, and to design and/or construction values; and for their ability to yield important information about prehistory and history.	Publicly important because preservation groups and private individuals support their protection, restoration, enhancement, or recovery.
Recreational Resources	Federal Water Project Recreation Act of 1965; Land and Water Conservation Fund Act of 1965.	Technically significant because of the high economic value of recreational activities and their contribution to local, state, and national economies.	Publicly significant because of the high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana, and the large per-capita number of recreational boat registrations in Louisiana.
Air Quality	Clean Air Act of 1963, as amended, and the Louisiana Environmental Quality Act of 1983, as amended.	Air quality is technically significant because of the status of regional ambient air quality in relation to the National Ambient Air Quality Standards (NAAQS).	Air quality is publicly significant because of the desire for clean air and public health concerns expressed by many citizens.
Socioeconomic and Human Resources	National Environmental Policy Act of 1969; Estuary Protection Act of 1968; Clean Water Act of 1972; Rivers and Harbors Act of 1899; Watershed Protection and Storm damage Protection Act of 1954. Executive Order 12898 of 1994 – Environmental Justice.	Technically significant because the social and economic welfare of the Nation may be positively or adversely impacted by the proposed action; the social and economic welfare of minority and low-income populations may be positively or disproportionately impacted by proposed actions.	Publicly significant because of the public's concern for health, welfare, and economic and social well-being from water resources projects; also public concerns about the fair and equitable treatment of all people

SOUTHWEST COASTAL LOUISIANA INTEGRATED FINAL FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex J

Environmental Compliance Laws

Table J-1: Relevant Environmental Federal Statutory Authorities and Executive Orders. (Note: this list is not complete or exhaustive.)	
Abandoned Shipwreck Act of 1987	Marine Mammal Protection Act of 1972
American Indian Religious Freedom Act of 1978	Marine Protected Areas (EO 13158) of 2000
Anadromous Fish conservation Act of 1965	Marine Protection, Research, and Sanctuaries Act of 1972
Antiquities Act of 1906	Migratory Bird Conservation Act of 1929
Archeological Resources Protection Act of 1979	Migratory Bird Treaty Act of 1918
Archeological and Historical Preservation Act of 1974	Migratory Bird Habitat Protection (EO 13186) of 2001
Bald Eagle Protection Act of 1940	National Environmental Policy Act of 1969
Clean Air Act of 1970	National Historic Preservation Act of 1966
Clean Water Act of 1977	Native American Graves Protection and Repatriation Act of 1990
Coastal Barrier Improvement Act of 1990	Neotropical Migratory Bird Conservation Act of 2000
Coastal Barrier Resources Act of 1982	Noise Control Act of 1972
Coastal Wetlands Planning, Protection, and Restoration Act of 1990	Nonindigenous Aquatic Nuisance Prevention and Control Act of 1996
Coastal Zone Management Act of 1972	North American Wetlands Conservation Act of 1989
Comprehensive Environmental Response, Compensation, and Liability Act of 1980	Oil Pollution Act of 1990
Consultation and Coordination with Indian Tribal Governments (EO 13175) of 2000	Outer Continental Shelf Lands Act of 1953
Emergency Planning and Community Right-to-Know Act of 1986	Pollution Prevention Act of 1990
Emergency Wetlands Restoration Act of 1986	Prime and Unique Farmlands, 1980 CEQ Memorandum
Endangered Species Act of 1973	Protection and Enhancement of the Cultural Environment (EO 11593) of 1971
Environmental Quality Improvement Act of 1970	Protection and Enhancement of Environmental Quality (EO 11991) of 1977
Estuaries and Clean Water Act of 2000	Protection of Children from Environmental Health Risks and Safety Issues (EO 13045) of 1997
Estuary Protection Act of 1968	Protection of Cultural Property (EO 12555) of 1986
Estuary Restoration Act of 2000	Protection of Wetlands (EO 11990) of 1977
Exotic Organisms (EO 11987) of 1977	Reclamation Projects Authorization and Adjustments Act of 1992
Farmland Protection Policy Act of 1981	Recreational Fisheries (EO 12962) of 1995
Federal Actions to Address Environmental Justice in Minority Populations & Low-Income Populations (EO 12898) of 1994	Resource Conservation and Recovery Act of 1976
Federal Emergency Management (EO 12148) of 1979	Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186) of 2001
Federal Facilities Compliance Act of 1992	Rivers and Harbors Acts of 1899 and 1956
Federal Land Policy and Management Act of 1976	River and Harbor and Flood Control Act of 1970
Federal Water Pollution Control Act of 1972	Safe Drinking Water Act of 1974
Federal Water Project Recreation Act of 1965	Submerged Land Act of 1953
Fish and Wildlife Conservation Act of 1980	Sustainable Fisheries Act of 1996
Fish and Wildlife Coordination Act of 1934	Toxic Substances Control Act of 1976
Flood Control Act of 1944	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970
Floodplain Management (EO 11988) of 1977	Water Resources Development Acts of 1976, 1986, 1990, 1992, and 2007
Food Security Act of 1985	Water Resources Planning Act of 1965
Greening of the Government Through Efficient Energy Management (EO 13148) of 2000	Watershed Protection & Flood Prevention Act of 1954
Historic Sites Act of 1935	Water Pollution Control Act Amendments of 1972
Historical and Archeological Data-Preservation Act of 1974	Wild and Scenic River Act of 1968
Indian Sacred Sites (EO 13007) of 1996	Wilderness Act of 1964
Invasive Species (EO 13112) of 1999	
Land & Water Conservation Fund Act of 1965	
Magnuson-Stevens Fishery Conservation and Management Act of 1976	

(Note: this list is not complete or exhaustive.)	
Air Control Act	Louisiana Threatened and Endangered Species and Rare & Unique Habitats
Archeological Treasury Act of 1974	Protection of Cypress Trees
Louisiana Coastal Resources Program	Water Control Act
Louisiana Scenic Rivers Act of 1988	

ENVIRONMENTAL LAWS AND COMPLIANCE (*NEPA REQUIRED)

Federal projects must comply with Federal and state environmental laws, regulations, policies, rules and guidance. The team has coordinated and will continue to coordinate with Federal and state resource agencies during planning of the proposed action. Status of compliance with the various laws is presented below.

Bald and Golden Eagle Protection Act of 1940 (Bald Eagles)

The Bald and Golden Eagle Protection Act protects two eagle species. Bald eagles occur or occasionally occur in the proposed project area. Based on review of existing data and preliminary field surveys, the CEMVN finds that implementation of the Recommended Plan (RP) would have no effect on bald eagles.

Clean Air Act of 1970

The Clean Air Act (CAA) sets goals and standards for the quality and purity of air. It requires the Environmental Protection Agency to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The project area is in Calcasieu, Cameron, and Vermilion Parishes, which are currently in attainment of NAAQS. The Louisiana Department of Environmental Quality is not required by the CAA and Louisiana Administrative Code, Title 33 to grant a general conformity determination.

Clean Water Act of 1977 – Section 401

The Clean Water Act (CWA) sets and maintains goals and standards for water quality and purity. Section 401 requires a Water Quality Certification from the Louisiana Department of Environmental Quality that a proposed project does not violate established effluent limitations and water quality standards. Section 401 Water Quality Certification signed July 6, 2015.

Clean Water Act of 1972 – Section 404(b)(1) (Wetlands)

The USACE administers regulations under Section 404(b)(1) of the CWA, which establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. Potential project-induced impacts subject to these regulations has been evaluated. Section 404(b)(1) signed February 18, 2016.

Coastal Zone Management Act of 1972 (Coastal Zone Development)

The Coastal Zone Management Act provides for the management, beneficial use, protection and development of the nation's coastal resources by encouraging and assisting the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and esthetic values as well as the needs for compatible economic development. A Consistency Determination for the National Economic Development (NED) and the National Ecosystem Restoration (NER) Plans, dated April 29, 2014, was provided to the Louisiana Department of Natural Resources (LDNR), Office of Coastal Management for concurrence. By letter dated June 30, 2014, the LDNR, Office of Coastal Management provided programmatic concurrence that the project, at that stage of development (i.e., at a programmatic level), was consistent with the Louisiana Coastal Resources Program, but future phases of the project which may have coastal impacts would need to be reviewed as they were developed.

A revised Consistency Determination for fully constructible NED and NER Recommended Plans was provided to the LDNR, Office of Coastal Management on January 5, 2016. By letter dated February 12, 2016, the LDNR, Office of Coastal Management provided concurrence that the Southwest Coastal Louisiana project (application number C20160002) is consistent with the Louisiana Coastal Resources Program.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980

An appropriate level of assessment for the presence of Hazardous, Toxic and Radioactive Waste (HTRW) is required for feasibility studies per Engineering Regulation 1165-2-132 HTRW Guidance for Civil Works Projects. HTRW includes any material listed as a "Hazardous Substance" under the CERCLA. Other regulated contaminants include those substances that are not included under CERCLA but pose a potential health or safety hazard, and are regulated. Examples include, but are not limited to, many industrial wastes, naturally occurring radioactive materials (NORM), many products and wastes associated with the oil and gas industry, herbicides, and pesticides. Petrochemical and other plants are located along the Calcasieu River Ship Channel and the Lake Charles, Westlake, and Sulphur industrial corridors. These facilities have the potential for chemical and other HTRW-type discharges. Several waterways in the project area are known to be contaminated with CERCLA-regulated constituents. Some of these waterways are located within and nearby the NED and NER project areas

Consistent with the CERCLA, current USACE practice is to prepare a Phase I Environmental Site Assessment (ESA) following ASTM Standard E 1527-05. For the NER RP, an ASTM Phase I Environmental Site Assessment (ESA) has been completed. For the NED RP, an ASTM Phase I ESA and asbestos investigation will be conducted prior to construction of any nonstructural risk reduction measures and ecosystem restoration measures to confirm the absence of HTRW and damaged or friable asbestos or asbestos-containing materials, and, if warranted, additional HTRW investigations and a Phase II ESA will be conducted at the property. If the presence of HTRW, asbestos, or asbestos-containing materials in a damaged or friable form is confirmed on the property, the property owner shall be obligated, at his sole cost and expense, to conduct all necessary response and remedial activities in full compliance with applicable local, state, and federal laws and regulations and provide proof of same before the property can be deemed to have met the eligibility requirements.

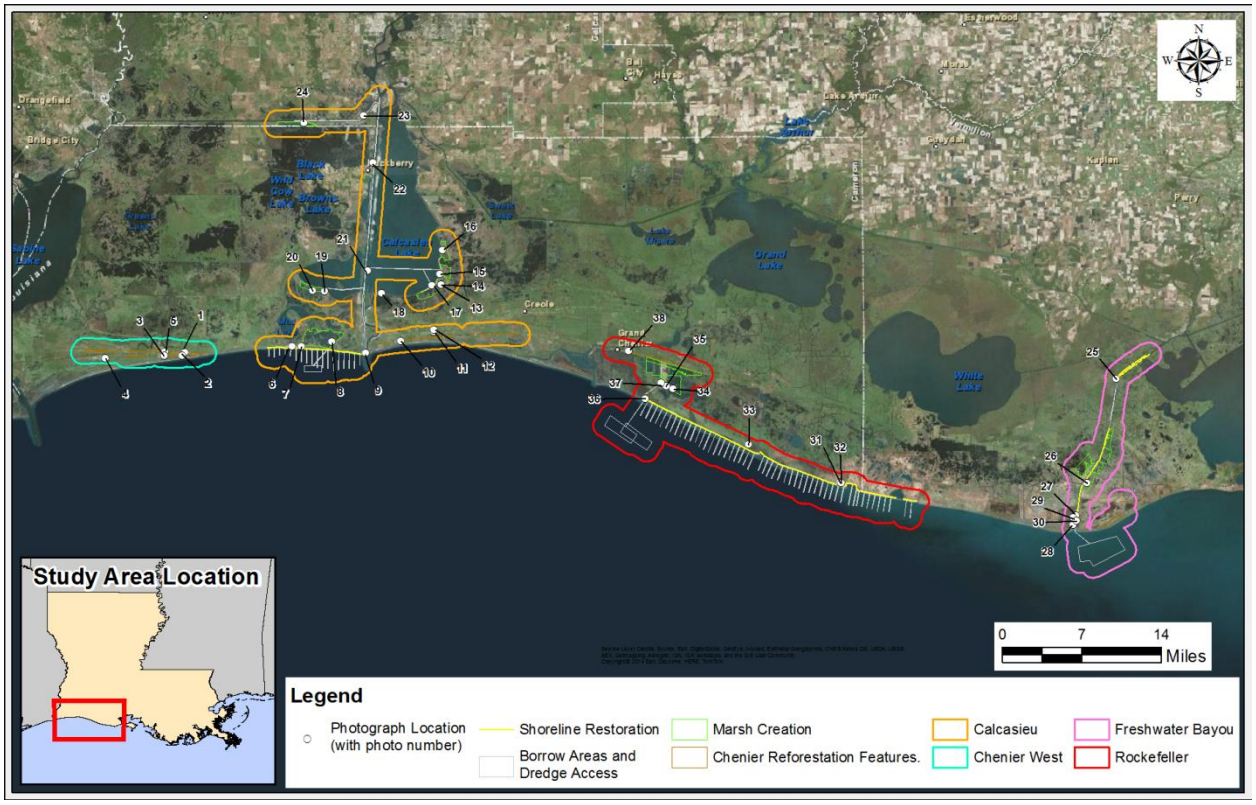


Figure 1. Restoration areas and points of interest photographed during the 3 February 2015 and 5 February 2015 aerial surveys.

An aerial survey of the Phase I buffer zones for each NER restoration area (Chenier West, Calcasieu, Rockefeller, and Freshwater Bayou) on 3 February 2015 and 5 February 2015 and documented mainly residential areas, marsh areas, oil and gas facilities, marinas, one dump site, and several unidentifiable drums/containers within the Phase I buffer zones for each restoration area (see Figure 1). Further investigation (i.e., pedestrian survey) is needed to determine if there are *recognized environmental conditions* associated with some of the aforementioned locations and items viewed during the aerial survey (see Table 1).

Table 1. Points of interest photographed during the aerial survey; these points will be investigated during the forthcoming pedestrian survey.

Site Number	Latitude	Longitude	Notes
4	29.75408	-93.72572	drum
7	29.77029	-93.43835	drum
10	29.7776	-93.29251	silo
11	29.789231	-93.244207	recycle center/dump
20	29.84121	-93.42261	drum
21	29.867346	-93.341841	drum
31	29.59649	-92.64969	metal box w/ legs and hatch ~4'x4'x5'
32	29.59576	-92.64734	another box
33	29.64556	-92.78358	tank

After a review of the Environmental Database Review (EDR) report generated for each of the four restoration areas, there appear to be no *recognized environmental conditions* within the restoration areas. The EDR report included a search of available ("reasonably ascertainable") government records within the four restoration areas for the databases listed below:

FEDERAL RECORDS

NPL	National Priority List
Proposed NPL	Proposed National Priority List Sites
Delisted NPL	National Priority List Deletions
NPL LIENS	Federal Superfund Liens
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
LIENS 2	CERCLA Lien Information
CORRACTS	Corrective Action Report
RCRA-TSDF	Resource Conservation and Recovery Act - Treatment, Storage and Disposal
US ENG CONTROLS	Engineering Controls Sites List
US INST CONTROL	Sites with Institutional Controls
HMIRS	Hazardous Materials Information Reporting System
DOT OPS	Incident and Accident Data
US CDL	Clandestine Drug Labs
US BROWNFIELDS	Listing of Brownfields Sites
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
LUCIS	Land Use Control Information System
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records of Decision

UMTRA	Uranium Mill Tailings Sites
ODI	Open Dump Inventory
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
US MINES	Mines Master Index File
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
RAATS	RCRA Administrative Action Tracking System
LEAD SMELTERS	Lead Smelter Sites
FEMA UST	Underground Storage Tank Listing
COAL ASH DOE	Steam-Electric Plant Operation Data
2020 COR ACTION	2020 Corrective Action Program List
PRP	Potentially Responsible Parties
EPA WATCH LIST	EPA Watch List
US FIN ASSUR	Financial Assurance Information
FEDERAL FACILITY	Federal Facility Site Information listing
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
US HIST CDL	National Clandestine Laboratory Register
CERC-NFRAP	CERCLIS No Further Remediation Planned
RCRA-LQG	RCRA Large Quantity Generators
RCRA-SQG	RCRA Small Quantity Generators
RCRA-CESQG	RCRA Conditionally Exempt Small Quantity Generators
RCRA NonGen / NLR	RCRA Non-Generators Do Not Presently Generate Hazardous Waste
ERNS	Emergency Response Notification System
TRIS	Toxic Chemical Release Inventory System
ICIS	Integrated Compliance Information System
FINDS	Facility Index System
RMP	Risk Management Program
US AIRS	US Aerometric Information Retrieval System

STATE AND LOCAL RECORDS

LA AUL	Conveyance Notice Listing
LA HIST DEBRIS	LDEQ Approved Debris Sites
LA SWRCY	Recycling Directory
LA HIST LUST	Underground Storage Tank Case History Incidents
LA LIENS	Environmental Liens
LA DEL SHWS	Deleted Potential & Confirmed Sites
LA VCP	Voluntary Remediation Program Sites
LA DRYCLEANERS	Drycleaner Facility Listing
LA BROWNFIELDS	Brownfields Inventory
LA CDL	Clandestine Drug Lab
LA COAL ASH	Coal Ash Disposal Sites
LA SHWS	Potential and Confirmed Sites List
LA SWF/LF	Solid Waste Facilities/Landfill Sites
LA DEBRIS	LDEQ Approved Debris Sites

LA UIC	Underground Injection Well Locations
LA LUST	Leaking Underground Storage Tank Incident Reports
LA UST	Underground Storage Tank
NY MANIFEST	Manifest
LA SPILLS	Spills and/or Releases
TX Ind. Haz Waste	Industrial and Hazardous Waste Database
LA NPDES	Louisiana Pollutant Discharge Elimination System
LA AIRS	Facilities with Air Permits Issued by the Air Permits Division
LA REM	Facilities Listed by the Underground Storage Tank and Remediation Division
LA ASBESTOS	Asbestos Demolition and Renovation Notification

TRIBAL RECORDS

INDIAN RESERV	Indian Reservations
INDIAN ODI	Report on the Status of Open Dumps on Indian Lands
INDIAN LUST	Leaking Underground Storage Tanks on Indian Land
INDIAN UST	Underground Storage Tanks on Indian Land
INDIAN VCP	Voluntary Cleanup Priority Listing

Interviews and information requests have been initiated with entities within each of the four restoration areas. No *recognized environmental conditions* have been reported within the restoration areas based upon information obtained thus far. Sources contacted for interviews and information requests are listed below:

United States Geological Survey
Louisiana Department of Natural Resources
Louisiana Oil Spill Coordinator's Office
U.S. Coast Guard
National Marine Fisheries Service
Cameron Parish Building Permits Office
Vermilion Parish Building Permits Office
Cameron Parish Fire District #10 (Johnson Bayou/Holly Beach) Fire Department
Vermilion Parish Fire Department
Cameron Parish Office of Emergency Preparedness
Vermilion Parish Office of Emergency Preparedness
Cameron Parish Police Jury
Vermilion Parish Police Jury
Cameron Parish Holly Beach Sewer Board District No. 10
Cameron Parish Sherriff's Office
Cameron Parish Tax Assessor's Office
Vermilion Parish Tax Assessor's Office
Louisiana Department of Environmental Quality

Endangered Species Act of 1973 (Threatened & Endangered Species)

The Endangered Species Act (ESA) is designed to protect and recover threatened and endangered (T&E) species of fish, wildlife and plants. The CEMVN is coordinating with the USFWS and the National Marine Fisheries Service (NMFS) to ensure for the protection of those T&E species under their respective jurisdictions. The USFWS identified in their September 20, 2013 email eleven listed T&E species, the Red-cockaded woodpecker, Piping plover, Red knot, Whooping crane, Gulf sturgeon, West Indian manatee, Green sea turtle, Hawksbill sea turtle, Kemp's Ridley sea turtle, Leatherback sea turtle and loggerhead sea turtle that are known to occur or occasionally occur in the project area. In addition, designated Piping plover critical habitat and Loggerhead critical habitat also occur within the project area. No plants were identified as being threatened or endangered in the project area. Based on review of existing data and preliminary field surveys, the MVN has determined that the proposed action *"may affect but will not likely adversely affect"* the piping plover or it's critical

habitat, red knot, West Indian manatee, Gulf sturgeon, loggerhead and Kemps Ridley sea turtles; would have no effect on the green, leatherback, and hawksbill sea turtles or loggerhead critical habitat and would not adversely impact other species of concern that could potentially be found in the project area. As part of the 2015 Revised Draft EIS, a Biological Assessment (BA) for NER Recommended Plan was submitted to USFWS on March 11, 2015; the USFWS concurred by letter on March 20, 2015. A BA was submitted to USFWS for the NED Recommended Plan on July 17, 2015; the USFWS concurred by letter on August 25, 2015. A BA for the NER RP was submitted to the NMFS on March 12, 2015 and NMFS provided their letter of concurrence dated January 26, 2016.

Louisiana State Threatened and Endangered Species and Rare and Unique Habitat
The Louisiana Department of Wildlife and Fisheries Louisiana Natural Heritage Program lists T&E species, rare, unique, and imperiled habitats in the State of Louisiana. Based on review of the LNHP online database, the following rare or unique habitats, animals and plants are found in the project area: Brackish marsh, coastal dune grassland, coastal live oak-hackberry forest, coastal prairie, freshwater marsh, red wolf, crested caracara, snowy plover, piping plover, Wilson's plover, common ground-dove, sandhill crane, diamondback terrapin, brown pelican, roseate spoonbill, glossy ibis, paddlefish, eastern spotted skunk, ornate box turtle, manatee, Gregg's amaranth, A milk-vetch, golden canna, dune sandbur, sand dune spurge, wedge-leaf prairie-clover, wedge-leaf whitlow-grass, slim spike-rush, punctuate cupgrass, narrow-leaved puccoon, grapefruit primrose willow, saltflat-grass, blue water lily, roundleaf scarf-pea, Correll's false dragon-head, wand blackroot, Mexican hat, small's beaksedge, southern beaksedge, sand rose-gentian, brookweed, Elliott sida, Florida bully, powdery thalia, woolly honeysweet, sea oats (LDWF 2013). The CEMVN finds the NER RP would have long term beneficial impacts on these rare and unique habitats and Louisiana T&E species.

Colonial Nesting Water Birds
The USFWS indicated in their January 9, 2009 coordination letter that the project area is known to support colonial nesting water birds (e.g., herons, egrets, ibis, night-herons and roseate spoonbills). Based on review of existing data and preliminary field surveys, the CEMVN finds that implementation of the RP would have no effect on colonial nesting water birds with implementation of Best Management Practices (BMPs) and USFWS recommendations.

Farmland Protection Policy Act of 1981 (Farmland)
The Farmland Protection Policy Act (FPPA) is intended to minimize the impact of Federal programs on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Projects are subject to requirements if they may irreversibly convert farmland to nonagricultural use and are completed by a Federal agency or with assistance from a Federal agency. There are approximately 3,200 acres of soils that are classified as prime farmlands in the Lake Charles East levee alignment area (NED). The Lake Charles area is a heavily developed urban area and few areas are currently being used for agriculture or pastureland. Approximately 514 acres of soils classified as prime farmlands are present on chenier ridges that could be removed from current or future agricultural use as a result of proposed reforestation activities. In compliance with the Farmland Protection Policy Act (FPPA), the USACE consulted with the Department of Agriculture – Natural Resources Conservation Service (NRCS) to determine the precise acreages that would be impacted. By letter dated December 13, 2013 the NRCS concurs that impacts to prime and unique farmlands from the RP would not "irreversibly" impact prime farmland and is therefore exempt from the rules and regulations of Section 1539-1549 of Farmland Protection Policy Act.

Fish and Wildlife Coordination Act of 1934 (Fish & Wildlife)
The Fish and Wildlife Coordination Act (FWCA) provides authority for the USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It requires Federal agencies that construct, license or permit water resource development projects to first consult with the USFWS, NMFS and state resource agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. Section 2(b) requires the USFWS to produce a Coordination Act Report (FWCAR) that details existing fish and wildlife resources in a project area, potential impacts due to a proposed project and recommendations

for a project. The final FWCAR (February 2016) includes the USFWS final positions and recommendations and are contained in Appendix A Annex G. The draft FWCAR is available upon request.

Magnuson-Stevens Fishery Conservation and Management Act of 1976 and the Magnuson-Stevens Act Reauthorization of 2006 (Essential Fish Habitat)

The law and its reauthorization govern marine fisheries management in the U.S. Essential Fish Habitat (EFH) would not intersect the proposed nonstructural NED Plan. The CEMVN has determined that the NER Plan would have significant impacts to EFH by shifting existing shallow open water EFH to marsh EFH and shoreline protection habitat which would protect marsh habitat. Hence, there would be a net positive gain and overall estuarine benefits of higher quality marsh EFH.

Marine Mammal Protection Act of 1972 (Marine Mammals)

The Marine Mammal Protection Act (MMPA) protects whales, dolphins, sea lions, seals, manatees, and other species of marine mammals. The CEMVN finds the RP would have no effect on marine mammals that may occasionally be found in the project area. To avoid "takings" of the West Indian manatee and ensure compliance with the MMPA, the CEMVN commits that 1) all construction personnel will be educated about the MMPA, ESA, and species protected by the MMPA, 2) a search for manatees and dolphins in the project area and mitigation areas would be conducted before construction, and 3) BMPs detailed in Appendix A to avoid or minimize potential entrapment of manatees and dolphins during construction would be implemented.

Migratory Bird Treaty Act of 1918 and Migratory Bird Conservation Act of 1929 (Migratory Birds)

The Migratory Bird Treaty Act (MBTA) and the Migratory Bird Conservation Act (MBCA) protect migratory birds and their habitat. Many important habitats in the project area provide migratory bird shelter, nesting, feeding and roosting habitat. All construction activities shall observe a buffer of 1,000 feet for any colonial-nesting waterbird colonies (e.g., egrets, herons, ibis, pelicans, etc.), 1,300 feet for any shorebird nesting colonies (e.g., terns, gulls, plovers, skimmers, etc.), and 2,000 feet for any brown pelican nesting colonies near the project feature. Based upon a field survey conducted in June 2015 for active colonial-nesting waterbird colonies, one active colonial-nesting waterbird colony was observed within 1,000 feet of the proposed construction limits of marsh creation feature 3a1 within the Calcasieu restoration area. Additionally, a shorebird nesting colony was recorded within 1,300 feet of the proposed construction limits of breakwater feature 6b2 within the Rockefeller restoration area. USFWS and USACE biologists will survey the area before construction to confirm active rookery locations. If colonial-nesting waterbird colonies exist within 1,000 feet, if shorebird colonies exist within 1,300 feet, or if brown pelican nesting colonies exist within 2,000 feet of the proposed action, this could be a project constraint. USFWS guidelines would be followed to avoid adverse impacts to these species

National Historic Preservation Act of 1966 (Cultural and Historic Resources)

Section 106 of the National Historic Preservation Act (NHPA) and the implementing regulations (36 CFR part 800) require Federal agencies to take into account the effects of their undertakings on historic properties, including any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places, and to provide the Advisory Council on Historic Preservation a reasonable opportunity to comment. Federal agencies are required to consult with other parties throughout the Section 106 process, including the State Historic Preservation Officer (SHPO) and Indian Tribes that attach traditional religious and cultural significance to historic properties that may be affected by an undertaking. Taking into account the views of consulting parties and the public, the federal agency will determine how to resolve any adverse effects to historic properties prior to the final decision-making. Section 106 consultation has been initiated, and programmatic agreements for the NED and NER Recommended Plans have been executed and are contained in Appendix A, Annex F.

Tribal Consultation (Tribal Interests)

In partial fulfillment of E.O. 13175 ("Consultation and Coordination With Indian Tribal Governments"), NEPA and Section 106, consultation has been initiated with the following federally recognized Tribes: Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of

Choctaw Indians, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida and Tunica-Biloxi Tribe of Louisiana. CEMVN has provided Tribes with a summary of the study authority and documentation of completed cultural resource investigations and previously recorded archaeological sites and standing structures within a one-mile buffer of the proposed alternatives, offering Tribes the opportunity to review and comment on the potential of the proposed action to significantly affect protected tribal resources, tribal rights, or Indian lands. Documentation of tribal consultation is included in the Appendix A, Annex F.

Wild and Scenic River Act of 1968 (Rivers)

The Wild and Scenic Rivers Act establishes a National Wild and Scenic Rivers System. The Louisiana Scenic Rivers Act recognizes and implements the 1968 Federal law, to preserve, protect, and enhance the wilderness qualities, scenic beauties, and ecological regimes of rivers and streams. Any construction within 100 feet of a scenic stream requires a scenic streams permit. There are no scenic rivers within the project area.

Executive Order 11514, Protection and Enhancement of Environmental Quality

EO 11514 directs Federal agencies to "initiate measures needed to direct their policies, plans, and programs so as to meet national environmental goals." The RP complies with EO 11514.

Executive Order 11988, Floodplain Management

EO 11988 directs agencies to avoid development in floodplains to the maximum extent feasible. The NED Plan would reduce the risk of storm surge flooding to existing structures within the floodplain. The CEMVN is also providing storm surge information to inform the Floodplain Administrators in Calcasieu, Cameron, and Vermilion Parishes in their floodplain management implementation. The NER Plan would have no significant adverse impacts on the floodplain or its management. Hence, the proposed action complies with EO 11988.

Executive Order 11990, Protection of Wetlands

EO 11990 directs Federal agencies to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Mitigation planning was integrated into the planning by considering, individually and collectively, each of the NEPA mitigation actions of avoiding, minimizing, reducing, and rectifying potential adverse impacts to wetlands to the extent practicable. Implementing the both the NED Plan and the NER Plan would not require any compensatory mitigation. For the NER Plan, unavoidable project-induced impacts to wetlands, such as placement of shoreline protection features and others have been avoided or will be mitigated in-kind by the ecosystem restoration benefits. Hence, the proposed action complies with the EO 11990.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 12898 requires agencies to make achieving environmental justice (EJ) part of their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of programs, policies and activities on minority populations and low-income populations. Potential EJ issues have been considered throughout planning. As part of the NEPA process, public and scoping meetings were held and attention was given to EJ issues. There are not expected to be any disproportionate EJ impacts from either the NED or NER RPs. However, CEMVN encourages any interested parties to inform the agency of potential EJ concerns.

Executive Order 13112, Invasive Species

EO 13112 directs Federal agencies to prevent the introduction of invasive species; provide for their control; and minimize the economic, ecological, and human health impacts that invasive species cause. The NED and NER RPS are consistent with EO 13112 to the extent practicable and permitted by law and subject to the availability of appropriations, and within Administration budgetary limits. Relevant programs and authorities to prevent the introduction of invasive species would be used during construction. The CEMVN will not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless the CEMVN has determined and made public its determination that

the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm would be taken in conjunction with the actions.

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

EO 13186 directs Federal agencies to take actions to further implement the MBTA. The NED and NER RPs have been evaluated for potential effects on migratory birds, with emphasis on species of concern. Many important habitats in the project area provide migratory bird shelter, nesting, feeding and roosting habitat. There are not expected to be any adverse effects to migratory birds from the NED and NER Plans.

SOUTHWEST COASTAL LOUISIANA
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex K

Threatened and Endangered Species

CONTENT

1. THREATENED AND ENDANGERED SPECIES

Historic and Existing Conditions

Eleven threatened and endangered species and one candidate species are known to occur or occasionally enter the Southwest Coastal Louisiana Project area (See Table 1). The proposed project area also contains Piping plover critical habitat. Personal coordination with USFWS staff concluded that a "programmatic Biological Assessment" is not required, therefore a Biological Assessment (BA) has been prepared and informal consultation with NMFS/USFWS will conclude upon development of subsequent NEPA analysis prior to implementing the Recommended Plans (RPs).

Table 1. Listed and Candidate Species within the Project Area

Species	Acadia Parish	Calcasieu Parish	Cameron Parish	Vermillion Parish
*Sprague's Pipit	Candidate	Candidate	Candidate	Candidate
Red-Cockaded Woodpecker		Endangered		
Piping Plover			Threatened/ Critical habitat	Threatened/ Critical habitat
Red Knot			Threatened	Threatened
**Whooping Crane				Threatened
West Indian Manatee			Endangered	Endangered
Gulf Sturgeon			Threatened	Threatened
Green Sea Turtle			Threatened	Threatened
Hawksbill Sea Turtle			Endangered	Endangered

Kemp's Ridley Sea Turtle			Endangered	Endangered
Leatherback Sea Turtle			Endangered	Endangered
Loggerhead Sea Turtle			Threatened Critical habitat	Threatened Critical habitat

* Candidate species are those taxa for which the Service has on file sufficient information regarding biological vulnerability and threat(s) to support issuance of a proposal to list
**This is a nonessential population which is considered "threatened". However, the ESA's section 7 consultation regulations do not apply.

Sprague's Pipit: Candidate species

The Sprague's pipit, is a candidate species for Federal listing as a threatened or endangered species. Candidate species are those taxa for which the Service has on file sufficient information regarding biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions. The Sprague's pipit is known to or believed to occur in all parishes within the project area.

Sprague's pipit is a small (4 to 6 inches in length) passerine bird with a plain buffy face, a large eye-ring, and buff and blackish streaking on the crown, nape, and under parts. It winters in Louisiana, arriving from its northern breeding grounds in September and remaining until April. Sprague's pipit exhibits a strong preference for open grassland (i.e., native prairie) with native grasses of intermediate height and thickness, and it avoids areas with too much shrub encroachment. This species is a ground feeder and forages mainly on insects but will occasionally eat seeds (personal coordination USFWS Brigette Firmin).

Red-Cockaded Woodpecker: Endangered species

The red-cockaded woodpecker (RCW) was Federally listed as endangered in 1970. Red-cockaded woodpeckers are known to, or believed to occur within the proposed project area, specifically in Calcasieu Parish. Deforestation for timber harvesting and habitat fragmentation for agricultural purposes has been the driving factor in reducing its habitat. Approximately 1% of their range remains. Mature pines in open upland stands are the preferred habitat of the RCW, however habitat selection varies regionally. Observations in Louisiana suggest significant use of bottomland hardwoods (Jones and Hunt).

The RCW is a small bird with a ladder-back, large white cheek patches and a black cap.

The male possesses a tiny patch of red feathers at the margin of the black cap and white cheeks. They roost and nest in cavities they sculpt primarily in pine trees. They feed on arthropods they gather from under tree bark. RCW can be found in Calcasieu Parish year round.

Piping Plover: Threatened species

Hunting in the early 1900s resulted in a drastic reduction of the piping plover population. Ongoing destruction of historical nesting sites further reduced plover populations (USFWS 1988). On December 11, 1985, the USFWS designated the piping plover as endangered in areas of the Great Lakes watershed. The piping plover was designated as threatened, except in those areas where it is listed as endangered. The Piping plover is listed as threatened in Louisiana as well as several other states.

In July of 2001, the USFWS designated specific areas in the United States as critical habitat for wintering piping plovers (Federal Register / Vol. 66, No. 132, 10 July 2001). Piping plover critical habitat is defined by the USFWS as "those elements essential for the primary biological needs of foraging, sheltering, roosting, and the physical features necessary for maintaining the natural processes that support those habitat components. These primary elements are found only in coastal areas with intertidal beaches or flats that are associated with dunes systems." The USFWS designated a total of 1,798 miles (165,211 acres) of shoreline along the Gulf of Mexico and Atlantic coasts as critical wintering habitat. Critical habitat in Louisiana encompasses 24,950 acres along 342.5 miles of shoreline, which is most of the coast of Louisiana. Piping plovers winter in Louisiana but do not nest on Louisiana's coast. They arrive from their northern breeding grounds as early as late July and may be present for 8 to 10 months of the year.

In 2006, an international piping plover breeding and wintering census was conducted. The results of the census showed that the piping plovers were found wintering primarily in Texas (53.8%), Florida (11.7%) and the Bahamas (10.7%). The results of the Census showed only 5.8% found wintering in Louisiana (Elliott-Smith et al 2006). In Louisiana, the 2006 census takers recorded 226 piping plovers, almost half of the 2001 census numbers. The substantial decline in numbers can be attributed to habitat damage incurred by Hurricanes Katrina and Rita. Sites in Terrebonne and Cameron Parishes had some of the largest populations of piping plovers in the state: Raccoon (Last) Island, 39 birds; Whiskey Island, 31 birds; Smith Bayou to West Jetty, 35 birds.

Red Knot: Threatened species

The red knot is a medium-sized shorebird about 9 to 11 inches in length with a proportionately small head, small eyes, short neck, and short legs. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. Legs are typically dark gray to black, but sometimes greenish in juveniles or older birds in non-breeding plumage. Non-breeding plumage is dusky gray above and whitish below. The red knot can be found in Louisiana during the winter months (generally October through March).

In the southeastern United States, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Observations along the Texas coast indicate that red knots forage on beaches, oyster reefs, and exposed bay bottoms and roost on high sand flats, reefs, and other sites protected from high tides. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. Coquina clams, a frequent and often important food resource for red knots, are common along many gulf beaches. Major threats to this species along the Gulf of Mexico include the loss and degradation of habitat due to erosion and shoreline stabilization development, disturbance by humans and pets, and predation (personal coordination USFWS Brigette Firmin).

Whooping Crane: Threatened species (nonessential experimental population (NEP))

The whooping crane was listed as endangered in 1970 by the U. S. Fish and Wildlife Service. A NEP was introduced into historic southwestern Louisiana habitat on the state-owned White Lake Wetlands Conservation Area in Vermilion Parish, Louisiana. This reintroduced population was designated as NEP under section 10(j) of the Endangered Species Act of 1973 (ESA), as amended. A NEP population is a reintroduced population believed not to be essential for the survival of the species, but important for its full recovery and eventual removal from the endangered and threatened list. These populations are treated as "threatened" species except that the ESA's section 7 consultation regulations do not apply.

The whooping crane is a large white bird with black wing tips, red on forehead and cheeks, bill and legs are dark gray and eyes are yellow. Whooping cranes nest on the ground in marshy areas with bulrushes, cattails and sedges and will sometimes roost in shallow waters. They feed on insects, crabs, clams, crayfish, frogs, rodents, small birds, berries, acorns and other wild fruit (USFWS).

West Indian Manatee: Endangered species

The manatee was listed as an endangered species in 1967 by the USFWS. Manatees inhabit coastal areas from Florida to the Greater Antilles and suitable habitats in Central and South America. The manatees' range is generally restricted to the southeastern United States; individuals occasionally range as far north as Massachusetts and as far west as Texas. On occasion they have been observed in eastern Louisiana waters. Preferred manatee habitat includes abundant submerged aquatic vegetation, such as sea grasses, which are limited to shallow water near shore, because deep water limits the amount of light which can penetrate the water and reach the vegetation (USFWS 2008). They can feed in brackish or salt water, but require a fresh water source, such as estuaries or natural springs, for drinking. The manatee is known to or believed to occur in Cameron and Vermilion Parishes within the project area.

Gulf Sturgeon: Threatened species

On September 30, 1991, the Gulf sturgeon was listed as a threatened species under the Endangered Species Act (ESA) (56 FR 49653). The Gulf sturgeon is known to or believed to occur in Cameron and Vermilion Parishes within the project area. Gulf sturgeons are rather large fish with bony plates and a hard extended snout. They are brackish/marine water bottom feeders that eat primarily macro invertebrates. Gulf sturgeons spawn in fresh water coastal rivers during the warmer months and move to marine waters during the cooler months. Some of the primary causes of the species' decline are habitat loss due to the construction of water control structures, dredging, poor water quality and irrigation (NOAA-6).

Green Sea Turtle: Threatened species

Green sea turtles were listed as Threatened on July 28, 1978. The green sea turtle is known or believed to occur in Cameron and Vermillion Parishes within the project area. Green sea turtles are found worldwide in oceans and gulfs with water temperatures greater than 20° C. During their first year of life they are primarily carnivorous, feeding mainly on invertebrates. As adults they feed almost exclusively on sea grasses growing in shallow water flats (Fritts et al. 1983). Historically, green sea turtles were fished off the Louisiana coast (Rebel 1974, in Fritts et al. 1983), but exploitation and incidental drowning in shrimp trawls led to the decline of this species and its listing as a threatened species. Sightings or strandings are rare in Louisiana, but do occur. Strandings are defined as turtles that wash ashore, dead or alive, or are found floating dead or alive (generally in a weakened condition). NMFS' records show 6 plus strandings in 2011, 9 plus in 2012 and in 2013 4 plus (NOAA-1).

Hawksbill Sea Turtle: Endangered species

Hawksbill sea turtles were listed as endangered in 1970. The Hawksbill sea turtle is known or believed to occur in Cameron and Vermillion Parishes within the project area. Hawksbills regularly occur in the Gulf of Mexico but mainly in Texas They feed on animals associated with coral reefs, sponges, other invertebrates and algae. There is no record of Hawksbill strandings along Louisiana shorelines (NOAA-2).

Kemp's Ridley Sea Turtle: Endangered species

The Kemp's ridley sea turtle was listed as endangered on December 2, 1970. Inshore areas of the Gulf of Mexico appear to be important habitat for the Kemp's ridley sea turtle. Kemp's ridley turtles in the Gulf of Mexico tend to be concentrated around major river mouths (Frazier 1980). Ridleys are commonly captured by shrimpers off the Texas coast, as well as in heavily trawled areas off the coasts of Louisiana and Alabama (Carr 1980, Pritchard and Marquez 1973). Kemp's ridley turtles are thought to be the most abundant turtle off the Louisiana coast (Gunter 1981, Viosca 1961) as well as the most endangered of the sea turtles. Occurrence of ridleys in bays and estuaries

along the Louisiana coast would not be unexpected, since many of their primary food items occur there.

The nesting season for the Kemp's ridley is April through July. The possibility of Kemp's ridley sea turtles nesting in Louisiana has been suggested (Hildebrand 1981, Viosca 1961), but no actual documentation of nesting exists. However, based on information obtained from NMFS, Kemp's ridley sea turtle strandings on the Louisiana coast have been documented and have increased since 2011. In 2013 at least 145 plus Kemp's ridley sea turtles were recorded along the Louisiana coast compared to 104 plus in 2011. The majority of the sightings were in the spring months and approximately half of the 2013 sightings were along the western Louisiana coastline within the proposed project area (NOAA-3).

Leatherback Sea Turtle: Endangered species

The Leatherback sea turtle was listed as endangered in 1970. It is known to or believed to occur in Cameron and Vermillion Parishes within the project area. Leatherbacks feed on soft-bodied prey like jellyfish. Adult leatherbacks have been sighted in the Gulf of Mexico; however, only one stranding has been recorded along the Louisiana shoreline (NOAA-4).

Loggerhead Sea Turtle: Threatened species

The loggerhead was listed as threatened in 1978 by the USFWS. The loggerhead turtle is distributed worldwide in temperate and tropical waters. Nesting is from April through August, with 90 percent of the nesting effort on the gulf coast, occurring on the south-central coast of Florida (Hildebrand 1981). Nesting in Louisiana is limited almost exclusively to the Chandeleur Island. Loggerhead strandings, although few, have been reported along the Louisiana coast. NMFS' records show 19 plus strandings in 2011, 3 plus in 2012 and 6 plus in 2013 (NOAA-5).

The loggerhead's diet includes mollusks, shrimp, crabs, sponges, jellyfish, squid, sea urchins, and basket stars (Caldwell et al. 1955, Hendrickson 1980). Landry (1986) suggested that they may also feed on the by-catch from shrimp trawling. Adult loggerheads feed in waters less than 50 meters in depth, while the primary foraging areas for juveniles appear to be estuaries and bays (Rabalais and Rabalais 1980).

On July 10, 2014 Loggerhead Critical Habitat (*Sargassum* habitat) issued a final rule to designate critical habitat for the Northwest Atlantic Ocean Distinct Population Segment (DPS) of the loggerhead sea turtle (*Caretta caretta*) within the Atlantic Ocean and the Gulf of Mexico pursuant to the Endangered Species Act of 1973, as

amended (ESA). Loggerhead critical habitat exists in the southern (offshore) portion of the SWC project area (see **Figure 4-3** below). This critical habitat expands the entire length of the project (west to east) and the closest points range from approximately 4 miles to 9 miles offshore.

2. USFWS COORDINATION

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

March 11, 2015

Regional Planning and
Environmental Division South
New Orleans Environmental Branch

Jeffrey D. Weller
Supervisor, Louisiana Field Office
US Fish and Wildlife Service
646 Cajundome Blvd. - Suite 400
Lafayette, Louisiana 70506

Dear Mr. Weller:

The U.S. Army Corps of Engineers, New Orleans District (CEMVN) is submitting a request for consultation on the Southwest Coastal Louisiana Project. A Biological Assessment with a determination of *"may affect but will not likely adversely affect"* the piping plover or it's critical habitat, red knot, West Indian manatee, Gulf sturgeon, loggerhead and Kemps Ridley sea turtles; would have "*no effect*" on the Red-cockaded woodpecker, green, leatherback, and hawksbill sea turtles or loggerhead critical habitat and would not adversely impact other species of concern that could potentially be found in the project area has been prepared by the CEMVN and is enclosed for your review and opinion.

Questions and/or concerns should be directed to Ms. Tammy Gilmore; U.S. Army Corps of Engineers; Planning Division; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267. Ms. Gilmore may also be contacted by e-mail tammy.h.gilmore@usace.army.mil or phone (504) 862-1002.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental
Planning Branch

Encls.

Biological Assessment

I. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), New Orleans District (MVN), has prepared this Biological Assessment (BA) to evaluate the potential impacts associated with the proposed hurricane and storm surge damage risk reduction measures and ecosystem restoration features within Calcasieu, Cameron, and Vermilion Parishes in southwest Louisiana referred to as the Southwest Coastal Louisiana Study (the "SWC project").

The low elevation and proximity to the Gulf of Mexico places the unique environment and cultural heritage of southwest Louisiana communities at risk from storm surge flooding and coastal erosion. Land subsidence and rising sea level is expected to increase the potential for coastal flooding, shore erosion, saltwater intrusion, and loss of wetlands and chenier habitats.

II. ACTION AREA

The project area (**Figure 2-1**) is located in southwest Louisiana and includes all of Calcasieu, Cameron, and Vermilion parishes and small portions of Beauregard, Jefferson Davis, and Iberia parishes encompassing approximately 4,700 square miles.

Cameron Parish is located in the southwest corner of Louisiana. The southern boundary of the parish is the Gulf of Mexico. Eighty-two percent of Cameron Parish is coastal marshes. Geographically, it is one of the largest parishes in Louisiana. The parish is chiefly rural and the largest communities are Cameron and Hackberry. Cameron is located along Louisiana Highway 82 (LA-82), while Hackberry is located along LA-27. Other smaller communities include Creole, Johnsons Bayou, and Holly Beach.

Calcasieu Parish is located due north of Cameron Parish. The town of Lake Charles is the parish seat, which is the largest urban area in the project area. Only a small portion of the parish is located in the coastal zone.

Vermilion Parish is located due east of Cameron Parish. The southern boundary of the parish is the Gulf of Mexico. Large expanses of Vermilion Parish are open water (lakes, bays, and streams). Approximately 50 percent of the land is coastal marshes. The parish is chiefly rural and the town of Abbeville is the parish seat as well as the largest urban area in the parish. Other communities include Delcambre, Kaplan, and Gueydan, which are all located along LA-14 in the northern part of the project area. Pecan Island and Forked Island are smaller communities, both located along LA-82 in lower Vermilion Parish. Located along LA-333, Intracoastal City is the nearest access to Vermilion Bay and the Gulf of Mexico in this region and supports the area's oil and shrimp industries.

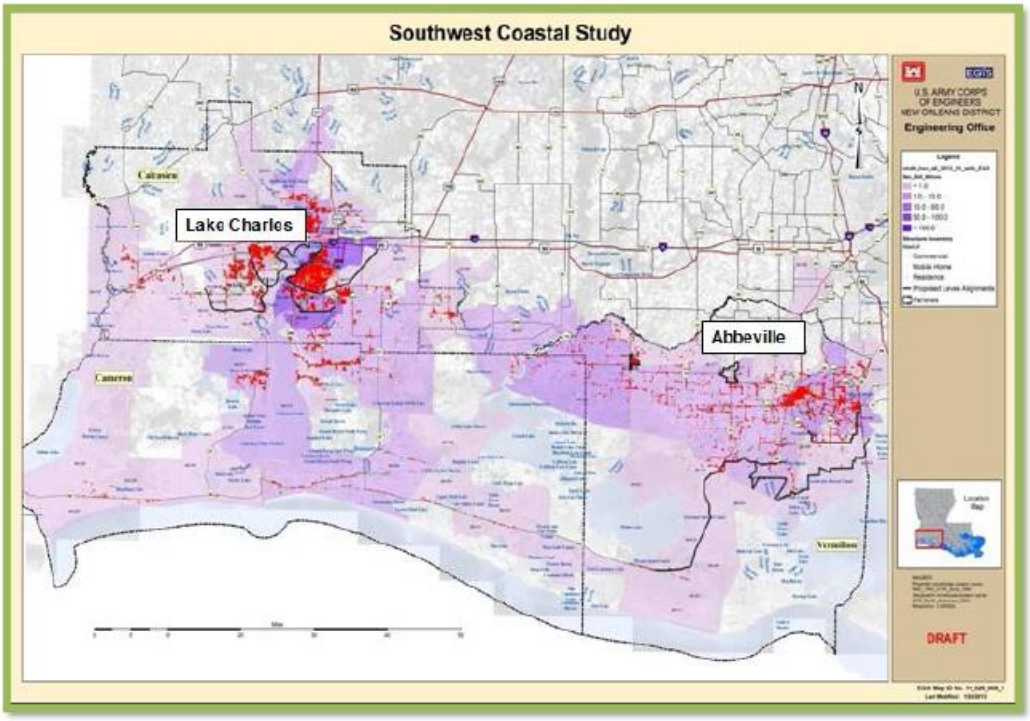


Figure 2-1 SWC Project Area

III. PROJECT DESCRIPTION

The SWC project includes both a National Economic Development (NED) and a National Ecosystem Restoration (NER) component. The NED tentatively selected plan (TSP) is programmatic and nonstructural. The program has been developed to address damages associated with hurricane and coastal storm surge flooding in Calcasieu, Cameron and Vermillion Parishes. The NED TSP is subject to parish-specific codes and regulations, additional NEPA compliance, and participation agreements. Consultation would be reinitiated, as necessary, upon further design of the NED plan and during preparation of additional NEPA compliance. Details of the NED TSP are below and in Figures 3-1:

- Nonstructural measures include:
  - Elevating residential structures*
  - Flood proofing non-residential structures (public and commercial facilities)*
  - Building small berms around warehouses
  - Potentially acquiring structures

  (* Note that some residential structures could be flood-proofed and some commercial structures could be elevated)

- Structures eligible for nonstructural measures have first-floor elevations at or below the 25-year flood zone, based on year 2025 hydrology. Eligible structures would be raised to the 100-year base flood elevation based on year 2075 hydrology.

- The TSP would reduce flood risk for 4,952 residential and non-residential structures (4,219 residential; 396 non-residential; 337 warehouses).

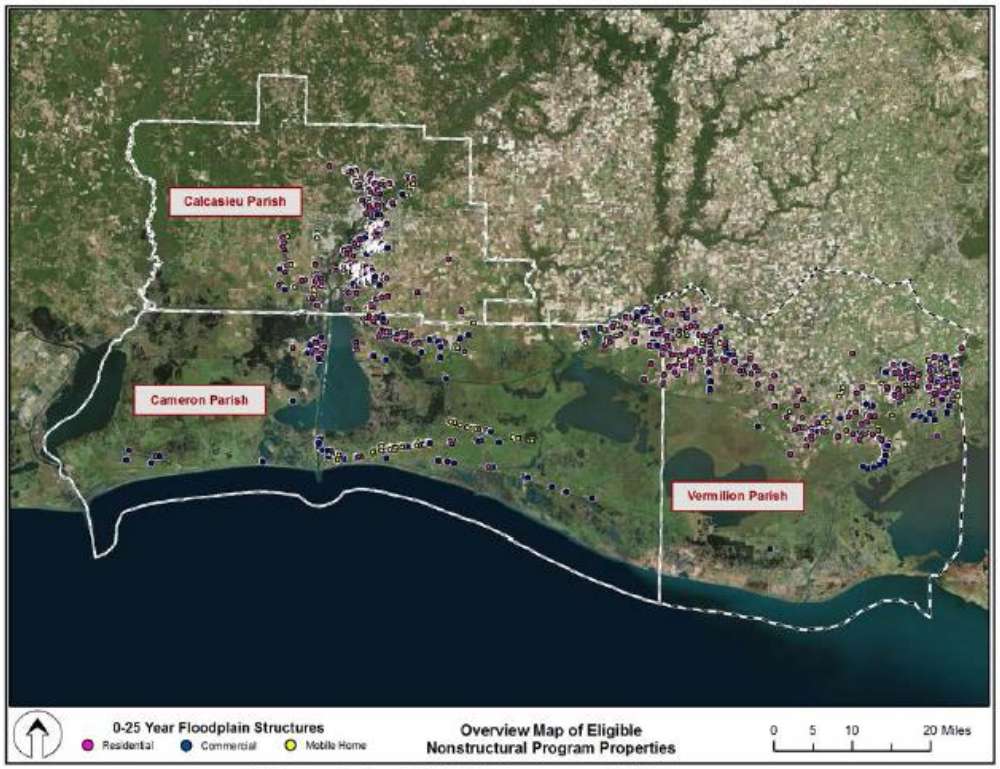


Figure 3-1 NED Nonstructural Measures

The NER TSP is Small Integrated Restoration (Plan CM-4), a comprehensive ecosystem restoration plan that attempts to address land loss problems and ecosystem degradation. The plan is cost effective, and is the least cost comprehensive best buy plan. The plan goal is to minimize land loss; enhance plant productivity by reducing major stressors; and to reinforce and protect critical landscape features. Details of the TSP are listed below and in Figures 3-2 and 3-3:

- A total of 51 ecosystem restoration features
  - 9 marsh restoration features
  - 35 chenier reforestation features
  - 5 shoreline protection features
  - 1 hydrologic / salinity control feature
  - The Calcasieu Ship Channel Salinity Barrier Navigation Study is recommended as an additional long-range study

Details of the construction of the NER plan features are included in the Enclosures section (**Annex A**).

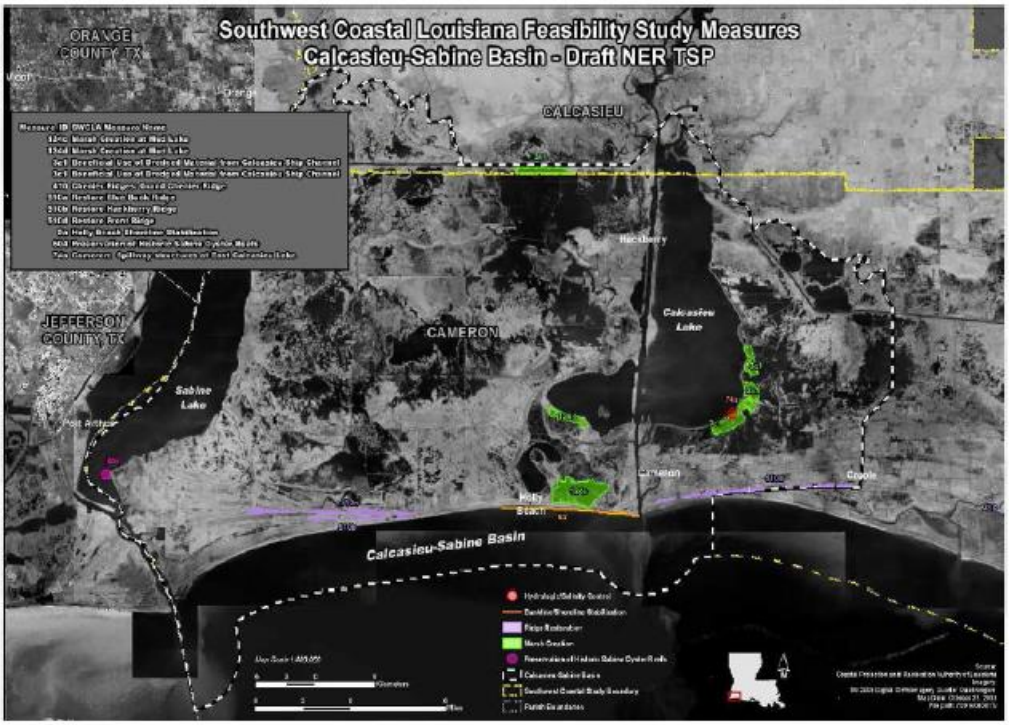


Figure 3-2 NER TSP features (Calcasieu)

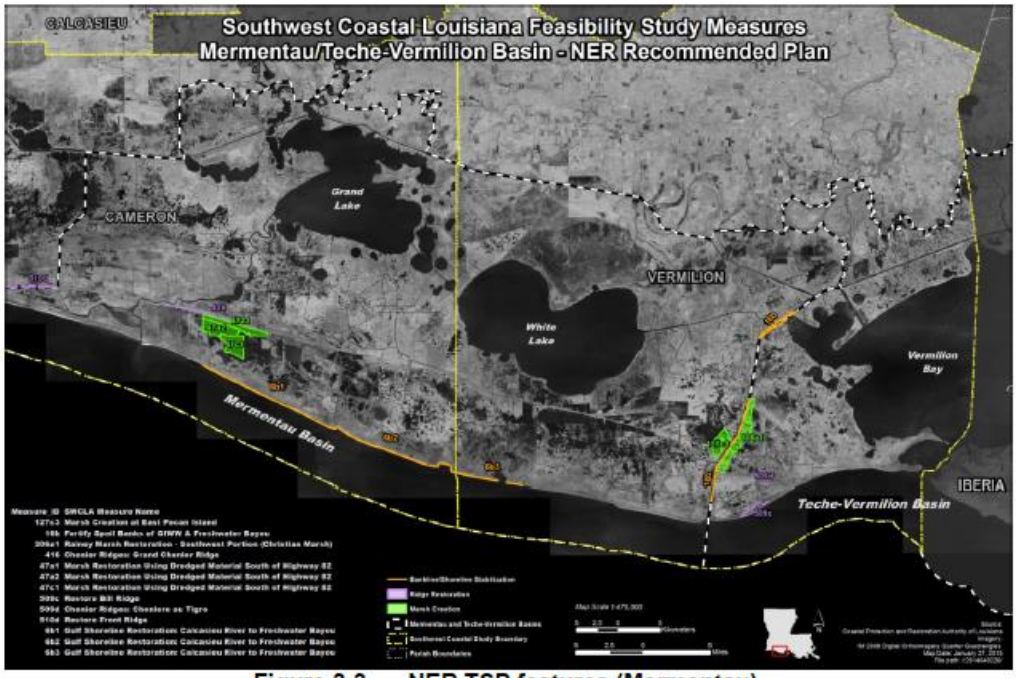


Figure 3-3 NER TSP features (Mermentau)

IV. SPECIES CONSIDERED

Eleven threatened or endangered species and one candidate species are known to or believed to occur within the SWC project area (**Table 4-1**). With the exception of the red-cockaded woodpecker (RCW), all of the species provided in **Table 4-1** below were listed in the November 2013 USFWS Draft Fish and Wildlife Coordination Act Report (USFWS 2013).

Cetaceans

A total of 28 cetaceans have been reported in the Gulf of Mexico waters (Davis et al. 2002). Of these, five Mysticeti (e.g., baleen whales including blue whale (*Balaneoptera musculus*), humpback whale (*Megaptera novaeangliae*), finback whale (*Balaenoptera physalus*), and sei whale (*Balaenoptera borealis*); and Odontoceiti (e.g., toothed whales, including sperm whale (*Physeter macrocephalus*) have been reported in the Gulf of Mexico and all are listed as endangered species. Infrequent, shallow water, historical sightings and strandings in the Gulf of Mexico of these endangered cetaceans suggest that most of these species are rare, accidental, or uncommon in this area (Davis et al. 2002). All whales are principally marine deepwater species and would not likely be impacted by the SWC TSP.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) was removed from the list of Threatened and Endangered species on 8 August 2007. Bald eagles nest in Louisiana from October through mid-May and typically nest in mature trees (such as bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water (USFWS 2013). The bald eagle continues to be protected under the Migratory Bird Treaty Act of 1918 (MBTA) and the Bald and Golden Eagle

Protection Act. Forested portions of the project area may provide habitat for the bald eagle. Most active bald eagle nesting sites have been historically located to the east of the SWC project area (source: http://www.lsuagcenter.com/en/communications/publications/agmag/Archive/2002/Spring/Bald+Eagles+Make+Comeback+in+South+Louisiana.htm). No known nests are located near any project features, however, if an eagle's nest is found, a no-work zone of 660 feet must be implemented and the Corps must be immediately notified.

Brown Pelican and Colonial Nesting Water Birds

The brown pelican (*Pelecanus occidentalis*) was removed from the list of Threatened and Endangered species on 17 December 2009. Their nests continue to be protected under the Migratory Bird Treaty Act (MBTA) of 1918. The brown pelican and a variety of colonial nesting water birds including but not limited to: herons, egrets, ibis, anhinga, double crested cormorants, and roseate spoonbill may nest within the project area. In general, the nesting season for these species runs from February 15 through September 1. The area is also known to support various species of shore birds including but not limited to: Sanderlings, sandpipers, gulls, and terns. These birds and their nests are protected under the MBTA and adverse impacts would be avoided. No known rookeries are located near any project features, however, if any nests are found, a no-work zone of 1,000 feet would be implemented. Additionally, if needed, a bird abatement plan would be developed and implemented, in coordination with USFWS, to deter colonial nesting water birds and shore birds from nesting within project boundaries.

Bottlenose Dolphin

The western north Atlantic bottlenose dolphin (*Tursiops truncatus*) populations found along the mid-Atlantic coast have been designated as depleted under the Marine Mammal Protection Act (MMPA) and, therefore, are stringently managed (NOAA 2015). In addition, the National Marine Fisheries Service (NMFS) has classified five U.S. stocks of bottlenose dolphins as *"strategic"* stocks, they are: Eastern Gulf of Mexico Coastal; Western Gulf of Mexico Coastal; Northern Gulf of Mexico Coastal; Gulf of Mexico Bay, Sound and Estuarine; and Western North Atlantic Coastal (NOAA 2015). Atlantic bottlenose dolphins inhabit temperate and tropical waters, and are found in the United States from Cape Cod to the Gulf of Mexico (IMMS 2015). These marine mammals are protected under the MMPA of 1972 and therefore impacts should be avoided. **Annex B** provides entrapment prevention measures for the Atlantic bottlenose dolphins.

Table 4-1 Threatened and Endangered Species within the SWC Project Area

	Common Name	Scientific Name	Critical Habitat	Agency	Status
Birds	*Sprague's Pipit	*Anthus spragueii*		USFWS	Candidate
	red-cockaded woodpecker	*Picoides borealis*		USFWS	endangered
	piping plover	*Charadrius melodus*	yes	USFWS	threatened
	rufa red knot	*Calidris canutus rufa*		USFWS	threatened
	**whooping crane	*Grus americana*		USFWS	endangered
Fishes	Gulf sturgeon	*Acipenser oxyrinchus desotoi*		NOAA/NMFS	threatened

	Common Name	Scientific Name	Critical Habitat	Agency	Status
Mammals	West Indian manatee	*Trichechus manatus*		USFWS	endangered
Reptiles	green sea turtle	*Chelonia mydas*		NOAA/NMFS	threatened
	Kemp's ridley sea turtle	*Lepidochelys kempii*		NOAA/NMFS	endangered
	leatherback sea turtle	*Dermochelys coriacea*		NOAA/NMFS	endangered
	loggerhead sea turtle	*Caretta caretta*	yes	NOAA/NMFS	threatened
	hawksbill sea turtle	*Eretmochelys imbricata*		NOAA/NMFS	endangered

* Candidate species are those taxa for which the USFWS has on file sufficient information regarding biological vulnerability and threat(s) to support issuance of a proposal to list.

**This is an *"experimental population, nonessential"* designation.

Sources:
http://ecos.fws.gov/ecos/home.action
http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm

The SWC TSP could potentially impact the piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), West Indian manatee (*Trichechus manatus*), Gulf sturgeon and sea turtles. The project area encompasses critical habitat for the piping plover and for the loggerhead sea turtle (*Caretta caretta*). Only a very small area in the extreme southern off-shore portion of the project area encompasses Sargassum critical habitat for the loggerhead sea turtle. The project area does not encompass critical habitat for any other species mentioned in **Table 4-1** above. Descriptions of the species that could potentially be impacted by the SWC TSP are described below.

Red-cockaded Woodpecker (*Picoides borealis*)
The RCW was listed as endangered in 1970 (35 FR 16047 16048). The RCW is a permanent resident of Louisiana and is dependent on a very specific habitat type. Old stand longleaf pine forests are preferred; however, all of the southern pine species can harbor RCWs. The birds may forage on pines of most sizes but only the oldest fungus infested pines are used as cavity trees. Old pine forests have declined substantially due to the lumber industry, development and agriculture. The red-cockaded woodpecker is known to occur in Calcasieu Parish.

Piping Plover (*Charadrius melodus*)
On December 11, 1985, the USFWS published the final rule (50 CFR 50720) that listed the piping plover as endangered in the Great Lakes watershed (Illinois, Indiana, Michigan, northeastern Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario, Canada) and as threatened elsewhere within its range. This listing includes piping plovers breeding in Canada, with their status under the Endangered Species Act (ESA) of 1973 determined by whether they breed in the watershed of the Great Lakes (endangered) or elsewhere (threatened). Piping plovers on migratory routes outside of the Great Lakes watershed or on their wintering grounds are considered threatened (USFWS 2001a).

The International Piping Plover Coordination Group facilitates the International Piping Plover Census (IPPC) of breeding and wintering piping plovers throughout their range (Elliott-Smith et al 2006). The IPPC has taken place in 1991, 1996, 2001, 2006, and 2011. (Results from 2011 have not yet been published.) (B. Firmin 2014 personal communication) Survey results for

Louisiana have varied in intensity and number of sites visited over the years due to poor weather conditions, lack of personnel, and logistical constraints for site access (USFWS 2011). Results of those IPPC surveys for Louisiana range from a high of 750 birds in 1991 to a low of 226 birds in 2006; those numbers, however, do not reflect the variations in survey intensity or the number of sites visited (USFWS 2011).

In Louisiana, the 2006 IPPC recorded only 226 piping plovers, the lowest numbers in the State in IPPC history. The substantial decline in numbers of wintering piping plover along the Louisiana coast could be attributed to habitat loss as a result of Hurricanes Katrina and Rita; however, lack of personnel and poor weather conditions also affected survey intensity in the State that year (B. Firmin, USFWS, personal communication 2014). Approximately 40 piping plovers were reported in Cameron Parish in the 2006 Census.

Piping plovers arrive on wintering grounds in July, with some late-nesting birds arriving in September. Migration is poorly understood, but most piping plovers probably migrate non-stop from interior breeding areas to wintering grounds (Haig 1992). The habitats used by wintering birds include beaches, mud flats, sand flats, algal flats, and washover passes (areas where breaks in the sand dunes result in an inlet). Wintering plovers are dependent on a mosaic of habitat patches, and move among these patches depending on local weather and tidal conditions (USFWS 2001a). In late February, piping plovers begin leaving the wintering grounds to migrate back to breeding sites. Northward migration peaks in late March, and by late May most birds have left the wintering grounds (USFWS 2001a).

On July 10, 2001, the USFWS designated 137 areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana (piping plover critical habitat within the project area is shown in **Figure 4-1**), and Texas as critical habitat for the wintering population of the piping plover. This includes approximately 1,798.3 miles of mapped shoreline and approximately 165,211 acres of mapped area along the gulf and Atlantic coasts and along margins of interior bays, inlets, and lagoons. Approximately 6,548 acres of the aforementioned are located within Cameron and Vermilion Parishes (LA-1 Figure 4-1) (66 FR 36074). All piping plovers are considered threatened species under the Act when on their wintering grounds.

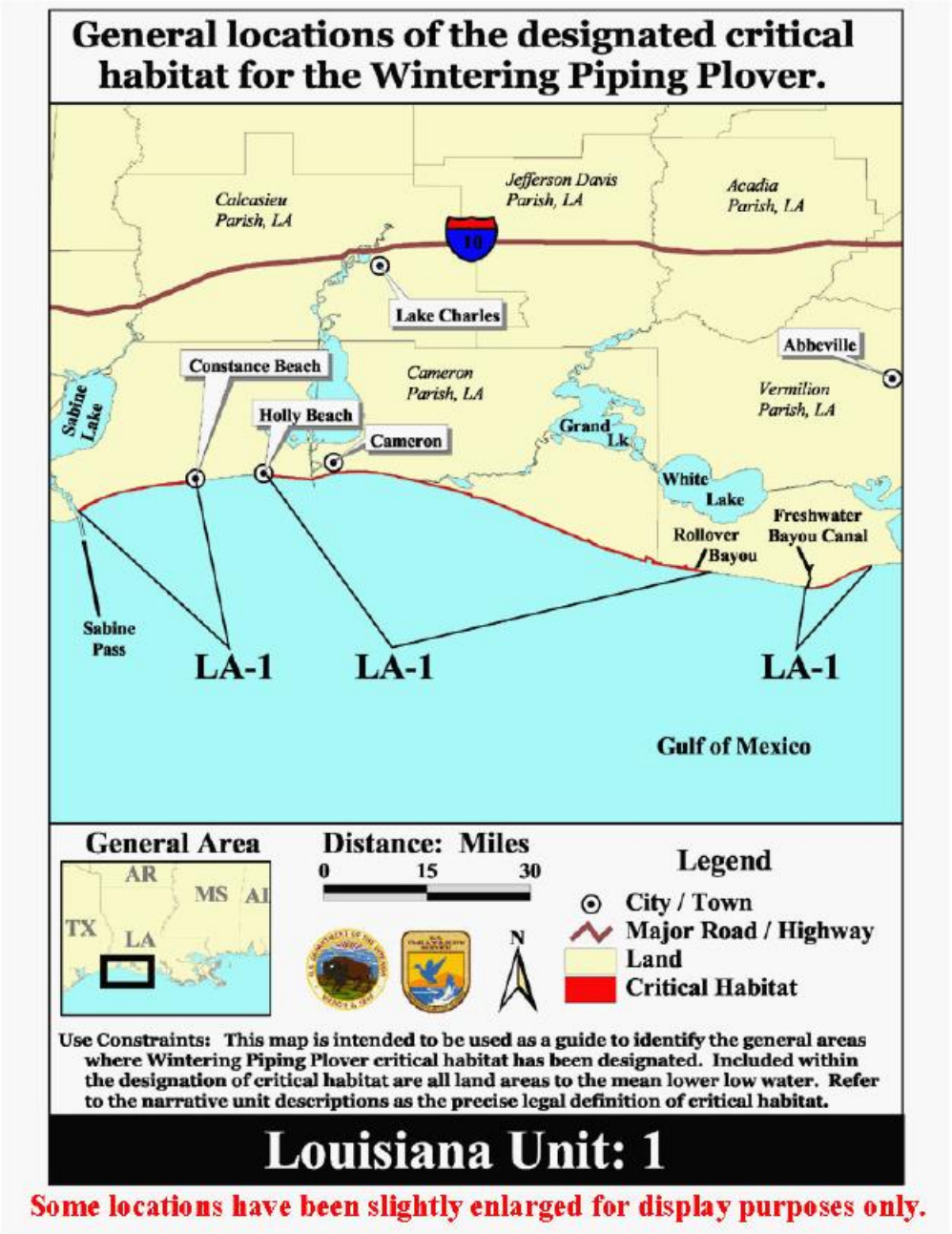


Figure 4-1 Piping plover critical habitat in the project area

Rufa red knot (*Calidris canutus rufa*)
In a 11 December 2014 final rule, the USFWS made a final determination to protect the rufa subspecies of the red knot as threatened under the ESA, with an effective date of 12 January 2015. All of the following information regarding red knot is summarized from the Rufa Red Knot Ecology and Abundance (USFWS 2014a) and final rule 50 CFR Part 17 (USFWS 2014b) and is in reference to the rufa red knot, unless otherwise stated.

The rufa red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast U.S., the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the northbound (spring) and southbound (fall) migrations, rufa red knots use key staging and stopover areas to rest and feed (USFWS 2014a, 2014b).

Louisiana is a migration stopover for red knots in both spring and fall, and some birds may overwinter in small numbers. In the U.S., the rufa red knot is found principally in intertidal marine habitats, especially near coastal inlets, estuaries, and bays, or along resting formations (i.e., intertidal shelf typically formed of densely-packed dirt blown by strong, offshore winds). Within the U.S., rufa red knot migratory and wintering habitats are principally utilized for resting and foraging activities. In the Southeastern U.S., rufa red knots commonly forage on bivalves, gastropods, and crustaceans along sandy beaches, tidal mudflats, salt marshes, and peat banks (USFWS 2014b).

Sprague's Pipet (*Anthus spragueii)*
The Sprague's pipit, is a candidate species for federal listing as a threatened or endangered species. It winters in Louisiana, arriving from its northern breeding grounds in September and remaining until April. Sprague's pipit exhibits a strong preference for open grassland (i.e., native prairie) with native grasses of intermediate height and thickness, and it avoids areas with too much shrub encroachment. The Sprague's pipit is known to or believed to occur in all parishes within the project area.

West Indian Manatee (*Trichechus manatus*)
The West Indian manatee was listed as endangered throughout its range for both the Florida and Antillean subspecies in 1967, and received Federal protection with the passage of the ESA in 1973. Critical habitat was designated in 1976, 1994, 1998, 2002, and 2003 for the Florida subspecies. This species is also protected as a depleted stock under the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407).

Manatees inhabit both salt and freshwater of sufficient depth (5 feet [1.5 meters] to usually less than 20 feet [6.1 meters]) throughout their range. Shallow grassbeds with ready access to deep channels are preferred feeding areas in coastal and riverine habitats (USFWS 2001b). They may also be encountered in canals, rivers, estuarine habitats, saltwater bays, and have been observed as much as 3.7 miles (6.0 kilometers) off the Florida gulf coast. Between October and April, Florida manatees concentrate in areas of warmer water. During warmer months they appear to choose areas based on an adequate food supply, water depth, and proximity to fresh water (USFWS 2001b). During summer months, they migrate as far north as coastal Virginia on the east coast and the Louisiana coast in the Gulf of Mexico (O'Shea 1988).

Sightings of the West Indian manatee in Louisiana have occurred in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, Mississippi River Gulf Outlet (MRGO), and in canals within the adjacent coastal marshes of Louisiana. However, there is no known population thriving in the state. On 9 July 2001, a manatee was observed passing safely through the Inner Harbor

Navigation Canal (IHNC) Lock and into the Mississippi River, and one was sighted in Contraband Bayou in Calcasieu Parish in February, 2010.

Gulf Sturgeon (*Acipenser oxyrinchus*)
On September 30, 1991, the Gulf sturgeon was listed as a threatened species under the Endangered Species Act (ESA) (56 FR 49653).

Gulf sturgeon sightings are rare in the proposed project area; however, the LDWF (1979) reported that an Atlantic sturgeon was caught by a Mr. Hugh Mhire in an otter trawl while shrimping in the Gulf of Mexico off the mouth of the Mermentau River, Cameron Parish, LA. This specimen was probably a Gulf sturgeon (Paruka, 2000). In 1990 a commercial fisherman reported trawling up a Gulf sturgeon three miles out from Last Island (Raccoon Island), Terrebonne Parish, LA (D. Walther, personal communication). The Gulf sturgeon is known to or believed to occur in Cameron and Vermilion Parishes within the project area.

Green Sea Turtle (*Chelonia mydas*)
The green sea turtle was listed as endangered/threatened on July 28, 1978. The breeding populations off Florida and the Pacific coast of Mexico are listed as endangered while all others are threatened (USFWS 1991). This species' current status is listed as threatened in Louisiana.

Although green sea turtles are found worldwide in oceans and gulfs with water temperatures greater than 68°F (20°C), their distribution can be correlated to grassbed distribution, location of nesting beaches, and associated ocean currents (Hirth 1971). Long migrations are often made between feeding and nesting grounds (Carr and Hirth 1962). Within Louisiana waters, these turtles probably occur all along the coast and may nest on the Chandeleur Islands (Dundee and Rossman 1989). Green sea turtles feed in shallow water areas with abundant seagrasses or algae. The turtles migrate from nesting areas to feeding grounds, which are sometimes several thousand miles away. Most turtles migrate along the coasts, but some populations are known to migrate across the ocean from nesting area to feeding grounds. The major nesting beaches are always found in places where the seawater temperature is greater than 77°F (25°C) (NMFS 1991).

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)
On 2 December 1970 the Kemp's ridley sea turtle was designated as endangered across its entire range (USFWS 1991) and has continued to decline in Louisiana (USFWS 1990). This species is currently listed as endangered in Louisiana. Critical habitat has been proposed for this species, but it has not been finalized to date.

This small sea turtle is believed to be the most frequently encountered (Dundee and Rossman 1989), if not the most abundant sea turtle, off the Louisiana coast (Viosca 1961). Kemp's ridley sea turtles have been found along coastal Louisiana from Lake Borgne, Barataria and Terrebonne Bays, and near Calcasieu Pass (Dundee and Rossman 1989). Adult Kemp's ridley sea turtles are usually confined to the Gulf of Mexico. Post-pelagic stages are commonly found over crab-rich, sandy, or muddy bottoms. Juveniles can be found in bays, coastal lagoons, and river mouths. In Louisiana, adults are found seasonally near the Mississippi river outlet. The main nesting grounds for the Kemp's ridley turtle occur on the northeastern coast of Mexico. Occurrence of these sea turtles in bays and estuaries along the Louisiana coast would not be unexpected, as many of their primary food items occur there.

Leatherback Sea Turtle (*Dermochelys coriacea*)

The leatherback sea turtle was listed as an endangered species throughout its range in June 1970 (USFWS 199l), and it is currently listed as endangered in Louisiana. Critical habitat has been established for shoreline and adjacent waters of the U.S. Virgin Islands (50 CFR 17.95; 50 CFR 226.207).

The leatherback sea turtle occurs mostly in continental shelf waters, but will occasionally enter shallow waters and estuaries. Adults are highly migratory, and are believed to be the most pelagic of all sea turtles. Habitat requirements for juvenile and post-hatchling leatherbacks are unknown (NMFS and USFWS 1992b). In Louisiana, leatherbacks are believed to occur offshore in deep waters; however, they have been sighted in Cameron Parish, Atchafalaya Bay, Timbalier Bay, and Chandeleur Sound (Dundee and Rossman 1989). No nesting has been reported in Louisiana (Gunter 1981, Dundee and Rossman 1989).

Loggerhead Sea Turtle (*Caretta caretta*)
The loggerhead sea turtle was listed as a threatened species in July 1978 (USFWS 1991), and it is currently listed as threatened in Louisiana. Critical habitat was established for this species in July 2014 within the Atlantic Ocean and the Gulf of Mexico (50 CFR 226; 79 FR 39855-39912) and within the terrestrial environment of the U.S. Atlantic and Gulf of Mexico coasts (50 CFR 17; 79 FR 39755-39854). These critical habitat areas contain one or a combination of habitat types: nearshore reproductive habitat, winter area, breeding areas, constricted migratory corridors, and/or *Sargassum* habitat.

Loggerheads are capable of living in a variety of environments, such as in brackish waters of coastal lagoons and river mouths. The major nesting beaches are located in the southeastern U.S., primarily along the Atlantic coast of Florida, North Carolina, South Carolina, and Georgia. Only minor and solitary nesting has been recorded along the coasts of the Gulf of Mexico (NMFS AND USFWS 2008).

Loggerheads probably range all along the Louisiana coast; however, Dundee and Rossman (1989) reported specimens only from Chandeleur Sound, Barataria Bay, and Cameron Parish. Nesting on the gulf coast occurs between the months of April and August, with 90 percent of the nesting effort occurring on the south-central gulf coast of Florida (Hildebrand 1981). Although loggerheads have been documented as nesting on the Chandeleurs in 1962 and Grand Isle in the 1930s, it is doubtful whether this species currently successfully nests on the Louisiana coast (Hildebrand 1981, Dundee and Rossman 1989). Loggerhead Critical Habitat (*Sargassum* habitat) exists in the southern (offshore) portion of the SWC project area (see **Figure 4-2** below). This critical habitat expands the entire length of the project (west to east) and the closest points range from approximately 4 miles to 9 miles offshore.

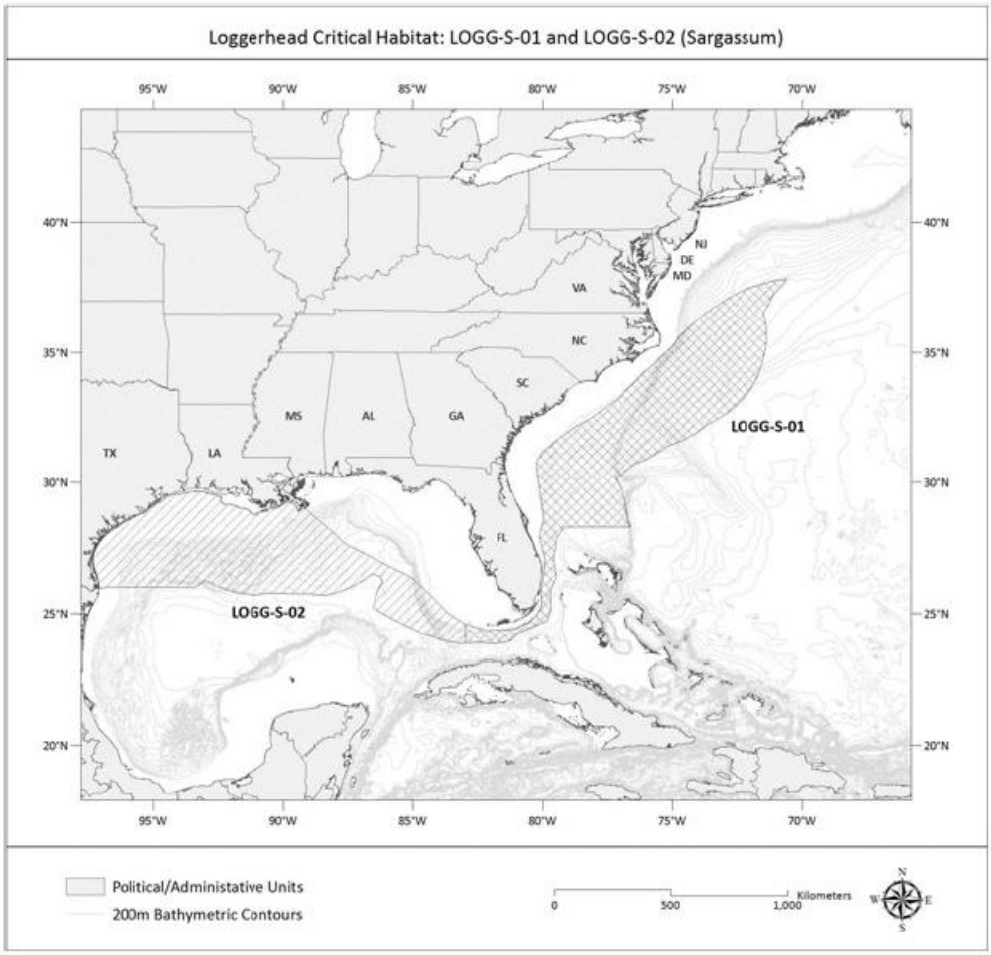


Figure 4-2 Loggerhead Sea Turtle critical habitat in the project area

Hawksbill Sea Turtle (*Eretmochelys imbricata*)
The hawksbill was listed as an endangered species in June 1970 (USFWS 1991), and it is currently listed as endangered in Louisiana.

The hawksbill occurs in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. Only one record of a hawksbill in Louisiana has been reported (Fuller and Tappen 1986). Florida is considered foraging habitat for those turtles, and Texas may be foraging habitat for hatchlings and juveniles (77 observations of small turtles were reported between 1972 and 1984) from the nesting sites in Mexico (NMFS AND USFWS 1993). Hawksbills are observed in Florida with some regularity on the reefs off Palm Beach County and in the Florida Keys. Texas is the only other state where hawksbills are sighted with any regularity. Most sightings involve post hatchlings and juveniles, which are believed to originate from nesting beaches in Mexico (NMFS AND USFWS 1993).

V. EFFECTS ANALYSIS

The potential exists that any of the endangered or threatened species listed in the previous section may be present in the project area during proposed construction activities. However, while individuals may be affected by the proposed construction activities, whole populations would not be adversely affected by implementation of the TSP. The implementation of TSP features (i.e., marsh restoration, shoreline protection, chenier reforestation, and hydraulic and salinity control features) could impact the piping plover, rufa red knot, Sprague's pipit, West Indian Manatee, Gulf sturgeon and sea turtles but is not expected to impact the RCW.

Red-cockaded Woodpecker (*Picoides borealis*)

The NED construction activities would be rather small and localized such as the raising of homes or construction of small berms on developed land. Although the red-cockaded woodpecker may occur in Calcasieu Parish, it is unlikely to be impacted by any SWC TSP features as the habitat it is dependent upon is found in the far north of the parish and near the project features.

Due to the lack of old pine forests near the project features, it is the USACE's determination that the TSP is expected to have *"no effect"* on the RCW.

Piping Plover (*Charadrius melodus*)

The TSP would involve activities in the critical habitat of the piping plover. However, the activities are temporary and minimal (temporary placement of pipeline on the surface) and therefore it is the USACE's determination that the proposed TSP would constitute a *"may affect, but will not likely adversely affect"* determination for the species and its critical habitat. Potential project-induced impacts may result from incidental interaction with the piping plover during the following construction activities: marsh restoration features 47a1, 47a2, and 47c1 would temporarily utilize Gulf of Mexico shoreline for the placement of pipeline to deliver offshore sediment to the onshore marsh restoration areas. Approximately 0.14 acres (200 feet long by 30 feet wide) of critical habitat is expected to be impacted temporarily by these three measures. Another feature that would also temporarily utilize Gulf of Mexico shoreline for temporary pipeline placement is 124c, approximately 0.34 acres (500 feet long by 30 feet wide) of critical habitat is expected to be impacted. Due to their mobility, piping plovers would be able to avoid the aforementioned small areas of temporary disturbance by using abundant adjacent areas for foraging and roosting. Additionally, there is a considerable amount of critical habitat area within the SWC project area that could be utilized (see **Figure 4-1**).

All harmful activities (e.g., pipeline crossings) could be temporarily suspended until the bird(s) moves out of the project area. Any disturbance to the piping plover would be temporary during construction activities, and would result in temporary displacement. The piping plover would likely move and relocate to other nearby areas for foraging or roosting purposes.

Construction of the TSP is anticipated to begin in 2025, and would last up to ten years. During construction of the TSP, construction activities would include placement of hydraulically-dredged material for marsh restoration features. A marsh buggy would be used to place the pipeline across the beach. The noise and disturbance during construction activities would cause the displacement of wildlife in the construction area and nearby vicinity.

Rufa red knot (*Calidris canutus rufa*)

The TSP would involve activities in suitable habitat of the rufa red knot. However, the activities would be temporary and minimal and therefore it is the USACE's determination that the

proposed TSP would constitute a *"may affect, but will not likely adversely affect"* determination for the species. Potential project-induced impacts may result from incidental interaction with the rufa red knot during the following construction activities: marsh restoration features 47a1, 47a2, and 47c1 would temporarily utilize Gulf of Mexico shoreline for the placement of pipeline to deliver offshore sediment to the onshore marsh restoration areas. Approximately 0.14 acres (200 feet long by 30 feet wide) of shoreline habitat is expected to be impacted temporarily by these three measures. Other features that would also temporarily utilize Gulf of Mexico shoreline for temporary pipeline placement are: 124c, approximately 0.34 acres of suitable habitat is expected to be impacted; 306a1 and 127c3, approximately 1.10 acres of suitable habitat is expected to be impacted. Due to their mobility, rufa red knots would be able to avoid the aforementioned small areas of temporary disturbance by using abundant adjacent areas for foraging and roosting. Additionally, there is a considerable amount of habitat within the SWC project area that could be utilized (see **Figure 4-1**).

Because the piping plover and rufa red knot share similar foraging/roosting behaviors and utilize similar coastal habitats within Louisiana, the effects of the action would be very similar for both species.

Sprague's Pipit (*Anthus spragueii*)
The USACE has determined that the proposed TSP would constitute a *"may affect, but will not likely adversely affect"* determination for candidate species, Sprague's pipit. Depending on final designs of the NED TSP, potential indirect and minimal impacts could occur to the species. These impacts would include the temporary displacement of any birds that may be present due to construction activity and noise. The NER TSP could cause minimal indirect impacts to the species, if present during planting operations on chenier grasslands. It is assumed that the birds would relocate to adjacent or nearby suitable foraging/roosting areas.

West Indian Manatee (*Trichechus manatus*)
Due to the rarity of the manatee within the project area, MVN concludes that the proposed action *"may affect, but will not likely adversely affect"* the West Indian manatee. However, should any manatees be encountered during the proposed activities, an on-board observer would notify the proper personnel, and harmful activities (e.g., dredging) would be temporarily suspended until the animal(s) moves out of the project area. Any disturbance to the manatee would only be temporary during construction activities, and would result in temporary displacement. The manatees would likely move and relocate to other nearby areas for foraging or resting purposes.

Because the West Indian manatee may occur in the project area, the Contractor shall instruct all personnel associated with the project of the potential presence of manatees in the area, and the need to avoid collisions with these animals. All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the MMPA of 1972 and the ESA of 1973. The Contractor shall be held responsible for any manatee harmed, harassed, or killed as a result of construction activities not conducted in accordance with these specifications. See **Annex B** for special operating conditions if manatees are present in the project area.

Gulf Sturgeon
Due to the rarity of the Gulf sturgeon within the project area, MVN concludes that the proposed action *"may affect, but will not likely adversely affect"* the Gulf sturgeon. However, all contract personnel associated with the project would be informed of the potential presence of Gulf

sturgeon and best management practices (**Annex B**) would be implemented to avoid impacts to the listed species.

Sea Turtles
It is anticipated that the contractor will utilize a hydraulic cutterhead dredge and booster pump(s) to excavate sediment from available offshore borrow area(s) and then transport it through a submerged sediment pipeline to the marsh restoration areas. Hopper dredges are not being proposed. Incidental takes of sea turtles have only been documented from hopper dredge operations that use trailing suction dragheads. Thus far, no incidental takes of sea turtles have been reported from clamshell (mechanical dredge), pipeline cutterhead (hydraulic dredge), or other types of dredges operating in southeastern coastal channels. Operational differences between these dredge types contribute to the differences in potential impacts to sea turtles. The relatively slow dredging motion of clamshell and pipeline dredges present minimal risk for sea turtle takes (Diskerson et al. 2004). Environmental laws protecting sea turtles could require the cessation of work for a limited time if the allowable number of sea turtle mortalities is exceeded during dredging. Additionally, sediment used to construct the containment dikes will be dredged from existing material inside the marsh creation area rather than from offshore borrow areas and therefore dredging operations associated with containment dikes are not expected to adversely impact sea turtles.

By implementing the above-mentioned monitoring and avoidance program, it is the USACE's determination that the proposed TSP plan *"may affect, but will not likely adversely affect"* some sea turtles and have *"no effect"* on others.

Green Sea Turtle (*Chelonia mydas*)
Due to the lack of extensive seagrass beds in and near the project area, the lack of major nesting colonies along coastal Louisiana, and the low incidence of sightings and strandings along coastal Louisiana (NMFS 1991), it is the USACE's determination that the TSP is expected to have *"no effect"* on the green sea turtle population.

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)
The proposed wetland restoration/nourishment and shoreline protection features would provide a more suitable inshore foraging habitat (i.e., characterized by low salinity, high turbidity, and high organic content – where shrimp and blue crabs are abundant) for this species (NMFS and USFWS 1992a). Given the Kemp's ridley sea turtle has been found along Louisiana's coast, it is possible that the dredging of borrow material for the marsh creation features would have an effect; however, the Kemp's ridley sea turtle would likely avoid the borrow areas during construction. It is the USACE's determination that the proposed TSP plan *"may affect, but will not likely adversely affect"* the Kemp's Ridley sea turtle population.

Leatherback Sea Turtle (*Dermochelys coriacea*)
Leatherback sea turtles occur mostly in continental shelf waters more than 164 feet (50 meters) in depth and are uncommon in shallow Gulf of Mexico waters along Louisiana. There are no known nesting records for this species reported for Louisiana (NMFS and USFWS 1992b). Therefore, it is the USACE's determination that the TSP is expected to have *"no effect"* on the leatherback sea turtle population.

Loggerhead Sea Turtle (*Caretta caretta*)
The project area does not contain suitable nesting habitat and no suitable habitat will be created by the TSP. Loggerhead sea turtle Critical Habitat (*Sargassum* habitat) exists in the southern

(offshore) portion of the SWC project area (see Figure 4-2). The closest proximity the critical habitat comes to the shoreline is approximately 4 miles. Given the location of the loggerhead sea turtle's Critical Habitat (*Sargassum* habitat), and the fact that dredging activities would be limited to approximately 3 miles offshore avoiding impacts to critical habitat, it is the USACE's determination that the proposed TSP would have "no effect" on loggerhead critical habitat. The loggerhead sea turtle would likely avoid the borrow areas during construction minimizing the potential of impacts to the species. It is the USACE's determination that the proposed TSP plan *"may affect, but will not likely adversely affect"* the loggerhead sea turtle population.

Hawksbill Sea Turtle (*Eretmochelys imbricata*)
Due to its rarity along the Louisiana coast and its preference for nesting on beaches in Puerto Rico and the U.S. Virgin Islands (NMFS AND USFWS 1993), it is the USACE's determination that the TSP is expected to have *"no effect"* on the hawksbill sea turtle population.

Effects on Other Species of Concern
MVN has assessed the environmental impacts of the proposed action on species found in the project area that are protected under the MMPA of 1972, the MBTA of 1918, and the Migratory Bird Conservation Act of 1929.

MVN has determined that, with use of guidelines from USFWS and nesting bird abatement plan (if necessary), the proposed action would have no adverse impacts on protected birds (see **Section IV** for discussions on colonial nesting birds and shore birds).

MVN has determined that, with use of the best management practices (**Annex B**) established in coordination with NMFS, the proposed action would have no adverse impacts on bottlenose dolphins (see **Section IV** for discussions on bottlenose dolphins).

VI. CONCLUSION AND DETERMINATION OF EFFECTS

Based on the above information, the MVN has determined that the proposed action *"may affect but will not likely adversely affect"* the piping plover or it's critical habitat, red knot, West Indian manatee, Gulf sturgeon, loggerhead and Kemps Ridley sea turtles; would have no effect on the Red-cockaded woodpecker, green, leatherback, and hawksbill sea turtles or loggerhead critical habitat and would not adversely impact other species of concern that could potentially be found in the project area. MVN requests your concurrence on the aforementioned determinations.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
March 20, 2015

Ms. Joan M. Exnicios
Chief, Environmental Planning Branch
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Exnicios:

Please reference your letter dated March 11, 2015, and the attached Biological Assessment (BA) on the Southwest Coastal Louisiana Project. In that BA, you have determined that the project "may affect but will not likely adversely affect" the piping plover or it's critical habitat, red knot, West Indian manatee, Gulf sturgeon, loggerhead and Kemps Ridley sea turtles, and would have "no effect" on the red-cockaded woodpecker, green, leatherback, and hawksbill sea turtles or loggerhead critical habitat.

The Service concurs with that determination. No further ESA consultation with the Service will be necessary for the proposed action, unless there are significant changes in the scope or location of the proposed project or the project has not been initiated one year from the date of this letter. If the proposed project has not been initiated within one year, follow-up consultation (via telephone call or e-mail) should be accomplished with the Service prior to making expenditures because our threatened and endangered species information is updated annually. If the scope or location of the proposed project is changed significantly, consultation should occur as soon as such changes are made.

If you have any further questions, please contact Mr. Ronny Paille of this office (337-291-3117).

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

cc: LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CMD), Baton Rouge, LA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

July 17, 2015

Regional Planning and
Environmental Division South
New Orleans Environmental Branch

Jeffrey D. Weller
Supervisor, Louisiana Field Office
US Fish and Wildlife Service
646 Cajundome Blvd. - Suite 400
Lafayette, Louisiana 70506

Dear Mr. Weller:

The U.S. Army Corps of Engineers, New Orleans District (CEMVN) is submitting a request for consultation on the National Economic Development portion of the Southwest Coastal Louisiana Project. A Biological Assessment with a determination of *"may affect but will not likely adversely affect"* the Sprague's pipit "*no effect*" on the Red-cockaded woodpecker, and would not adversely impact other species of concern that could potentially be found in the project area has been prepared by the CEMVN and is enclosed for your review and opinion. Consultation on the National Environmental Restoration portion of the project was completed on March 20, 2015 (see attached).

Questions and/or concerns should be directed to Ms. Tammy Gilmore; U.S. Army Corps of Engineers; Planning Division; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267. Ms. Gilmore may also be contacted by e-mail tammy.h.gilmore@usace.army.mil or phone (504) 862-1002.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental
Planning Branch

Encls.

Biological Assessment

I. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), New Orleans District (MVN), has prepared this Biological Assessment (BA) to evaluate the potential impacts associated with the proposed hurricane and storm surge damage risk reduction measures and ecosystem restoration features within Calcasieu, Cameron, and Vermilion Parishes in southwest Louisiana referred to as the Southwest Coastal Louisiana Study (the "SWC project").

The low elevation and proximity to the Gulf of Mexico places the unique environment and cultural heritage of southwest Louisiana communities at risk from storm surge flooding and coastal erosion. Land subsidence and rising sea level is expected to increase the potential for coastal flooding, shore erosion, saltwater intrusion, and loss of wetlands and chenier habitats.

II. ACTION AREA

The project area (**Figure 2-1**) is located in southwest Louisiana and includes all of Calcasieu, Cameron, and Vermilion parishes and small portions of Beauregard, Jefferson Davis, and Iberia parishes encompassing approximately 4,700 square miles.

Cameron Parish is located in the southwest corner of Louisiana. The southern boundary of the parish is the Gulf of Mexico. Eighty-two percent of Cameron Parish is coastal marshes. Geographically, it is one of the largest parishes in Louisiana. The parish is chiefly rural and the largest communities are Cameron and Hackberry. Cameron is located along Louisiana Highway 82 (LA-82), while Hackberry is located along LA-27. Other smaller communities include Creole, Johnsons Bayou, and Holly Beach.

Calcasieu Parish is located due north of Cameron Parish. The town of Lake Charles is the parish seat, which is the largest urban area in the project area. Only a small portion of the parish is located in the coastal zone.

Vermilion Parish is located due east of Cameron Parish. The southern boundary of the parish is the Gulf of Mexico. Large expanses of Vermilion Parish are open water (lakes, bays, and streams). Approximately 50 percent of the land is coastal marshes. The parish is chiefly rural and the town of Abbeville is the parish seat as well as the largest urban area in the parish. Other communities include Delcambre, Kaplan, and Gueydan, which are all located along LA-14 in the northern part of the project area. Pecan Island and Forked Island are smaller communities, both located along LA-82 in lower Vermilion Parish. Located along LA-333, Intracoastal City is the nearest access to Vermilion Bay and the Gulf of Mexico in this region and supports the area's oil and shrimp industries.

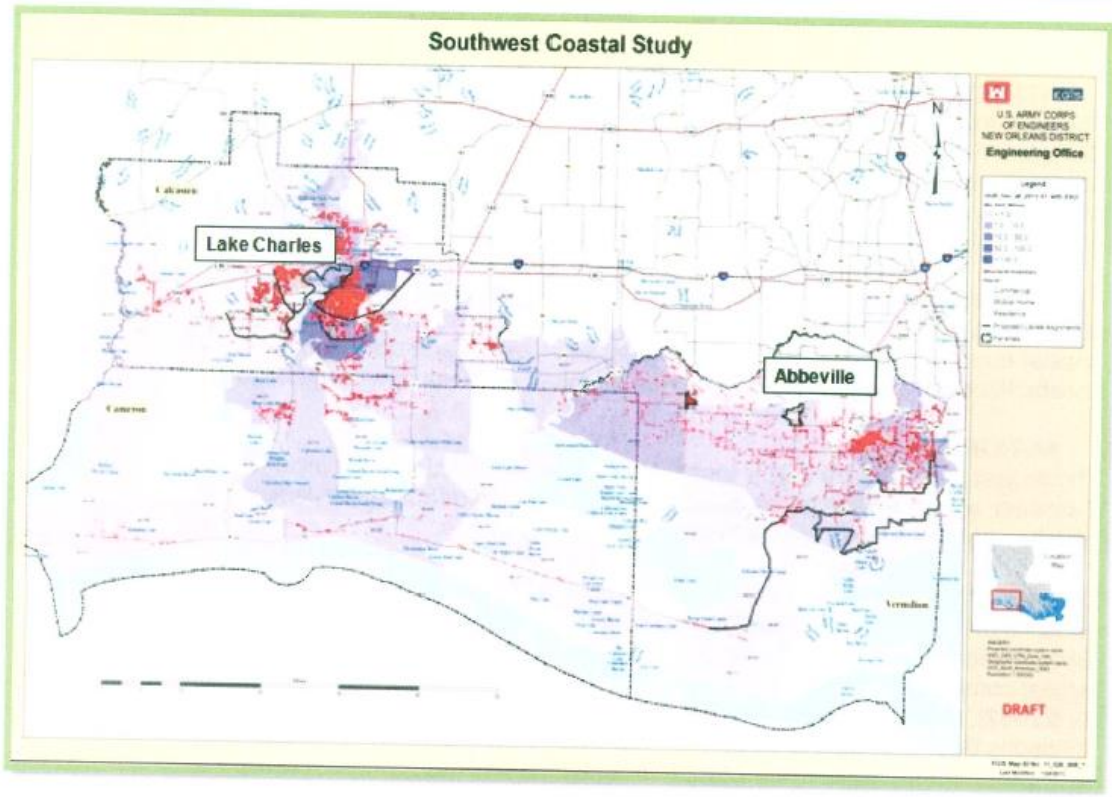


Figure 2-1 SWC Project Area

III. PROJECT DESCRIPTION

The SWC project includes both a National Economic Development (NED) and a National Ecosystem Restoration (NER) component. The NED component is non-structural and has been developed to address damages associated with hurricane and coastal storm surge flooding in Calcasieu, Cameron and Vermillion Parishes. Details of the NED TSP are below and in Figure 3-1:

- Nonstructural measures include:
  - Elevating residential structures*
  - Flood proofing non-residential structures (public and commercial facilities)*
  - Building small berms around warehouses
  - Potentially acquiring structures

  (* Note that some residential structures could be flood-proofed and some commercial structures could be elevated)

- Structures eligible for nonstructural measures have first-floor elevations at or below the 25-year flood zone, based on year 2025 hydrology. Eligible structures would be raised to the 100-year base flood elevation based on year 2075 hydrology.

- The TSP would reduce flood risk for 3,961 structures, comprised of 3,462 residential structures, 342 non-residential structures, and 157 warehouses.

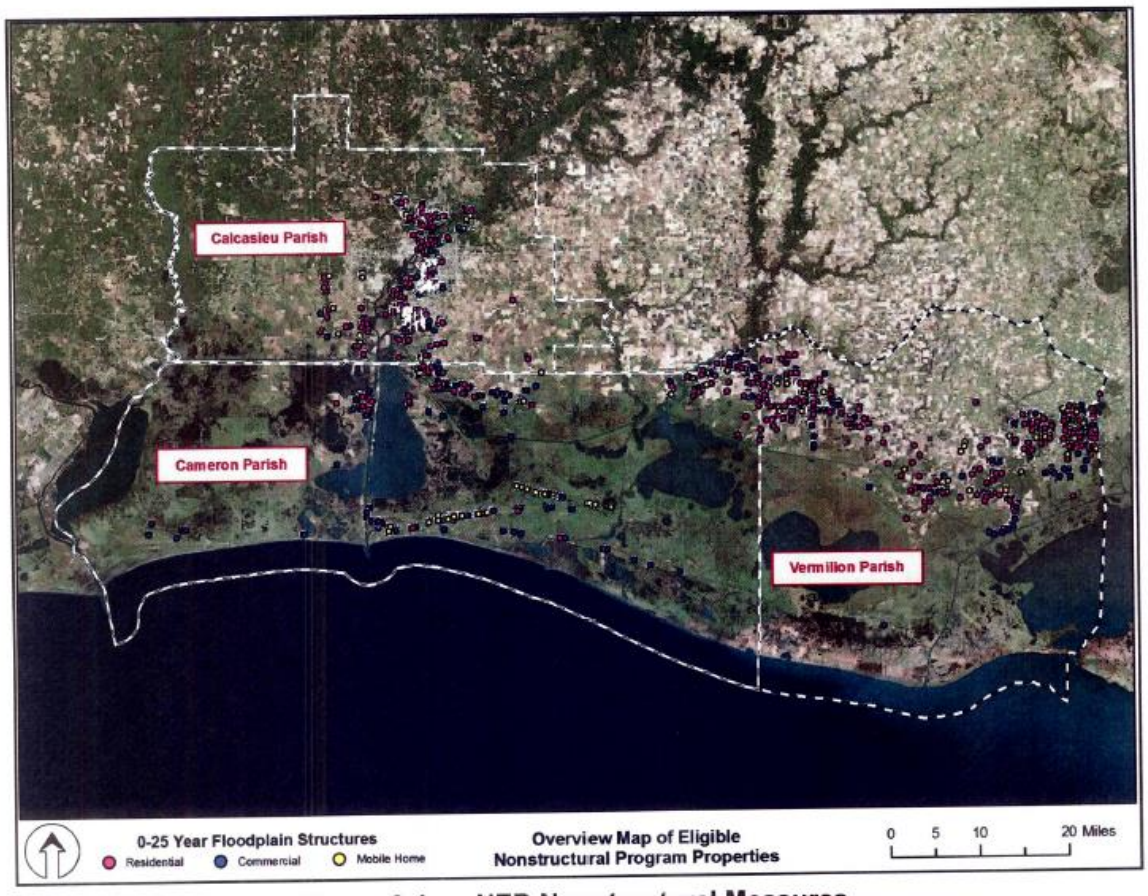


Figure 3-1 NED Nonstructural Measures

IV. SPECIES CONSIDERED

One endangered species, one candidate species and one delisted species are known to or believed to occur within the SWC NED project area (**Table 4-1**). Colonial nesting water birds could also occur in the SWC NED project area.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) was removed from the list of Threatened and Endangered species on 8 August 2007. Bald eagles nest in Louisiana from October through mid-May and typically nest in mature trees (such as bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water (USFWS 2013). The bald eagle continues to be protected under the Migratory Bird Treaty Act of 1918 (MBTA) and the Bald and Golden Eagle Protection Act. Forested portions of the project area may provide habitat for the bald eagle. Most active bald eagle nesting sites have been historically located to the east of the SWC project area. However, as of 2002 only one nest was documented within the project area in Calcasieu Parish. (source: http://www.lsuagcenter.com/en/communications/publications/agmag/Archive/2002/Spring/Bald+Eagles+Make+Comeback+in+South+Louisiana.htm). Surveys would be conducted before construction to determine if any active eagle nests exist within the 660 foot buffer of any of the

project sites. If, during construction an eagle's nest is found, a no-work zone of 660 feet must be implemented and the Corps must be immediately notified.

Colonial Nesting Water Birds

Colonial nesting water birds, including but not limited to; herons, egrets, cormorants, ibis may occur near structures that are adjacent to water. These birds and their nests are protected by the migratory bird treaty act of 1918, as amended (MBTA). Surveys would be conducted before construction to determine if any active water nests exist within the 1,000 foot buffer of any of the project sites. If, during construction any nests are found, a no-work zone of 1,000 feet must be implemented and the Corps must be immediately notified.

Table 4-1 Threatened and Endangered Species within the SWC NED Project Area

Common Name	Scientific Name	Critical Habitat	Agency	Status
Sprague's Pipit*	*Anthus spragueii*		USFWS	Candidate
red-cockaded woodpecker	*Picoides borealis*		USFWS	Endangered

* Candidate species are those taxa for which the Service has on file sufficient information regarding biological vulnerability and threat(s) to support issuance of a proposal to list

The SWC NED TSP could potentially impact the red-cockaded woodpecker, sprague's pipet and bald eagle. The project area does not encompass critical habitat for any species mentioned in **Table 4-1** above. Descriptions of the species that could potentially be impacted by the SWC TSP are described below.

Red-cockaded Woodpecker (*Picoides borealis*)

The RCW was listed as endangered in 1970 (35 FR 16047 16048). The RCW is a permanent resident of Louisiana and is dependent on a very specific habitat type. Old stand longleaf pine forests are preferred; however, all of the southern pine species can harbor RCWs. The birds may forage on pines of most sizes but only the oldest fungus infested pines are used as cavity trees. Old pine forests have declined substantially due to the lumber industry, development and agriculture. The red-cockaded woodpecker is known to occur in Calcasieu Parish.

Sprague's Pipit (*Anthus spragueii*)

The Sprague's pipit, is a candidate species for federal listing as a threatened or endangered species. It winters in Louisiana, arriving from its northern breeding grounds in September and remaining until April. Sprague's pipit exhibits a strong preference for open grassland (i.e., native prairie) with native grasses of intermediate height and thickness, and it avoids areas with too much shrub encroachment. The Sprague's pipit is known to or believed to occur in all parishes within the project area.

V. EFFECTS ANALYSIS

The potential exists that any of the endangered or threatened species listed in the previous section may be present in the project area during proposed construction activities. However, while individuals may be affected by the proposed construction activities, whole populations would not be adversely affected by implementation of the NED TSP. The implementation of NED TSP features (i.e.) could impact the Sprague's pipit, colonial nesting birds and bald eagle, but is not expected to impact the RCW.

Red-cockaded Woodpecker (*Picoides borealis*)

The NED construction activities would be rather small and localized such as the raising of homes or construction of small berms on developed land. Although the red-cockaded woodpecker may occur in Calcasieu Parish, it is unlikely to be impacted by any SWC TSP features as the habitat it is dependent upon is found in the far north of the parish and not near the project features.

Due to the lack of old pine forests near the project features; it is the USACE's determination that the TSP is expected to have *"no effect"* on the RCW.

Sprague's Pipit (*Anthus spragueii)*
The USACE has determined that the proposed TSP would constitute a *"may affect, but will not likely adversely affect"* determination for candidate species, Sprague's pipit. Potential indirect and minimal impacts could occur to the species. These impacts would include the temporary displacement of any birds that may be present due to construction activity and noise. It is assumed that the birds would relocate to adjacent or nearby suitable foraging/roosting areas.

Other Species of Concern
The USACE has determined that the proposed TSP would not adversely impact any species of concern. Surveys would be conducted prior to construction to determine if any active eagle or water bird nests are present. If nests are found, the appropriate buffer zones would be implemented or the timing of construction would be adjusted. In addition, impacts to wetlands would be avoided during construction of the NED plan. During construction there could be temporary impacts to roosting and/or foraging birds. These impacts would include the temporary displacement of any birds that may be present due to construction activity and noise. It is assumed that the birds would relocate to adjacent or nearby suitable foraging/roosting areas.

VI. CONCLUSION AND DETERMINATION OF EFFECTS

Based on the above information, the MVN has determined that the proposed action *"may affect but will not likely adversely affect"* the Sprague's pipit; would have no effect on the Red-cockaded woodpecker and would not adversely impact other species of concern that could potentially be found in the project area. MVN requests your concurrence on the aforementioned determinations.

VII. LITERATURE CITED

[USFWS] U.S. Fish and Wildlife Service. 2013. U.S Fish and Wildlife Service Draft Coordination Act Report. Prepared by Ronald Paille. U.S. Fish and Wildlife Service Ecological Services. Lafayette, Louisiana.

[USFWS] U.S. Fish and Wildlife Service. 2015. Environmental Online Conservation System. http://ecos.fws.gov/ecos/home.action. Last accessed on 8 January 2015.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506
August 25, 2015

Ms. Joan M. Exnicios
Chief, Environmental Planning Branch
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Exnicios:

Please reference your letter dated July 17, 2015, and the attached Biological Assessment (BA) on the National Economic Development (NED) portion of the Southwest Coastal Louisiana Project. In that BA, you have determined that the NED measures, consisting of non-structural flood risk reduction measures, "may affect but will not likely adversely affect" the Sprague's pipit, a candidate species for listing as a threatened or endangered species. The BA also contains the determination that the proposed non-structural measures would have no effect on the Red-cockaded woodpecker, and would not adversely impact other species of concern that could potentially be found in the project area.

Although the Sprague's pipit is not listed as a threatened or endangered species, the Service agrees with your conclusions regarding impacts of the proposed measures on the Spragues' pipit.

The Service concurs with the Red-cockaded woodpecker determination. No further ESA consultation with the Service will be necessary for the proposed action, unless there are significant changes in the scope or location of the proposed project or the project has not been initiated one year from the date of this letter. If the proposed project has not been initiated within one year, follow-up consultation (via telephone call or e-mail) should be accomplished with the Service prior to making expenditures because our threatened and endangered species information is updated annually. If the scope or location of the proposed project is changed significantly, consultation should occur as soon as such changes are made.

If you have any further questions, please contact Mr. Ronny Paille of this office (337-291-3117).

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

cc: LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CMD), Baton Rouge, LA

3. NMFS COORDINATION

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

March 11, 2015

Regional Planning and
Environmental Division South
New Orleans Environmental Branch

David Bernhart
NMFS - Protected Species Division
263 13th Avenue South
St. Petersburg, FL 33701

Dear Mr. Bernhart:

The U.S. Army Corps of Engineers, New Orleans District (CEMVN) is submitting a request for consultation on the Southwest Coastal Louisiana Project. A Biological Assessment with a determination of *"may affect but will not likely adversely affect"* the piping plover or it's critical habitat, red knot, West Indian manatee, Gulf sturgeon, loggerhead and Kemps Ridley sea turtles; would have "*no effect*" on the Red-cockaded woodpecker, green, leatherback, and hawksbill sea turtles or loggerhead critical habitat and would not adversely impact other species of concern that could potentially be found in the project area has been prepared by the CEMVN and is enclosed for your review and opinion.

Questions and/or concerns should be directed to Ms. Tammy Gilmore; U.S. Army Corps of Engineers; Planning Division; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267. Ms. Gilmore may also be contacted by e-mail tammy.h.gilmore@usace.army.mil or phone (504) 862-1002.

Sincerely,

Joan M. Exnicios
Chief, Environmental
Planning Branch

Encls.

Biological Assessment

I. INTRODUCTION

The U.S. Army Corps of Engineers (USACE), New Orleans District (MVN), has prepared this Biological Assessment (BA) to evaluate the potential impacts associated with the proposed hurricane and storm surge damage risk reduction measures and ecosystem restoration features within Calcasieu, Cameron, and Vermilion Parishes in southwest Louisiana referred to as the Southwest Coastal Louisiana Study (the "SWC project").

The low elevation and proximity to the Gulf of Mexico places the unique environment and cultural heritage of southwest Louisiana communities at risk from storm surge flooding and coastal erosion. Land subsidence and rising sea level is expected to increase the potential for coastal flooding, shore erosion, saltwater intrusion, and loss of wetlands and chenier habitats.

II. ACTION AREA

The project area (**Figure 2-1**) is located in southwest Louisiana and includes all of Calcasieu, Cameron, and Vermilion parishes and small portions of Beauregard, Jefferson Davis, and Iberia parishes encompassing approximately 4,700 square miles.

Cameron Parish is located in the southwest corner of Louisiana. The southern boundary of the parish is the Gulf of Mexico. Eighty-two percent of Cameron Parish is coastal marshes. Geographically, it is one of the largest parishes in Louisiana. The parish is chiefly rural and the largest communities are Cameron and Hackberry. Cameron is located along Louisiana Highway 82 (LA-82), while Hackberry is located along LA-27. Other smaller communities include Creole, Johnsons Bayou, and Holly Beach.

Calcasieu Parish is located due north of Cameron Parish. The town of Lake Charles is the parish seat, which is the largest urban area in the project area. Only a small portion of the parish is located in the coastal zone.

Vermilion Parish is located due east of Cameron Parish. The southern boundary of the parish is the Gulf of Mexico. Large expanses of Vermilion Parish are open water (lakes, bays, and streams). Approximately 50 percent of the land is coastal marshes. The parish is chiefly rural and the town of Abbeville is the parish seat as well as the largest urban area in the parish. Other communities include Delcambre, Kaplan, and Gueydan, which are all located along LA-14 in the northern part of the project area. Pecan Island and Forked Island are smaller communities, both located along LA-82 in lower Vermilion Parish. Located along LA-333, Intracoastal City is the nearest access to Vermilion Bay and the Gulf of Mexico in this region and supports the area's oil and shrimp industries.

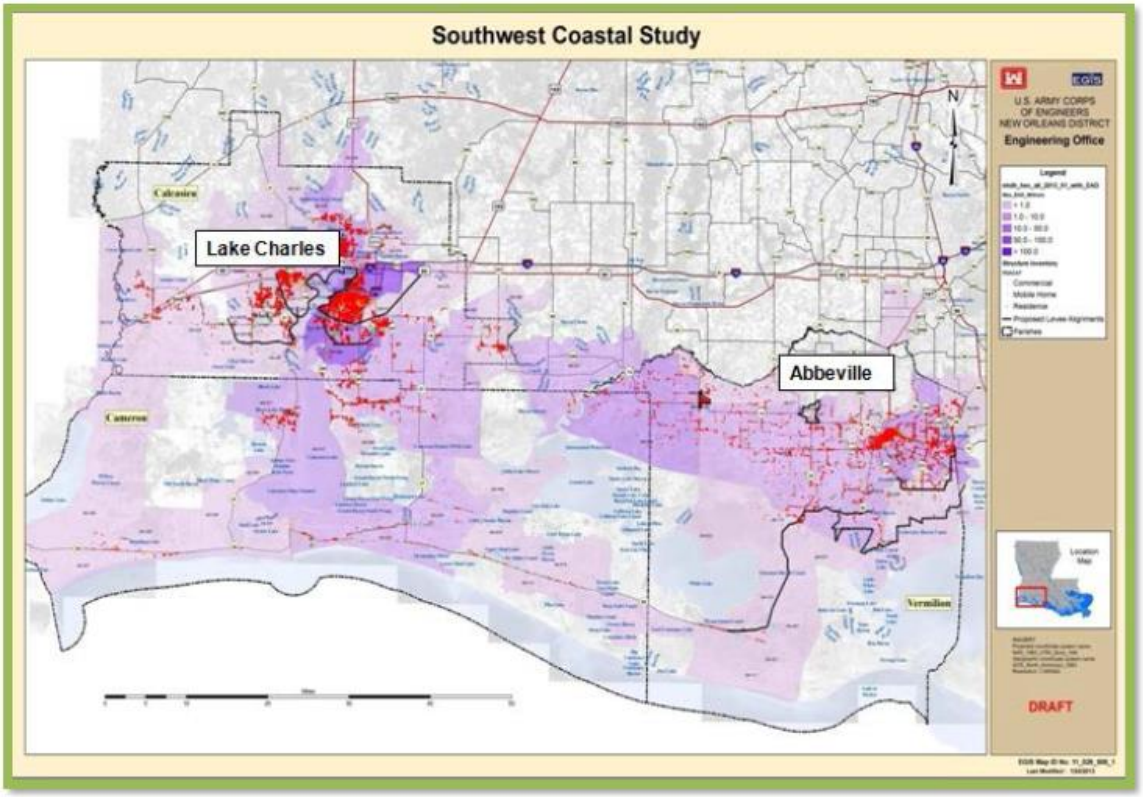


Figure 2-1 SWC Project Area

III. PROJECT DESCRIPTION

The SWC project includes both a National Economic Development (NED) and a National Ecosystem Restoration (NER) component. The NED tentatively selected plan (TSP) is programmatic and nonstructural. The program has been developed to address damages associated with hurricane and coastal storm surge flooding in Calcasieu, Cameron and Vermillion Parishes. The NED TSP is subject to parish-specific codes and regulations, additional NEPA compliance, and participation agreements. Consultation would be reinitiated, as necessary, upon further design of the NED plan and during preparation of additional NEPA compliance. Details of the NED TSP are below and in Figures 3-1:

- Nonstructural measures include:
  - Elevating residential structures*
  - Flood proofing non-residential structures (public and commercial facilities)*
  - Building small berms around warehouses
  - Potentially acquiring structures

  (* Note that some residential structures could be flood-proofed and some commercial structures could be elevated)

- Structures eligible for nonstructural measures have first-floor elevations at or below the 25-year flood zone, based on year 2025 hydrology. Eligible structures would be raised to the 100-year base flood elevation based on year 2075 hydrology.

- The TSP would reduce flood risk for 4,952 residential and non-residential structures (4,219 residential; 396 non-residential; 337 warehouses).

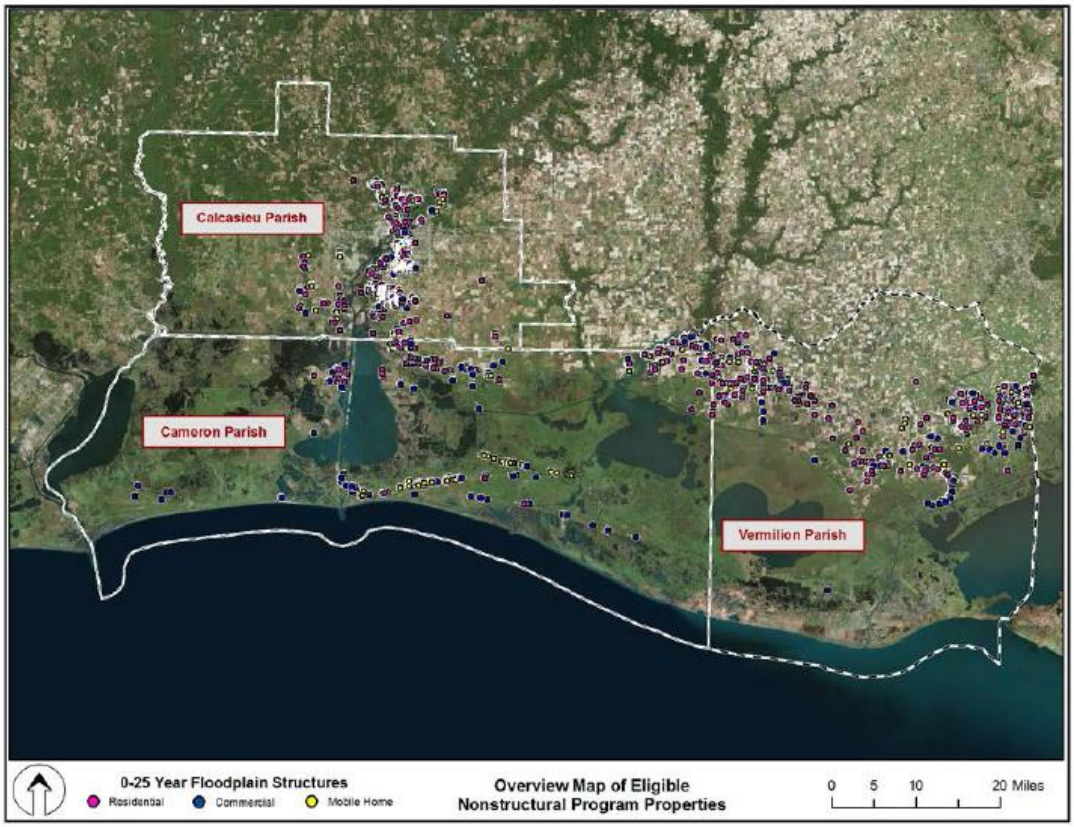


Figure 3-1 NED Nonstructural Measures

The NER TSP is Small Integrated Restoration (Plan CM-4), a comprehensive ecosystem restoration plan that attempts to address land loss problems and ecosystem degradation. The plan is cost effective, and is the least cost comprehensive best buy plan. The plan goal is to minimize land loss; enhance plant productivity by reducing major stressors; and to reinforce and protect critical landscape features. Details of the TSP are listed below and in Figures 3-2 and 3-3:

- A total of 51 ecosystem restoration features
  - 9 marsh restoration features
  - 35 chenier reforestation features
  - 5 shoreline protection features
  - 1 hydrologic / salinity control feature
  - The Calcasieu Ship Channel Salinity Barrier Navigation Study is recommended as an additional long-range study

Details of the construction of the NER plan features are included in the Enclosures section (**Annex A**).

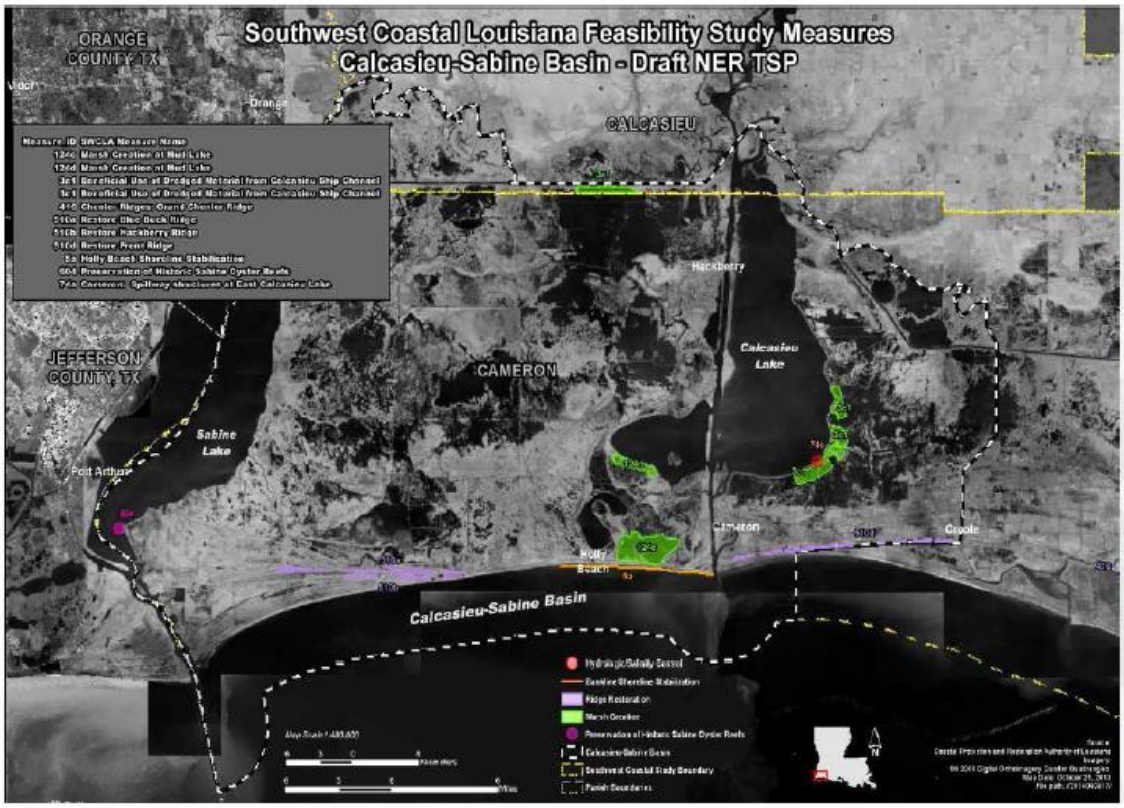


Figure 3-2 NER TSP features (Calcasieu)

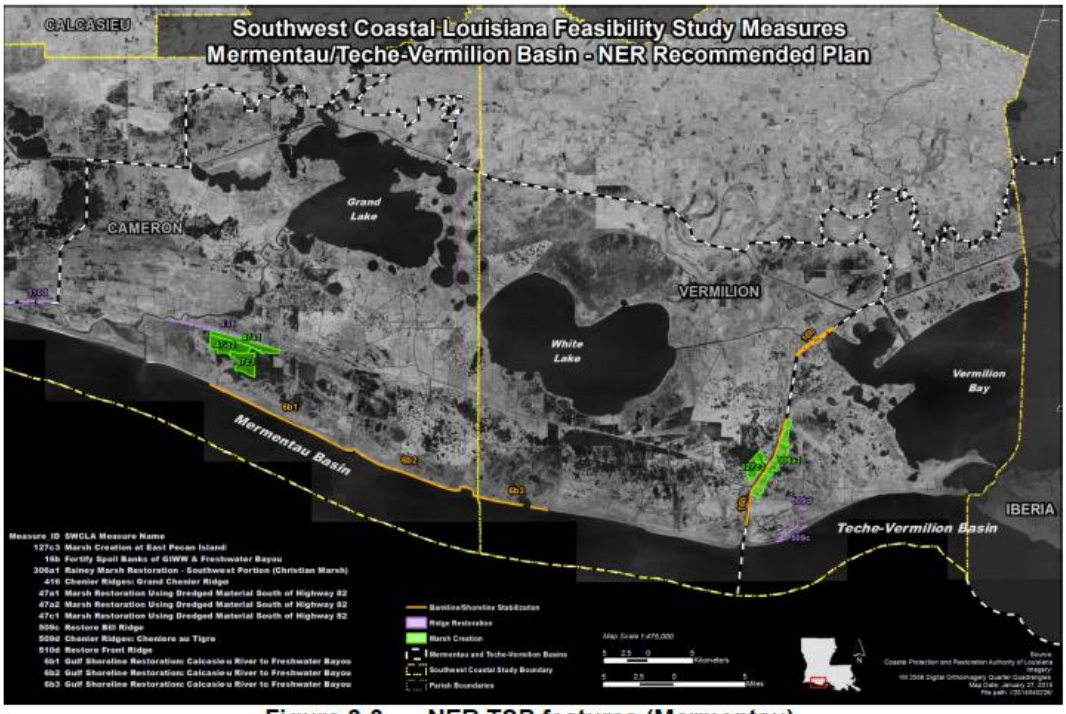


Figure 3-3 NER TSP features (Mermentau)

IV. SPECIES CONSIDERED

Eleven threatened or endangered species and one candidate species are known to or believed to occur within the SWC project area (**Table 4-1**). With the exception of the red-cockaded woodpecker (RCW), all of the species provided in **Table 4-1** below were listed in the November 2013 USFWS Draft Fish and Wildlife Coordination Act Report (USFWS 2013).

Cetaceans

A total of 28 cetaceans have been reported in the Gulf of Mexico waters (Davis et al. 2002). Of these, five Mysticeti (e.g., baleen whales including blue whale (*Balaneoptera musculus*), humpback whale (*Megaptera novaeangliae*), finback whale (*Balaenoptera physalus*), and sei whale (*Balaenoptera borealis*); and Odontoceiti (e.g., toothed whales, including sperm whale (*Physeter macrocephalus*) have been reported in the Gulf of Mexico and all are listed as endangered species. Infrequent, shallow water, historical sightings and strandings in the Gulf of Mexico of these endangered cetaceans suggest that most of these species are rare, accidental, or uncommon in this area (Davis et al. 2002). All whales are principally marine deepwater species and would not likely be impacted by the SWC TSP.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) was removed from the list of Threatened and Endangered species on 8 August 2007. Bald eagles nest in Louisiana from October through mid-May and typically nest in mature trees (such as bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water (USFWS 2013). The bald eagle continues to be protected under the Migratory Bird Treaty Act of 1918 (MBTA) and the Bald and Golden Eagle

Protection Act. Forested portions of the project area may provide habitat for the bald eagle. Most active bald eagle nesting sites have been historically located to the east of the SWC project area (source: http://www.lsuagcenter.com/en/communications/publications/agmag/Archive/2002/Spring/Bald+Eagles+Make+Comeback+in+South+Louisiana.htm). No known nests are located near any project features, however, if an eagle's nest is found, a no-work zone of 660 feet must be implemented and the Corps must be immediately notified.

Brown Pelican and Colonial Nesting Water Birds

The brown pelican (*Pelecanus occidentalis*) was removed from the list of Threatened and Endangered species on 17 December 2009. Their nests continue to be protected under the Migratory Bird Treaty Act (MBTA) of 1918. The brown pelican and a variety of colonial nesting water birds including but not limited to: herons, egrets, ibis, anhinga, double crested cormorants, and roseate spoonbill may nest within the project area. In general, the nesting season for these species runs from February 15 through September 1. The area is also known to support various species of shore birds including but not limited to: Sanderlings, sandpipers, gulls, and terns. These birds and their nests are protected under the MBTA and adverse impacts would be avoided. No known rookeries are located near any project features, however, if any nests are found, a no-work zone of 1,000 feet would be implemented. Additionally, if needed, a bird abatement plan would be developed and implemented, in coordination with USFWS, to deter colonial nesting water birds and shore birds from nesting within project boundaries.

Bottlenose Dolphin

The western north Atlantic bottlenose dolphin (*Tursiops truncatus*) populations found along the mid-Atlantic coast have been designated as depleted under the Marine Mammal Protection Act (MMPA) and, therefore, are stringently managed (NOAA 2015). In addition, the National Marine Fisheries Service (NMFS) has classified five U.S. stocks of bottlenose dolphins as *"strategic"* stocks, they are: Eastern Gulf of Mexico Coastal; Western Gulf of Mexico Coastal; Northern Gulf of Mexico Coastal; Gulf of Mexico Bay, Sound and Estuarine; and Western North Atlantic Coastal (NOAA 2015). Atlantic bottlenose dolphins inhabit temperate and tropical waters, and are found in the United States from Cape Cod to the Gulf of Mexico (IMMS 2015). These marine mammals are protected under the MMPA of 1972 and therefore impacts should be avoided. **Annex B** provides entrapment prevention measures for the Atlantic bottlenose dolphins.

Table 4-1 Threatened and Endangered Species within the SWC Project Area

	Common Name	Scientific Name	Critical Habitat	Agency	Status
Birds	*Sprague's Pipit	*Anthus spragueii*		USFWS	Candidate
	red-cockaded woodpecker	*Picoides borealis*		USFWS	endangered
	piping plover	*Charadrius melodus*	yes	USFWS	threatened
	rufa red knot	*Calidris canutus rufa*		USFWS	threatened
	**whooping crane	*Grus americana*		USFWS	endangered
Fishes	Gulf sturgeon	*Acipenser oxyrinchus desotoi*		NOAA/NMFS	threatened

	Common Name	Scientific Name	Critical Habitat	Agency	Status
Mammals	West Indian manatee	*Trichechus manatus*		USFWS	endangered
Reptiles	green sea turtle	*Chelonia mydas*		NOAA/NMFS	threatened
	Kemp's ridley sea turtle	*Lepidochelys kempii*		NOAA/NMFS	endangered
	leatherback sea turtle	*Dermochelys coriacea*		NOAA/NMFS	endangered
	loggerhead sea turtle	*Caretta caretta*	yes	NOAA/NMFS	threatened
	hawksbill sea turtle	*Eretmochelys imbricata*		NOAA/NMFS	endangered

* Candidate species are those taxa for which the USFWS has on file sufficient information regarding biological vulnerability and threat(s) to support issuance of a proposal to list.

**This is an *"experimental population, nonessential"* designation.

Sources:
http://ecos.fws.gov/ecos/home.action
http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm

The SWC TSP could potentially impact the piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), West Indian manatee (*Trichechus manatus*), Gulf sturgeon and sea turtles. The project area encompasses critical habitat for the piping plover and for the loggerhead sea turtle (*Caretta caretta*). Only a very small area in the extreme southern off-shore portion of the project area encompasses Sargassum critical habitat for the loggerhead sea turtle. The project area does not encompass critical habitat for any other species mentioned in **Table 4-1** above. Descriptions of the species that could potentially be impacted by the SWC TSP are described below.

Red-cockaded Woodpecker (*Picoides borealis*)
The RCW was listed as endangered in 1970 (35 FR 16047 16048). The RCW is a permanent resident of Louisiana and is dependent on a very specific habitat type. Old stand longleaf pine forests are preferred; however, all of the southern pine species can harbor RCWs. The birds may forage on pines of most sizes but only the oldest fungus infested pines are used as cavity trees. Old pine forests have declined substantially due to the lumber industry, development and agriculture. The red-cockaded woodpecker is known to occur in Calcasieu Parish.

Piping Plover (*Charadrius melodus*)
On December 11, 1985, the USFWS published the final rule (50 CFR 50720) that listed the piping plover as endangered in the Great Lakes watershed (Illinois, Indiana, Michigan, northeastern Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario, Canada) and as threatened elsewhere within its range. This listing includes piping plovers breeding in Canada, with their status under the Endangered Species Act (ESA) of 1973 determined by whether they breed in the watershed of the Great Lakes (endangered) or elsewhere (threatened). Piping plovers on migratory routes outside of the Great Lakes watershed or on their wintering grounds are considered threatened (USFWS 2001a).

The International Piping Plover Coordination Group facilitates the International Piping Plover Census (IPPC) of breeding and wintering piping plovers throughout their range (Elliott-Smith et al 2006). The IPPC has taken place in 1991, 1996, 2001, 2006, and 2011. (Results from 2011 have not yet been published.) (B. Firmin 2014 personal communication) Survey results for

Louisiana have varied in intensity and number of sites visited over the years due to poor weather conditions, lack of personnel, and logistical constraints for site access (USFWS 2011). Results of those IPPC surveys for Louisiana range from a high of 750 birds in 1991 to a low of 226 birds in 2006; those numbers, however, do not reflect the variations in survey intensity or the number of sites visited (USFWS 2011).

In Louisiana, the 2006 IPPC recorded only 226 piping plovers, the lowest numbers in the State in IPPC history. The substantial decline in numbers of wintering piping plover along the Louisiana coast could be attributed to habitat loss as a result of Hurricanes Katrina and Rita; however, lack of personnel and poor weather conditions also affected survey intensity in the State that year (B. Firmin, USFWS, personal communication 2014). Approximately 40 piping plovers were reported in Cameron Parish in the 2006 Census.

Piping plovers arrive on wintering grounds in July, with some late-nesting birds arriving in September. Migration is poorly understood, but most piping plovers probably migrate non-stop from interior breeding areas to wintering grounds (Haig 1992). The habitats used by wintering birds include beaches, mud flats, sand flats, algal flats, and washover passes (areas where breaks in the sand dunes result in an inlet). Wintering plovers are dependent on a mosaic of habitat patches, and move among these patches depending on local weather and tidal conditions (USFWS 2001a). In late February, piping plovers begin leaving the wintering grounds to migrate back to breeding sites. Northward migration peaks in late March, and by late May most birds have left the wintering grounds (USFWS 2001a).

On July 10, 2001, the USFWS designated 137 areas along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana (piping plover critical habitat within the project area is shown in **Figure 4-1**), and Texas as critical habitat for the wintering population of the piping plover. This includes approximately 1,798.3 miles of mapped shoreline and approximately 165,211 acres of mapped area along the gulf and Atlantic coasts and along margins of interior bays, inlets, and lagoons. Approximately 6,548 acres of the aforementioned are located within Cameron and Vermilion Parishes (LA-1 Figure 4-1) (66 FR 36074). All piping plovers are considered threatened species under the Act when on their wintering grounds.

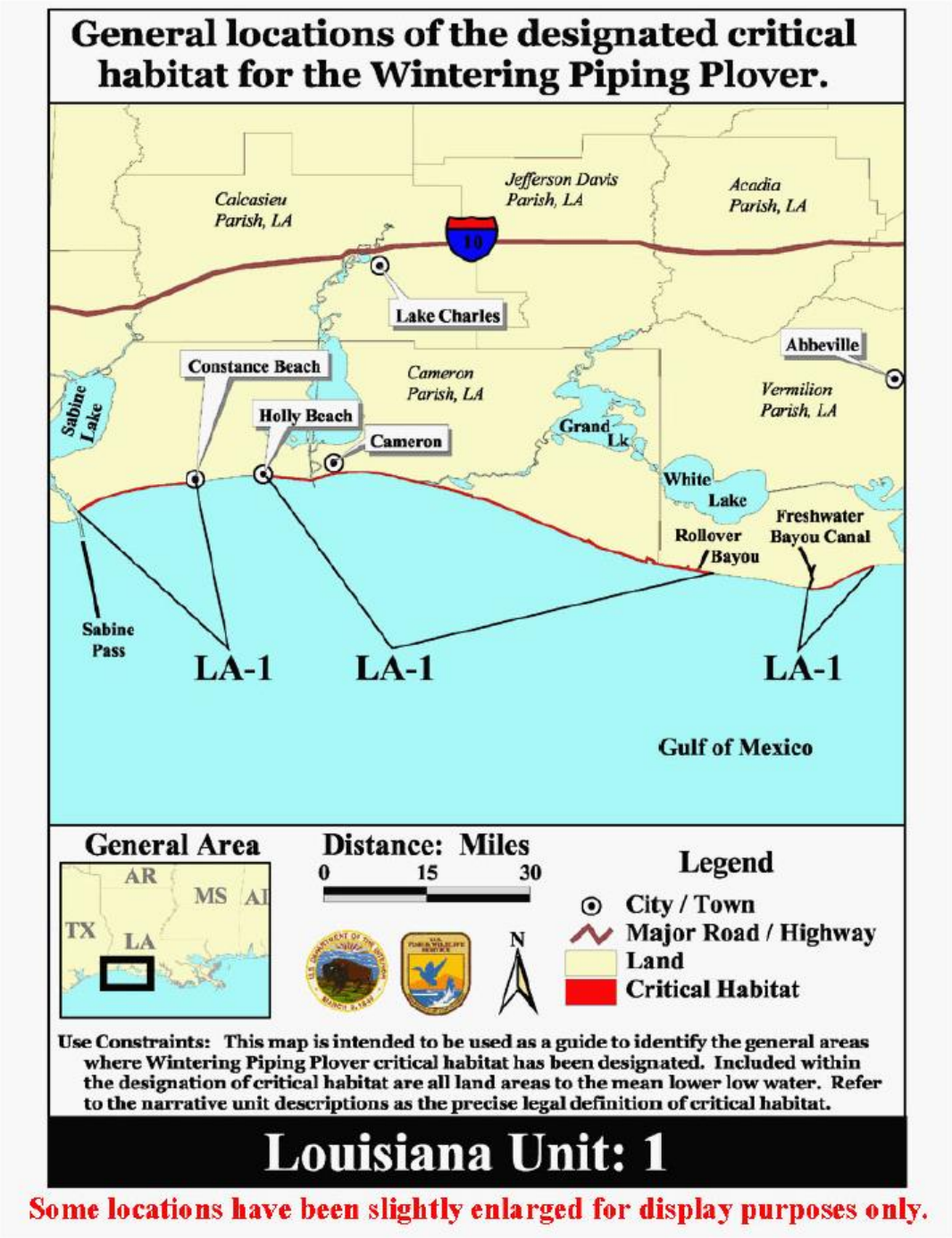


Figure 4-1 Piping plover critical habitat in the project area

Rufa red knot (*Calidris canutus rufa*)
In a 11 December 2014 final rule, the USFWS made a final determination to protect the rufa subspecies of the red knot as threatened under the ESA, with an effective date of 12 January 2015. All of the following information regarding red knot is summarized from the Rufa Red Knot Ecology and Abundance (USFWS 2014a) and final rule 50 CFR Part 17 (USFWS 2014b) and is in reference to the rufa red knot, unless otherwise stated.

The rufa red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast U.S., the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the northbound (spring) and southbound (fall) migrations, rufa red knots use key staging and stopover areas to rest and feed (USFWS 2014a, 2014b).

Louisiana is a migration stopover for red knots in both spring and fall, and some birds may overwinter in small numbers. In the U.S., the rufa red knot is found principally in intertidal marine habitats, especially near coastal inlets, estuaries, and bays, or along resting formations (i.e., intertidal shelf typically formed of densely-packed dirt blown by strong, offshore winds). Within the U.S., rufa red knot migratory and wintering habitats are principally utilized for resting and foraging activities. In the Southeastern U.S., rufa red knots commonly forage on bivalves, gastropods, and crustaceans along sandy beaches, tidal mudflats, salt marshes, and peat banks (USFWS 2014b).

Sprague's Pipet (*Anthus spragueii*)
The Sprague's pipit, is a candidate species for federal listing as a threatened or endangered species. It winters in Louisiana, arriving from its northern breeding grounds in September and remaining until April. Sprague's pipit exhibits a strong preference for open grassland (i.e., native prairie) with native grasses of intermediate height and thickness, and it avoids areas with too much shrub encroachment. The Sprague's pipit is known to or believed to occur in all parishes within the project area.

West Indian Manatee (*Trichechus manatus*)
The West Indian manatee was listed as endangered throughout its range for both the Florida and Antillean subspecies in 1967, and received Federal protection with the passage of the ESA in 1973. Critical habitat was designated in 1976, 1994, 1998, 2002, and 2003 for the Florida subspecies. This species is also protected as a depleted stock under the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361-1407).

Manatees inhabit both salt and freshwater of sufficient depth (5 feet [1.5 meters] to usually less than 20 feet [6.1 meters]) throughout their range. Shallow grassbeds with ready access to deep channels are preferred feeding areas in coastal and riverine habitats (USFWS 2001b). They may also be encountered in canals, rivers, estuarine habitats, saltwater bays, and have been observed as much as 3.7 miles (6.0 kilometers) off the Florida gulf coast. Between October and April, Florida manatees concentrate in areas of warmer water. During warmer months they appear to choose areas based on an adequate food supply, water depth, and proximity to fresh water (USFWS 2001b). During summer months, they migrate as far north as coastal Virginia on the east coast and the Louisiana coast in the Gulf of Mexico (O'Shea 1988).

Sightings of the West Indian manatee in Louisiana have occurred in the Amite, Blind, Tchefuncte, and Tickfaw Rivers, Mississippi River Gulf Outlet (MRGO), and in canals within the adjacent coastal marshes of Louisiana. However, there is no known population thriving in the state. On 9 July 2001, a manatee was observed passing safely through the Inner Harbor

Navigation Canal (IHNC) Lock and into the Mississippi River, and one was sighted in Contraband Bayou in Calcasieu Parish in February, 2010.

Gulf Sturgeon (*Acipenser oxyrinchus*)
On September 30, 1991, the Gulf sturgeon was listed as a threatened species under the Endangered Species Act (ESA) (56 FR 49653).

Gulf sturgeon sightings are rare in the proposed project area; however, the LDWF (1979) reported that an Atlantic sturgeon was caught by a Mr. Hugh Mhire in an otter trawl while shrimping in the Gulf of Mexico off the mouth of the Mermentau River, Cameron Parish, LA. This specimen was probably a Gulf sturgeon (Paruka, 2000). In 1990 a commercial fisherman reported trawling up a Gulf sturgeon three miles out from Last Island (Raccoon Island), Terrebonne Parish, LA (D. Walther, personal communication). The Gulf sturgeon is known to or believed to occur in Cameron and Vermilion Parishes within the project area.

Green Sea Turtle (*Chelonia mydas*)
The green sea turtle was listed as endangered/threatened on July 28, 1978. The breeding populations off Florida and the Pacific coast of Mexico are listed as endangered while all others are threatened (USFWS 1991). This species' current status is listed as threatened in Louisiana.

Although green sea turtles are found worldwide in oceans and gulfs with water temperatures greater than 68°F (20°C), their distribution can be correlated to grassbed distribution, location of nesting beaches, and associated ocean currents (Hirth 1971). Long migrations are often made between feeding and nesting grounds (Carr and Hirth 1962). Within Louisiana waters, these turtles probably occur all along the coast and may nest on the Chandeleur Islands (Dundee and Rossman 1989). Green sea turtles feed in shallow water areas with abundant seagrasses or algae. The turtles migrate from nesting areas to feeding grounds, which are sometimes several thousand miles away. Most turtles migrate along the coasts, but some populations are known to migrate across the ocean from nesting area to feeding grounds. The major nesting beaches are always found in places where the seawater temperature is greater than 77°F (25°C) (NMFS 1991).

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)
On 2 December 1970 the Kemp's ridley sea turtle was designated as endangered across its entire range (USFWS 1991) and has continued to decline in Louisiana (USFWS 1990). This species is currently listed as endangered in Louisiana. Critical habitat has been proposed for this species, but it has not been finalized to date.

This small sea turtle is believed to be the most frequently encountered (Dundee and Rossman 1989), if not the most abundant sea turtle, off the Louisiana coast (Viosca 1961). Kemp's ridley sea turtles have been found along coastal Louisiana from Lake Borgne, Barataria and Terrebonne Bays, and near Calcasieu Pass (Dundee and Rossman 1989). Adult Kemp's ridley sea turtles are usually confined to the Gulf of Mexico. Post-pelagic stages are commonly found over crab-rich, sandy, or muddy bottoms. Juveniles can be found in bays, coastal lagoons, and river mouths. In Louisiana, adults are found seasonally near the Mississippi river outlet. The main nesting grounds for the Kemp's ridley turtle occur on the northeastern coast of Mexico. Occurrence of these sea turtles in bays and estuaries along the Louisiana coast would not be unexpected, as many of their primary food items occur there.

Leatherback Sea Turtle (*Dermochelys coriacea*)

The leatherback sea turtle was listed as an endangered species throughout its range in June 1970 (USFWS 199l), and it is currently listed as endangered in Louisiana. Critical habitat has been established for shoreline and adjacent waters of the U.S. Virgin Islands (50 CFR 17.95; 50 CFR 226.207).

The leatherback sea turtle occurs mostly in continental shelf waters, but will occasionally enter shallow waters and estuaries. Adults are highly migratory, and are believed to be the most pelagic of all sea turtles. Habitat requirements for juvenile and post-hatchling leatherbacks are unknown (NMFS and USFWS 1992b). In Louisiana, leatherbacks are believed to occur offshore in deep waters; however, they have been sighted in Cameron Parish, Atchafalaya Bay, Timbalier Bay, and Chandeleur Sound (Dundee and Rossman 1989). No nesting has been reported in Louisiana (Gunter 1981, Dundee and Rossman 1989).

Loggerhead Sea Turtle (*Caretta caretta*)
The loggerhead sea turtle was listed as a threatened species in July 1978 (USFWS 1991), and it is currently listed as threatened in Louisiana. Critical habitat was established for this species in July 2014 within the Atlantic Ocean and the Gulf of Mexico (50 CFR 226; 79 FR 39855-39912) and within the terrestrial environment of the U.S. Atlantic and Gulf of Mexico coasts (50 CFR 17; 79 FR 39755-39854). These critical habitat areas contain one or a combination of habitat types: nearshore reproductive habitat, winter area, breeding areas, constricted migratory corridors, and/or *Sargassum* habitat.

Loggerheads are capable of living in a variety of environments, such as in brackish waters of coastal lagoons and river mouths. The major nesting beaches are located in the southeastern U.S., primarily along the Atlantic coast of Florida, North Carolina, South Carolina, and Georgia. Only minor and solitary nesting has been recorded along the coasts of the Gulf of Mexico (NMFS AND USFWS 2008).

Loggerheads probably range all along the Louisiana coast; however, Dundee and Rossman (1989) reported specimens only from Chandeleur Sound, Barataria Bay, and Cameron Parish. Nesting on the gulf coast occurs between the months of April and August, with 90 percent of the nesting effort occurring on the south-central gulf coast of Florida (Hildebrand 1981). Although loggerheads have been documented as nesting on the Chandeleurs in 1962 and Grand Isle in the 1930s, it is doubtful whether this species currently successfully nests on the Louisiana coast (Hildebrand 1981, Dundee and Rossman 1989). Loggerhead Critical Habitat (*Sargassum* habitat) exists in the southern (offshore) portion of the SWC project area (see **Figure 4-2** below). This critical habitat expands the entire length of the project (west to east) and the closest points range from approximately 4 miles to 9 miles offshore.

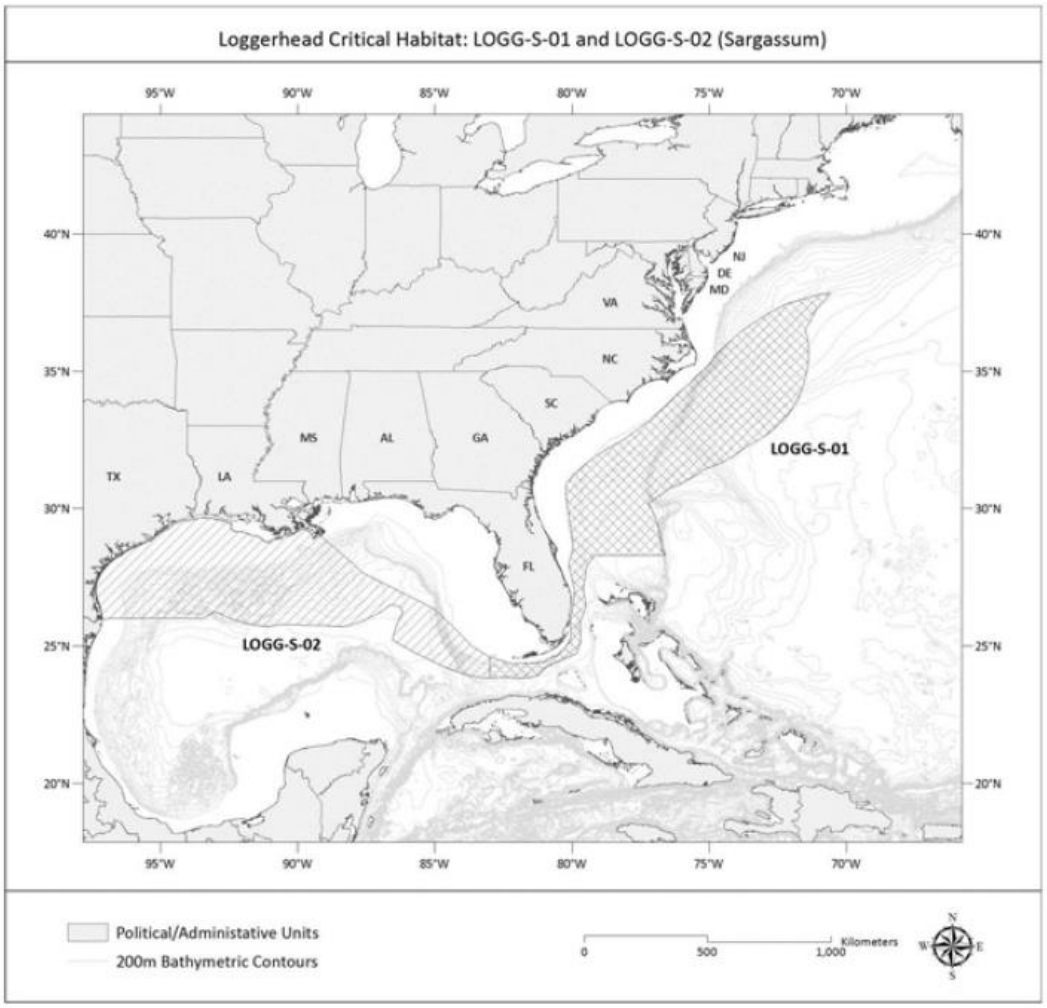


Figure 4-2 Loggerhead Sea Turtle critical habitat in the project area

Hawksbill Sea Turtle (*Eretmochelys imbricata*)
The hawksbill was listed as an endangered species in June 1970 (USFWS 1991), and it is currently listed as endangered in Louisiana.

The hawksbill occurs in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. Only one record of a hawksbill in Louisiana has been reported (Fuller and Tappen 1986). Florida is considered foraging habitat for those turtles, and Texas may be foraging habitat for hatchlings and juveniles (77 observations of small turtles were reported between 1972 and 1984) from the nesting sites in Mexico (NMFS AND USFWS 1993). Hawksbills are observed in Florida with some regularity on the reefs off Palm Beach County and in the Florida Keys. Texas is the only other state where hawksbills are sighted with any regularity. Most sightings involve post hatchlings and juveniles, which are believed to originate from nesting beaches in Mexico (NMFS AND USFWS 1993).

V. EFFECTS ANALYSIS

The potential exists that any of the endangered or threatened species listed in the previous section may be present in the project area during proposed construction activities. However, while individuals may be affected by the proposed construction activities, whole populations would not be adversely affected by implementation of the TSP. The implementation of TSP features (i.e., marsh restoration, shoreline protection, chenier reforestation, and hydraulic and salinity control features) could impact the piping plover, rufa red knot, Sprague's pipit, West Indian Manatee, Gulf sturgeon and sea turtles but is not expected to impact the RCW.

Red-cockaded Woodpecker (*Picoides borealis*)

The NED construction activities would be rather small and localized such as the raising of homes or construction of small berms on developed land. Although the red-cockaded woodpecker may occur in Calcasieu Parish, it is unlikely to be impacted by any SWC TSP features as the habitat it is dependent upon is found in the far north of the parish and near the project features.

Due to the lack of old pine forests near the project features, it is the USACE's determination that the TSP is expected to have *"no effect"* on the RCW.

Piping Plover (*Charadrius melodus*)

The TSP would involve activities in the critical habitat of the piping plover. However, the activities are temporary and minimal (temporary placement of pipeline on the surface) and therefore it is the USACE's determination that the proposed TSP would constitute a *"may affect, but will not likely adversely affect"* determination for the species and its critical habitat. Potential project-induced impacts may result from incidental interaction with the piping plover during the following construction activities: marsh restoration features 47a1, 47a2, and 47c1 would temporarily utilize Gulf of Mexico shoreline for the placement of pipeline to deliver offshore sediment to the onshore marsh restoration areas. Approximately 0.14 acres (200 feet long by 30 feet wide) of critical habitat is expected to be impacted temporarily by these three measures. Another feature that would also temporarily utilize Gulf of Mexico shoreline for temporary pipeline placement is 124c, approximately 0.34 acres (500 feet long by 30 feet wide) of critical habitat is expected to be impacted. Due to their mobility, piping plovers would be able to avoid the aforementioned small areas of temporary disturbance by using abundant adjacent areas for foraging and roosting. Additionally, there is a considerable amount of critical habitat area within the SWC project area that could be utilized (see **Figure 4-1**).

All harmful activities (e.g., pipeline crossings) could be temporarily suspended until the bird(s) moves out of the project area. Any disturbance to the piping plover would be temporary during construction activities, and would result in temporary displacement. The piping plover would likely move and relocate to other nearby areas for foraging or roosting purposes.

Construction of the TSP is anticipated to begin in 2025, and would last up to ten years. During construction of the TSP, construction activities would include placement of hydraulically-dredged material for marsh restoration features. A marsh buggy would be used to place the pipeline across the beach. The noise and disturbance during construction activities would cause the displacement of wildlife in the construction area and nearby vicinity.

Rufa red knot (*Calidris canutus rufa*)

The TSP would involve activities in suitable habitat of the rufa red knot. However, the activities would be temporary and minimal and therefore it is the USACE's determination that the

proposed TSP would constitute a *"may affect, but will not likely adversely affect"* determination for the species. Potential project-induced impacts may result from incidental interaction with the rufa red knot during the following construction activities: marsh restoration features 47a1, 47a2, and 47c1 would temporarily utilize Gulf of Mexico shoreline for the placement of pipeline to deliver offshore sediment to the onshore marsh restoration areas. Approximately 0.14 acres (200 feet long by 30 feet wide) of shoreline habitat is expected to be impacted temporarily by these three measures. Other features that would also temporarily utilize Gulf of Mexico shoreline for temporary pipeline placement are: 124c, approximately 0.34 acres of suitable habitat is expected to be impacted; 306a1 and 127c3, approximately 1.10 acres of suitable habitat is expected to be impacted. Due to their mobility, rufa red knots would be able to avoid the aforementioned small areas of temporary disturbance by using abundant adjacent areas for foraging and roosting. Additionally, there is a considerable amount of habitat within the SWC project area that could be utilized (see **Figure 4-1**).

Because the piping plover and rufa red knot share similar foraging/roosting behaviors and utilize similar coastal habitats within Louisiana, the effects of the action would be very similar for both species.

Sprague's Pipit (*Anthus spragueii*)
The USACE has determined that the proposed TSP would constitute a *"may affect, but will not likely adversely affect"* determination for candidate species, Sprague's pipit. Depending on final designs of the NED TSP, potential indirect and minimal impacts could occur to the species. These impacts would include the temporary displacement of any birds that may be present due to construction activity and noise. The NER TSP could cause minimal indirect impacts to the species, if present during planting operations on chenier grasslands. It is assumed that the birds would relocate to adjacent or nearby suitable foraging/roosting areas.

West Indian Manatee (*Trichechus manatus*)
Due to the rarity of the manatee within the project area, MVN concludes that the proposed action *"may affect, but will not likely adversely affect"* the West Indian manatee. However, should any manatees be encountered during the proposed activities, an on-board observer would notify the proper personnel, and harmful activities (e.g., dredging) would be temporarily suspended until the animal(s) moves out of the project area. Any disturbance to the manatee would only be temporary during construction activities, and would result in temporary displacement. The manatees would likely move and relocate to other nearby areas for foraging or resting purposes.

Because the West Indian manatee may occur in the project area, the Contractor shall instruct all personnel associated with the project of the potential presence of manatees in the area, and the need to avoid collisions with these animals. All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the MMPA of 1972 and the ESA of 1973. The Contractor shall be held responsible for any manatee harmed, harassed, or killed as a result of construction activities not conducted in accordance with these specifications. See **Annex B** for special operating conditions if manatees are present in the project area.

Gulf Sturgeon
Due to the rarity of the Gulf sturgeon within the project area, MVN concludes that the proposed action *"may affect, but will not likely adversely affect"* the Gulf sturgeon. However, all contract personnel associated with the project would be informed of the potential presence of Gulf

sturgeon and best management practices (**Annex B**) would be implemented to avoid impacts to the listed species.

Sea Turtles
It is anticipated that the contractor will utilize a hydraulic cutterhead dredge and booster pump(s) to excavate sediment from available offshore borrow area(s) and then transport it through a submerged sediment pipeline to the marsh restoration areas. Hopper dredges are not being proposed. Incidental takes of sea turtles have only been documented from hopper dredge operations that use trailing suction dragheads. Thus far, no incidental takes of sea turtles have been reported from clamshell (mechanical dredge), pipeline cutterhead (hydraulic dredge), or other types of dredges operating in southeastern coastal channels. Operational differences between these dredge types contribute to the differences in potential impacts to sea turtles. The relatively slow dredging motion of clamshell and pipeline dredges present minimal risk for sea turtle takes (Diskerson et al. 2004). Environmental laws protecting sea turtles could require the cessation of work for a limited time if the allowable number of sea turtle mortalities is exceeded during dredging. Additionally, sediment used to construct the containment dikes will be dredged from existing material inside the marsh creation area rather than from offshore borrow areas and therefore dredging operations associated with containment dikes are not expected to adversely impact sea turtles.

By implementing the above-mentioned monitoring and avoidance program, it is the USACE's determination that the proposed TSP plan *"may affect, but will not likely adversely affect"* some sea turtles and have *"no effect"* on others.

Green Sea Turtle (*Chelonia mydas*)
Due to the lack of extensive seagrass beds in and near the project area, the lack of major nesting colonies along coastal Louisiana, and the low incidence of sightings and strandings along coastal Louisiana (NMFS 1991), it is the USACE's determination that the TSP is expected to have *"no effect"* on the green sea turtle population.

Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)
The proposed wetland restoration/nourishment and shoreline protection features would provide a more suitable inshore foraging habitat (i.e., characterized by low salinity, high turbidity, and high organic content – where shrimp and blue crabs are abundant) for this species (NMFS and USFWS 1992a). Given the Kemp's ridley sea turtle has been found along Louisiana's coast, it is possible that the dredging of borrow material for the marsh creation features would have an effect; however, the Kemp's ridley sea turtle would likely avoid the borrow areas during construction. It is the USACE's determination that the proposed TSP plan *"may affect, but will not likely adversely affect"* the Kemp's Ridley sea turtle population.

Leatherback Sea Turtle (*Dermochelys coriacea*)
Leatherback sea turtles occur mostly in continental shelf waters more than 164 feet (50 meters) in depth and are uncommon in shallow Gulf of Mexico waters along Louisiana. There are no known nesting records for this species reported for Louisiana (NMFS and USFWS 1992b). Therefore, it is the USACE's determination that the TSP is expected to have *"no effect"* on the leatherback sea turtle population.

Loggerhead Sea Turtle (*Caretta caretta*)
The project area does not contain suitable nesting habitat and no suitable habitat will be created by the TSP. Loggerhead sea turtle Critical Habitat (*Sargassum* habitat) exists in the southern

(offshore) portion of the SWC project area (see Figure 4-2). The closest proximity the critical habitat comes to the shoreline is approximately 4 miles. Given the location of the loggerhead sea turtle's Critical Habitat (*Sargassum* habitat), and the fact that dredging activities would be limited to approximately 3 miles offshore avoiding impacts to critical habitat, it is the USACE's determination that the proposed TSP would have "no effect" on loggerhead critical habitat. The loggerhead sea turtle would likely avoid the borrow areas during construction minimizing the potential of impacts to the species. It is the USACE's determination that the proposed TSP plan *"may affect, but will not likely adversely affect"* the loggerhead sea turtle population.

Hawksbill Sea Turtle (*Eretmochelys imbricata*)
Due to its rarity along the Louisiana coast and its preference for nesting on beaches in Puerto Rico and the U.S. Virgin Islands (NMFS AND USFWS 1993), it is the USACE's determination that the TSP is expected to have *"no effect"* on the hawksbill sea turtle population.

Effects on Other Species of Concern
MVN has assessed the environmental impacts of the proposed action on species found in the project area that are protected under the MMPA of 1972, the MBTA of 1918, and the Migratory Bird Conservation Act of 1929.

MVN has determined that, with use of guidelines from USFWS and nesting bird abatement plan (if necessary), the proposed action would have no adverse impacts on protected birds (see **Section IV** for discussions on colonial nesting birds and shore birds).

MVN has determined that, with use of the best management practices (**Annex B**) established in coordination with NMFS, the proposed action would have no adverse impacts on bottlenose dolphins (see **Section IV** for discussions on bottlenose dolphins).

VI. CONCLUSION AND DETERMINATION OF EFFECTS

Based on the above information, the MVN has determined that the proposed action *"may affect but will not likely adversely affect"* the piping plover or it's critical habitat, red knot, West Indian manatee, Gulf sturgeon, loggerhead and Kemps Ridley sea turtles; would have no effect on the Red-cockaded woodpecker, green, leatherback, and hawksbill sea turtles or loggerhead critical habitat and would not adversely impact other species of concern that could potentially be found in the project area. MVN requests your concurrence on the aforementioned determinations.

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Annex B

Special Operating Conditions

and

Best Management Practices

Special Operating Conditions If Manatees Are Present in the Project Area:

(1) If a manatee(s) is sighted within 100 yards (91 m) of the project area, all appropriate precautions shall be implemented by the Contractor to ensure protection of the manatee. These precautions shall include the operation of all moving equipment no closer than 50 ft (15.2 m) of a manatee. If a manatee is closer than 50 ft (15.2 m) to moving equipment or the project area, the equipment will be shut down and all construction activities will cease to ensure protection of the manatee. Construction activities will not resume until the manatee has departed and the 50-foot (15.2 m) buffer has been re-established.

(2) If a manatee(s) is sighted in the project area, all vessels associated with the project shall operate at "no wake/idle" speeds at all times while in waters where the draft of the vessel provides less than a four-foot (1.2 m) clearance from the bottom, and vessels will follow routes of deep water whenever possible. Boats used to transport personnel shall be shallow-draft vessels, preferably of the light displacement category, where navigational safety permits.

(3) If siltation barriers are used, they will be made of material in which manatees cannot become entangled, are properly secured, and are regularly monitored to avoid manatee entrapment.

(4) Manatee Signs. Prior to commencement of construction, each vessel involved in construction activities shall display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8-1/2" x 11" (21.6 x 27.9 cm) reading, "CAUTION: MANATEE HABITAT/IDLE SPEED IS REQUIRED IN CONSTRUCTION AREA." In the absence of a vessel, a temporary 3' x 4' (0.9 x 1.2 m) sign reading "CAUTION: MANATEE AREA" will be posted adjacent to the issued construction permit. A second temporary sign measuring 8-1/2" x 11" (21.6 x 27.9 cm) reading "CAUTION: MANATEE HABITAT. EQUIPMENT MUST BE SHUT DOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION" will be posted at the dredge operator control station and at a location prominently adjacent to the issued construction permit. The Contractor shall remove the signs upon completion of construction.

Protected Marine Species Entrapment Prevention Measures

Bottlenose dolphins, sea turtles and Gulf sturgeon (NOAA Trust Species) are known to inhabit coastal Louisiana waters. Bottlenose dolphins are protected under the Marine Mammal Protection Act of 1972 (MMPA) and sea turtles and Gulf sturgeons are protected under the Endangered Species Act (ESA). Because of the potential for these protected species to become entrapped within construction sites in coastal Louisiana waters, projects that utilize shallow open water areas for the construction of enclosed facilities and wetland creation will utilize the following measures to minimize and/or prevent the potential for such entrapment:

1. Prior to construction, the Corps of Engineers (COE) Technical Manager, the Contracting Officer Representative (COR) and the Contractors should conduct a site visit and meeting to develop a mutual understanding relative to compliance with the MMPA and the ESA.

2. Contractors will instruct all personnel associated with the project of the potential presence of Trust Species in the area, and the need to prevent entrapment of these animals. All construction personnel will be advised that there are civil and criminal penalties for harming, harassing, or killing these protected species. The Contractor shall be held responsible for any Trust species harassed or killed as a result of construction activities not conducted in accordance with these specifications.

3. Contractor will observe the area to be enclosed for Trust Species at least 24 hours prior to and during closure of any levee, dike or structure. This is best accomplished by small vessel or aerial surveys, with at least two experienced marine observers on board scanning for Trust species. Large areas (e.g. >300 acres) will likely require the use of more than one vessel or aerial surveys to insure full coverage of the area. These surveys will occur in a best sea state (BSS) of 3 feet or less, as Trust species are difficult to sight in choppy water.

4. Any Trust Species sighted within the area to be enclosed triggers all appropriate precautions to be implemented by the Contractor to ensure protection of the animal(s). These precautions shall include avoiding direct contact with the Trust species.

5. Any sightings of Trust Species within an enclosed project site shall be reported immediately to the COE. The point of contact within the COE will be Tammy Gilmore, (504) 862-1002 or email at tammy.h.gilmore@usace.army.mil. Coordination by the COE personnel with the National Marine Fisheries Service (NMFS) Marine Mammal Health and Stranding Response (MMHSRP) and the Louisiana State Coordinator for the Sea Turtle Stranding and Salvage Network (STSSN) will be conducted, as applicable, to determine what further actions may be required.

6. During enclosure construction, the Contractor will leave or construct at least one escape route in retention structures to allow any Trust species to exit shallow open water areas during construction activities. Escape routes in retention structures would be constructed to lead directly to open water outside the disposal site with a minimum width of 100 feet and have a depth as deep as the deepest natural entrance into the disposal site.

7. Escape routes in retention structures would remain open until visual inspections of the enclosure have determined that no Trust species are present within the structure.

8. If observers note entrapped animals are not leaving the area, but are visually disturbed, stressed, or their health is compromised then COE may require any pumping activity to cease until the animals either leave on their own or are moved under the direction of NMFS.

    a. In coordination with the local stranding networks and other experts, NMFS will conduct an initial assessment to determine the number of animals, their size, age (in the case of dolphins), body condition, behavior, habitat, environmental parameters, prey availability and overall risk.
    b. If the animal(s) is/are not in imminent danger they will need to be monitored by the Stranding Network for any significant changes in the above variable.
    c. The contractor may not attempt to scare, herd, disturb, or harass the Trust species to encourage them to leave the area. Coordination by the COE with the NMFS SER Stranding Coordinator may result in authorization for these actions.
    d. NMFS may intervene (catch and release and/or rehabilitate) if the Trust Species are in a situation that is life threatening and evidence suggests the animal is unlikely to survive in its immediate surroundings.
    e. Surveys will be conducted throughout the area at least twice or more in calm surface conditions (BSS 3 feet or less), with experienced marine observers, to determine whether Trust species are no longer present in the area.

9. Any Trust Species observed dead must immediately be reported to the COE (Tammy Gilmore 504-862-1002) who will then report to NMFS and/or STSSN coordinator.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

F/SER31: MSP

JAN 2 6 2016

Chief, New Orleans Environmental Branch
New Orleans District Corps of Engineers
Department of the Army
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Sir or Madam:

This letter responds to your request for consultation with us, the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act (ESA) for the following action.

Project Name	Action Agency	SER Number	Project Type
Southwest Coastal Louisiana Project	U.S. Army Corps of Engineers (USACE)	SER-2015-16539	Marsh creation, dredging, and shoreline stabilization

Consultation History
We received your letter requesting consultation on March 12, 2015. We requested additional information on April 22, 2015, and September 17, 2015. We received a final response on October 26, 2015, and initiated consultation that day.

Project Locations

Address	Latitude/Longitude	Water body
Southwest Louisiana – areas accessible to NMFS regulated species include the waters offshore Cameron, Calcasieu and Vermilion parishes	Borrow Areas: • 124c borrow: 29.721314°N, 93.407697°W • 47a1, 47a2, 47c1 borrow: 29.666989°N, 92.963161°W • 127c3 and 306a1 borrow: 29.502422°N, 92.251978°W • Northern channel borrow: 30.097261°N, 93.32545°W • Center channel borrow: 29.938553°N, 93.338578°W • Southern channel borrow: 29.766189°N, 93.345331°W Shoreline Protection • 5a: 29.766392°N, 93.405708°W • 6b1: 29.670056°N, 92.856256°W • 6b2: 29.610561°N, 92.703236°W • 6b3: 29.579997°N, 92.582208°W 16b: 29.747592°N, 92.218825°N (North American Datum 1983)	Gulf of Mexico and Calcasieu Ship Channel

Image of the borrow area and shoreline protection locations and surrounding area (©2013Google) (BA = borrow areas; SPA = shoreline protection areas).

Existing Site Conditions

According to the USACE, the Louisiana shoreline is currently degrading at a rate estimated to be equivalent to a football field an hour. This is resulting in an extensive loss of marsh habitat. Numerous restoration projects have occurred along the Louisiana coast to armor shorelines against future erosion from wave action, and to create and restore interior marshes. The applicant states that the sediments within the borrow and the shoreline protection areas are composed primarily of silt, clay, and sand. There are no seagrasses, sponges, or corals within the borrow sites or shoreline protection areas.

Project Description

The Southwest Coastal Louisiana Project is designed to provide hurricane and storm damage risk reduction, as well as coastal ecosystem restoration in the southwest portion of Louisiana. The proposed project includes potential implementation of non-structural storm damage reduction measures (i.e., raising buildings, flood-proofing) in developed upland locations. The proposed project also includes numerous coastal restoration elements:

- 9 marsh restoration features
- 35 chenier[1] reforestation features
- 5 shoreline protection features
- 1 hydrologic/salinity control feature

The proposed non-structural storm damage and chenier reforestation reduction measures are located in upland areas. The proposed hydrologic/salinity control feature is located in an interior waterbody over 10 miles (mi) from the Gulf of Mexico.

The proposed project also includes wetland restoration and creation in 9 interior locations. Marshes will be created with material obtained from offshore borrow areas using only hydraulic dredges. The dredged material (a mixture of silt, clay, and sand) will be transported by submerged pipeline to interior marsh creation/restoration areas. The applicant states that the total volume to be hydraulically dredged is 63,928,988 cubic yards (yd^3). There are 3 borrow areas located in the Gulf of Mexico; these sites will be dredged to a depth of 15 feet (ft) below the mudline with side slopes of no less than a 4H:1V ratio to minimize the potential for the formation of hypoxic conditions. The applicant states that dredged material generated from USACE maintenance dredging of the federally-authorized Calcasieu Ship Channel (CSC) will also be used as sediment for marsh creation sites.

The proposed project also includes construction of approximately 47.64 mi of segmented (i.e., not continuous) shoreline protection along 5 separate reaches of the Gulf of Mexico shoreline. Rock will be placed parallel to shore using a barge-mounted crane. Approximately 2,083 acres (ac) of temporary access canals will be dredged by clamshell/bucket dredges to allow barge access to place the rock material. Locations for shoreline protection are shown in the image above and listed below:

- 5a Holly Beach shoreline stabilization
- 6b1 Gulf shoreline restoration – Calcasieu River to Freshwater Bayou
- 6b2 Gulf shoreline restoration – Calcasieu River to Freshwater Bayou
- 6b3 Gulf shoreline restoration – Calcasieu River to Freshwater Bayou
- 16b Intracoastal shoreline stabilization - Freshwater Bayou to Gulf Intracoastal Waterway

Construction Conditions
Construction is anticipated to begin in 2025, and could last up to 10 years. The applicant proposes to adhere to the following operating conditions and best management practices:

- Shoreline protection will be constructed in segments each measuring 280 ft long with 175-ft wide gaps between each segment.
- Prior to the start of mechanical dredging activities, the contractor will be required to drop the bucket (or similar equipment) into the water and retrieve it empty once. After the bucket has been dropped and retrieved, a 1-minute, no-work period will be observed. During this no-work period, personnel will carefully observe the work area in an effort to visually detect listed species. If listed species are sighted, no bucket dredging will be initiated until the listed species have left the work area. If the water turbidity makes such visual sighting impossible, work will proceed after the 1-minute no-work period has elapsed. If more than 15 minutes elapses with no work, then the empty bucket drop/retrieval process will be performed again prior to construction commencing.
- Hydraulic dredging would be limited to the borrow areas located approximately 3 mi offshore avoiding impacts to Loggerhead critical habitat (LOGG-S-02), which contains *Sargassum* habitat.

Effects Determinations for Species the USACE or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status	USACE Effect Determinations	NMFS Effect Determinations
Sea Turtles			
Kemp's ridley	E	NLAA	NLAA
Loggerhead (Northwest Atlantic Ocean distinct population segment [DPS])	T	NLAA	NLAA
Fish			
Gulf sturgeon (Atlantic sturgeon, Gulf subspecies)	T	NLAA	NP
E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; NP = not present			

Critical Habitat
The project is not located in designated critical habitat, and there are no potential routes of effect to any designated critical habitat.

Analysis of Potential Routes of Effects to Species
The proposed non-structural storm damage reduction and chenier reforestation measures will not have effects on resources managed under the ESA due to the location of these activities in uplands. The proposed hydrologic/salinity control feature is located in an interior waterbody over 10 miles from the Gulf of Mexico and ESA-listed species managed by NMFS are not likely to be found in the project area. Therefore, these proposed features are not analyzed in this consultation.

Marsh creation activities will occur in interior wetland locations which are not accessible to sea turtles and therefore the marsh creation and placement of dredged material in these areas will not be analyzed further.

The proposed use of dredged material from the CSC has been previously considered under the Gulf of Mexico Regional Biological Opinion (GRBO). The GRBO evaluated the effects of maintenance dredging within authorized federal navigation channels. Therefore, all aspects of on-going maintenance dredging of the CSC are evaluated under the GRBO. This consultation evaluates those portions and effects of the project not covered in the GRBO, as well as any potential cumulative and indirect effects to the species that may result from the additional project components. We do not anticipate any additional synergistic effects would result from the proposed use of dredged material from the CSC for the purpose of marsh creation and restoration. The applicant does not propose any additional maintenance dredging in the CSC as part of the proposed action, and the marsh creation activities will occur in interior locations not accessible to sea turtles. Accordingly, the proposed use of these CSC borrow areas is not analyzed further in this consultation.

The use of hydraulic dredges and mechanical dredges to generate sediment for marsh creation and construct temporary channels to allow equipment access to shoreline protection sites may affect sea turtles by injury or death as a result of interactions with mechanical and cutterhead dredging equipment, rock placement or barges. We believe the chance of effects from interactions with these activities is discountable. NMFS has previously determined in Biological Opinions that non-hopper type dredging methods (e.g., mechanical, clamshell/bucket, cutterhead, pipeline, and sidecast dredging) are unlikely to adversely affect motile listed species, and deems the risk of interactions with motile protected species to be discountable. NMFS has no new information that would change the basis of our conclusion.

Mechanical dredging or the placement of rock has the potential to kill or injure sea turtles if the bucket or rock is dropped onto a sea turtle that enters the dredging area and is directly beneath the bucket when it is dropped. NMFS believes this risk is extremely low and discountable as sea turtles are highly mobile and are likely to avoid the active construction area.

While dredging may result in temporary and localized increases in turbidity, we believe any risk of injury due to increased turbidity is insignificant. The existing borrow site conditions are normally highly turbid, and we anticipate that increased turbidity would occur only temporarily in the immediate vicinity of dredging areas. We anticipate any increase in turbidity would not be measurable and therefore is insignificant.

The project may affect sea turtles by reducing forage resources through dredging activities and the installation of breakwaters. However, it is extremely unlikely that sea turtles use the project area for foraging due to the naturally occurring turbid characteristics of the water and the lack of seagrasses and other forage resources used by sea turtles. Additionally, there are large expanses of similar habitat nearby, and throughout the Gulf of Mexico. Therefore, we believe this effect will be discountable.

Conclusion

Because all potential project effects to listed species were found to be discountable, insignificant, or beneficial, we conclude that the proposed action is not likely to adversely affect listed species under NMFS's purview. This concludes your consultation responsibilities under the ESA for species under NMFS's purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. NMFS's findings on the project's potential effects are based on the project description in this response. Any changes to the proposed action may negate the findings of this consultation and may require reinitiation of consultation with NMFS.

We have enclosed additional relevant information for your review. We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions on this consultation, please contact Michelle Press, Consultation Biologist, at (727) 209-5977, or by email at Michelle.Press@noaa.gov.

Sincerely,

for Roy E. Crabtree, Ph.D.
Regional Administrator

Enc.: 1. *Sea Turtle and Smalltooth Sawfish Construction Conditions* (Revised March 23, 2006)
2. *PCTS Access and Additional Considerations for ESA Section 7 Consultations* (Revised March 10, 2015)

File: 1514-22.F.6

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

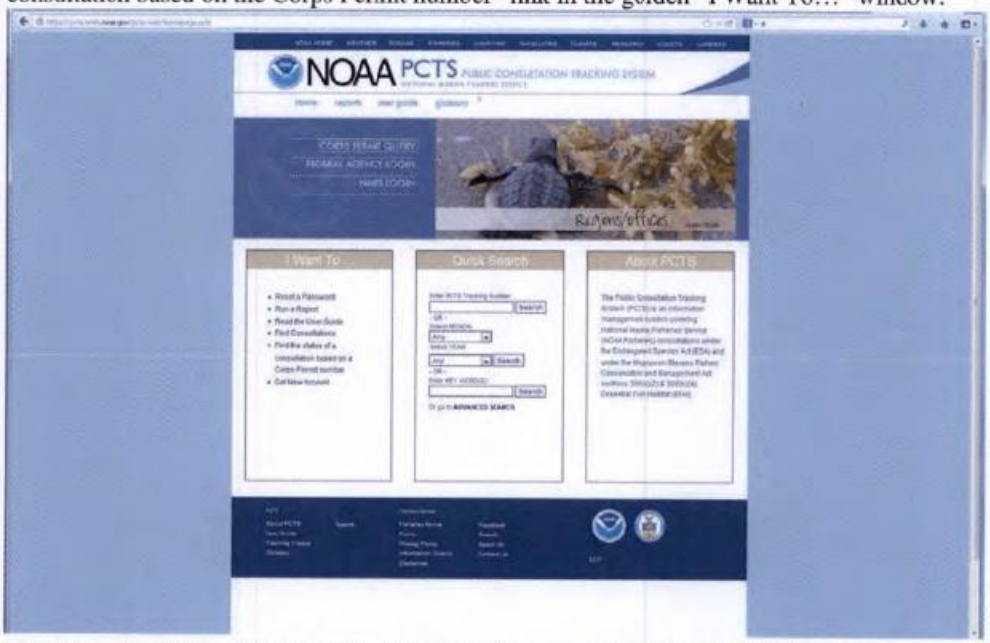
g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006

PCTS Access and Additional Considerations for ESA Section 7 Consultations
(Revised 03-10-2015)

Public Consultation Tracking System (PCTS) Guidance: PCTS is a Web-based query system at **https://pcts.nmfs.noaa.gov/** that allows all federal agencies (e.g., U.S. Army Corps of Engineers - USACE), project managers, permit applicants, consultants, and the general public to find the current status of NMFS's Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations which are being conducted (or have been completed) pursuant to ESA Section 7 and the Magnuson-Stevens Fishery Conservation and Management Act's (MSA) Sections 305(b)2 and 305(b)(4). Basic information including access to documents is available to all.

The PCTS Home Page is shown below. For USACE-permitted projects, the easiest and quickest way to look up a project's status, or review completed ESA/EFH consultations, is to click on either the "Corps Permit Query" link (top left); or, below it, click the "Find the status of a consultation based on the Corps Permit number" link in the golden "I Want To…" window.



Then, from the "Corps District Office" list pick the appropriate USACE district. In the "Corps Permit #" box, type in the 9-digit USACE permit number identifier, with no hyphens or letters. Simply enter the year and the permit number, joined together, using preceding zeros if necessary after the year to obtain the necessary 9-digit (no more, no less) number. For example, the USACE Jacksonville District's issued permit number SAJ-2013-0235 (LP-CMW) must be typed in as 201300235 for PCTS to run a proper search and provide complete and accurate results. For querying permit applications submitted for ESA/EFH consultation by other USACE districts, the procedure is the same. For example, an inquiry on Mobile District's permit MVN201301412 is entered as 201301412 after selecting the Mobile District from the "Corps District Office" list. PCTS questions should be directed to Kelly Shotts at Kelly.Shotts@noaa.gov or (727) 551-5603.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to Section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA Section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA Section 101 (a)(5) is necessary. Please contact NMFS' Permits, Conservation, and Education Division at (301) 713-2322 for more information regarding MMPA permitting procedures.

SOUTHWEST COASTAL LOUISIANA INTEGRATED FINAL FEASIBILITY REPORT AND ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex L

Adaptive Management and Monitoring Plan

INTRODUCTION

Wetland loss in Southwest Louisiana experienced approximately 20 percent of the total wetland loss observed in Louisiana from 1932-2010 (Couvillion et al., 2011). The processes of sea level rise, ground subsidence, saltwater intrusion, and erosion of wetlands have caused significant adverse impacts to the study area (Figure 1). The continued land loss and ecosystem degradation threaten the productivity of the Southwest's ecosystems, the economic viability of its industries, and the safety of its residents. Without action, this highly productive coastal ecosystem, composed of diverse habitats and wildlife, is not sustainable. The goal of the Southwest Coastal Louisiana Feasibility Study is to develop a comprehensive plan for Southwest Louisiana for that will provide hurricane storm surge damage risk reduction and provide coastal restoration measures to achieve ecosystem sustainability.

Initially, two separate studies were underway in the Southwest Coastal project area—one for coastal restoration under the LCA program and one for hurricane risk reduction following the impacts of Hurricane Rita in 2005. Recognizing the importance of coastal restoration for hurricane risk reduction and to reduce redundancies, the two projects were integrated. The Southwest Coastal project will produce both a National Economic Development (NED) plan for hurricane storm surge risk reduction and a National Ecosystem Restoration (NER) plan for ecosystem restoration. Please refer to Chapter 1 Section 7 of the Final Integrated Feasibility Report and PEIS for additional information on the authorities for the Southwest Coastal Study.

Since the restoration in the Southwest Coastal area is a large-scale project that may influence regional conditions, an Adaptive Management and Monitoring (AM&M) Program will be implemented before, during, and after construction. Such monitoring will allow the USACE to assess the progress of restoration and will provide the necessary information to adjust project performance through adaptive management (AM), if necessary, to better meet project goals and objectives, and will ultimately provide information to better design and maintain coastal resources in the future.

In accordance with the Water Resources Development Act of 2007 Section 2036, Section 2039 and subsequent implementation guidance (CECW-PB Memorandum dated August 31, 2009), AM&M are required for both National Ecosystem Restoration (NER) project components and for any Mitigation Plan required for the National Economic Development (NED) component. This AM&M Plan describes the monitoring design proposed to evaluate NER project progress towards meeting the restoration objectives, describes the organizational structure for the AM&M process, identifies key uncertainties, and describes potential AM actions. A separate plan is not needed for the NED since mitigation is not currently anticipated to be required.

Many factors such as ecosystem dynamics, engineering applications, institutional requirements, and many other key uncertainties can change and/or evolve over a project's life. The AM&M Plan will be regularly updated to reflect monitoring-acquired and other new information as well as resolution of and progress on resolving existing key uncertainties or identification of any new uncertainties that might emerge. Specifically, this AM&M Plan will be revised and updated and project measure specific plans developed during the feasibility level of design phase and further in the pre-construction engineering and design (PED) phase as more detailed project designs are developed and uncertainties are better understood. The AM&M plan will then be used during and after project construction to adjust the project, as necessary, to better achieve goals, objectives, and restoration/management outputs/results.

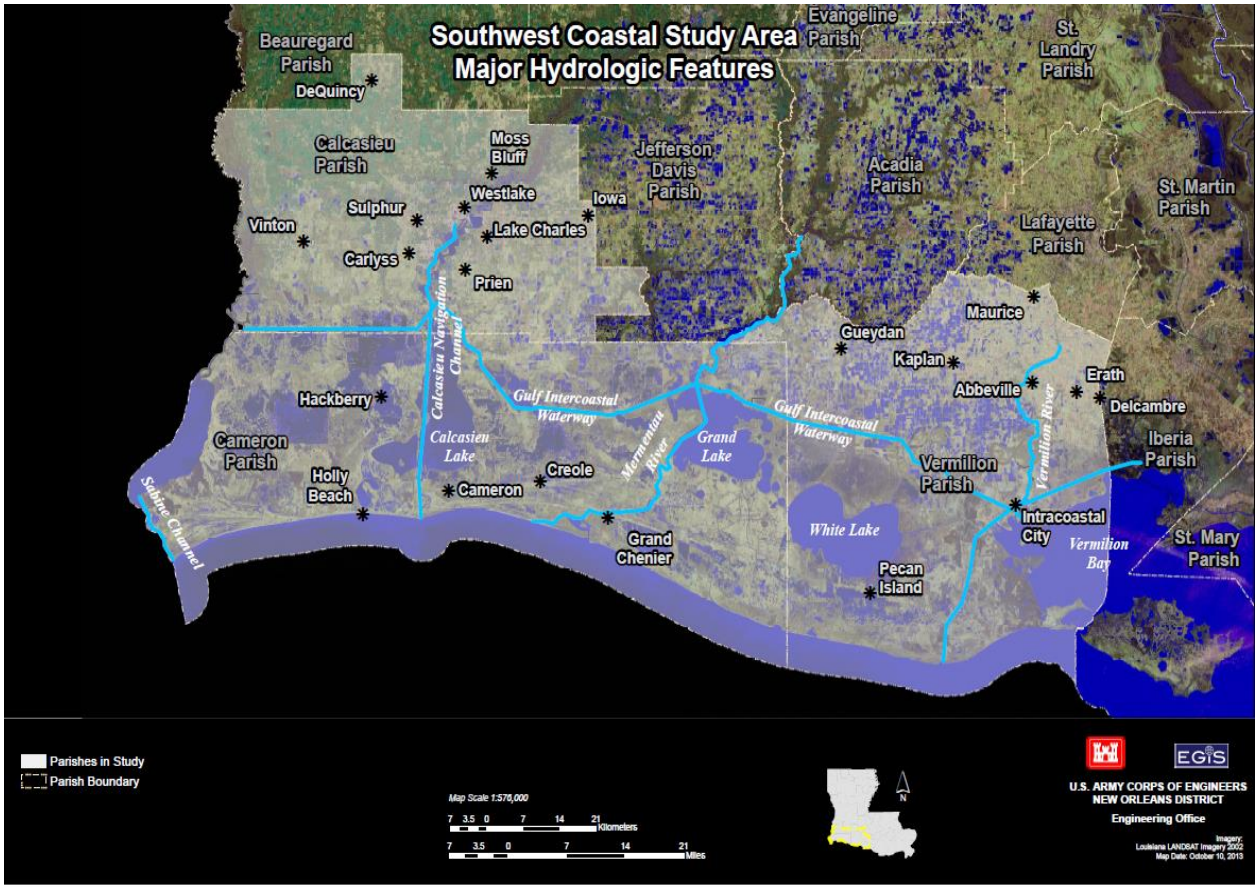


Figure 1: Southwest Coastal Louisiana study area.

Introduction to Adaptive Management and Monitoring

Adaptive Management and Monitoring (AM&M) provides a directed iterative approach to achieving restoration project goals and objectives by focusing on strategies promoting flexible decision making that can be adjusted in the face of uncertainties as outcomes from restoration management actions and other events become better understood. Initiating a formal AM&M process early in the study process enables the Project Delivery Team (PDT) to identify and resolve key uncertainties and other potential issues that can positively or negatively influence project outcomes during every stage of the planning and project implementation process. Hence, early implementation of AM and monitoring will result in a project that can better succeed under a wide range of uncertain conditions and can be adjusted as necessary. Furthermore, careful monitoring of project outcomes both advances scientific understanding and helps adjust policies and/or operations as part of an iterative learning process (National Research Council 2004).

Learning from the management experience is certainly not a new idea; but the purposeful and systematic pursuit of knowledge to address identified uncertainties has rarely been practiced. Adaptive management acknowledges the uncertainty about how ecological systems function and how they may respond to management actions. Nevertheless, AM is not a random trial-and-error process; it is not ad-hoc or simply reactionary. An essential element of AM is the development and execution of a monitoring and assessment program to analyze and understand responses of the system to implementation of the project as restoration progresses. The AM&M Program for the Southwest Coastal Project Ecosystem Restoration/NER components was developed and will be used to:

- Allow scientists and managers to collaboratively design plans for managing complex and incompletely understood ecological systems
- Reduce uncertainty over time
    - Acknowledgement, identification, and characterization of risks and uncertainties

    - Uncertainty can be analyzed and exploited to identify key gaps in information and understanding
- Implement systematic monitoring of outcomes and impacts
    - Scientific information obtained through continued monitoring is used to evaluate and manage uncertainties to achieve desired goals and objectives
    - Explicitly stated goals and measurable indicators of progress toward those goals
    - Demonstrate to others that the project is meeting or exceeding performance goals; "ecological success"
    - Detect detrimental system responses as early as possible in order to minimize the adverse effects of these responses
    - Evaluate hypotheses and performance measures and revise conceptual ecological models as appropriate
- Incorporate an iterative approach to decision-making
    - The monitoring data is used to influence future management decisions
    - Feedback loops are developed so that monitoring and assessment produce continuous and systematic learning that in turn is incorporated into subsequent decision-making
    - Projects and programs can be implemented in phases to allow for course corrections based on new information to allow for management flexibility
- Provide a basis for identifying options for improvements in the design, construction and operation of Southwest Coastal Restoration through AM
- Develop reports on the status and progress of the Southwest Coastal Restoration for the agencies involved, the public, Congress, and stakeholders
- Enhance predictive capability through improvements in simulation models before and after project construction
- Provide information to summarize and develop lessons learned to optimize restoration strategies in the future; "lessons learned"
- Ensure interagency collaboration and productive stakeholder participation as they are key elements to success. AM encourages defining agency objectives for stakeholder involvement, deciding upon a strategy for stakeholder involvement, clearly communicating this to the public, and maintaining long-term collaboration among stakeholders. Continued communication with key stakeholders helps identify and reduce socio-economic uncertainties, measure project progress towards objectives, and adaptively manage projects (Knight *et al.*, 2008, Smith *et al.*, 2009, Nkhata and Breen 2010)

1.1 Adaptive Management and Monitoring Process

The developed AM&M program and process is complimentary to the USACE Project Life Cycle (planning, design, construction and operation and maintenance). The AM&M process is not elaborate or duplicative and enhances activities that already take place. The basic process of AM&M for USACE projects (Figure 2) was adapted from the DRAFT USACE Adaptive Management Technical Guide (USACE 2011) and includes:

- **Planning** a program or project;
- **Designing** the corresponding project;
- **Building** the project (construction and implementation);
- **Operating** and maintaining the project; and
- **Monitoring** and **assessing** the project performance;
- **Continue** project implementation as originally designed; or
- **Adjust** the project if goals and objectives are not being achieved
- **Complete** project if goals and objectives and success criteria are achieved, or it is determined the project has successfully produced the desired outcomes
- Project **Termination** is possible if project goals and objectives are not being achieved and the decision is made not to adjust the project or no adjustments are possible

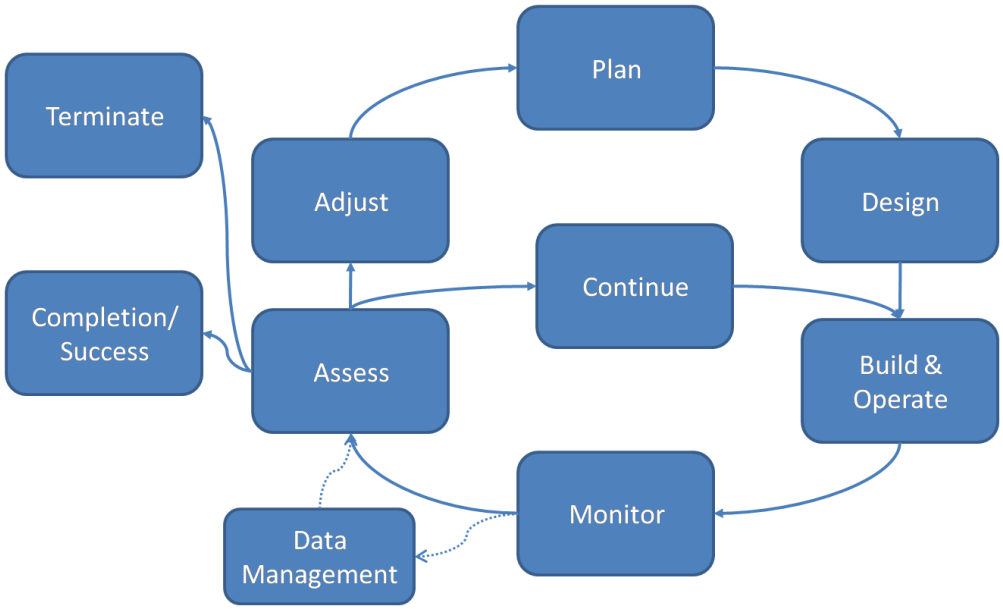


Figure 2: Adaptive management monitoring and process for the USACE Civil works.

1.2 Authorization and Implementation Guidance

Section 2039 of the Water Resources Development Act (WRDA) of 2007 and implementation guidance for Section 2039, in the form of a CECW-PB Memo dated 31 August 2009; require ecosystem restoration projects to develop a plan for monitoring the success of the ecosystem restoration and to develop an AM Plan (contingency plan).

The Monitoring Plan

The purpose of the Monitoring Plan is to assess performance and determine the ecological success of the restoration and management measures.

- Specifically, the Monitoring Plan will assess project performance towards the particular objectives developed for the project. (Project Objectives are specified in Chapter 2 Section 2.1 of the main report.)
- The plan must specify the nature, duration, and periodicity of monitoring, disposition of monitoring and analysis, costs, and responsibilities.
- Scope and duration should include the minimum monitoring actions necessary to evaluate success.
- Monitoring plan will be reviewed during Agency Technical Review (ATR) and Independent External Peer Review (IEPR) as necessary.
- Monitoring will be continued until "restoration success" is documented by the USACE District Engineer in consultation with federal and state resource agencies and determined by USACE Mississippi Valley Division Commander.
- Success is determined by an evaluation of predicted ecological success outcomes as compared to actual results.
- Financial and implementation responsibilities for monitoring will be included in the Project Partnership Agreement (PPA).
- Section 2039 and implementation guidance allows for but does not require a 10 year cost shared Monitoring Plan. Necessary monitoring for a period not to exceed 10 years, monitoring can end sooner if ecological success is determined, will be considered a project cost and will be cost shared and funded under Construction.
- Any cost shared monitoring costs cannot increase the Federal cost, and cannot increase the Federal cost beyond the authorized dollar limit.

- Post Construction monitoring that may be needed beyond 10 years is a 100% non-Federal responsibility.

Adaptive Management/Contingency Plan

- Adaptive management plan must be appropriately scoped to project scale.
- The rationale and cost of AM and anticipated adjustments will be reviewed as part of the decision document.
- Identified physical modifications will be cost-shared and must be agreed upon by the sponsor.
- Changes to the AM plan approved in the decision document must be coordinated with USACE Headquarters (HQUSACE).
- Significant changes needed to achieve ecological success that can't be addressed through operational changes or the AM plan may be examined under other authorities.
- Costly AM plans may lead to re-evaluation of the project.

The importance of Adaptive Management was reinforced with the release of the Civil Works *Strategic Plan 2011-2015: Sustainable Solutions to America's Water Resources Needs* which identified Adaptive Management as a strategy to support the USACE moving towards Integrated Water Resources Management.

1.3 Adaptive Management and Monitoring Program Structure

The U.S. Army Corps of Engineers (USACE), New Orleans District (MVN), Louisiana Coastal Protection and Restoration Authority (CPRA), and the US. Geological Survey (USGS) collaborated to establish a general framework for adaptive management to be applied to all USACE Regional Planning Division South (RPDS) restoration projects. The framework for AM&M is consistent with the previously mentioned authority, implementation guidance, and is consistent with and supports the guidance provided by:

- Technical Letter: Procedures to Evaluation Sea Level Change: Impacts Responses and Adaptation (ETL 1100-2-1)
- DRAFT U.S. Army Corps of Engineers: A Systems Approach to Adaptive Management USACE Technical Guide (USACE 2011)
- U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's (NOAA) "Availability of a Final Addendum to the Handbook for Habitat Conservation Planning and Incidental Take Permitting Process" (Federal Register vol. 65, No. 106 35242)
- Planning Guidance Notebook (Engineering Regulation [ER] 1105-2-100) (USACE 2000)
- Planning Manual (Institute for Water Resources [IWR] Report 96-R-21; (Yoe and Orth 1996), Civil Works Ecosystem Restoration Policy (ER 1165-2-501)
- Ecosystem Restoration – Supporting Policy Information (EP 1165-2-502).

Please note that a Standard Operating Procedure (SOP) providing guidance for integration of Adaptive Management and Monitoring into Ecosystem Restoration and Mitigation Projects is being developed for the USACE Regional Planning & Environmental Division, South and will be incorporated in further versions of this AM&M plan once approved.

Adaptive Management and Monitoring Framework

The AM&M Framework includes both a Set-up Phase (Figure 2) and an Implementation Phase (Figure 3). The Set-up Phase proceeds concurrently with the USACE's traditional six-step planning process. While planners are identifying problems and opportunities, inventorying and forecasting resource conditions, evaluating and comparing alternative formulations, and selecting a recommended plan, the AM&M Plan for the project will be developed concurrently. In addition to the items developed during the planning process a conceptual ecological model (CEM) will be developed, uncertainties will be identified; and performance measures, targets, and decision criteria (triggers and thresholds) will be developed. See subsequent Sections of the AM&M plan for the CEM and performance measures developed thus far.

The implementation phase of the AM&M Framework subsequently puts the developed AM&M Plan into action. Projects will be designed, constructed, monitored and assessed to understand responses of the system to implementation of the project relative to stated targets, goals, objectives and success project criteria. Leadership will then decide whether to alter the project and implement AM actions to improve plan performance based on assessment results. Potential AM actions for the project are identified in Section 6.

Baseline monitoring will begin during PED prior to project construction and continue during construction when possible. Although not typical there may be some need for AM actions during construction. Unexpected detrimental events may alter the project site, requiring consideration of corrective measures. For example, a tropical event impacting a project site or invasion of an exotic species may necessitate management actions. A decision will be required on how to address the change in conditions. In addition, since it is expected that construction/implementation will be phased over a long period of time, there is greater potential for changing conditions due to construction methods, deviations from selected methods, or development of new information. It will need to be determined if these need to be corrected, whether they are acceptable, or whether they enhance the site. Using an AM strategy in this situation may increase the chances of overall project success. Design changes during construction may require changes to the AM&M Plan.

Post Construction, the project will enter the iterative cycle of AM where the project will be monitored. The results of the monitoring program will be used to assess system responses to management, evaluate overall project performance, and assemble Assessment Reports and project Report Cards as outlined in the AM&M Plans (Sections 5 & 6). These monitoring results and reports will guide decision making. The projects' Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) manuals should clearly communicate the AM&M Plans and process including: monitoring parameters, frequency and duration of monitoring and assessment, decision criteria, and options for adjustment to increase project success.

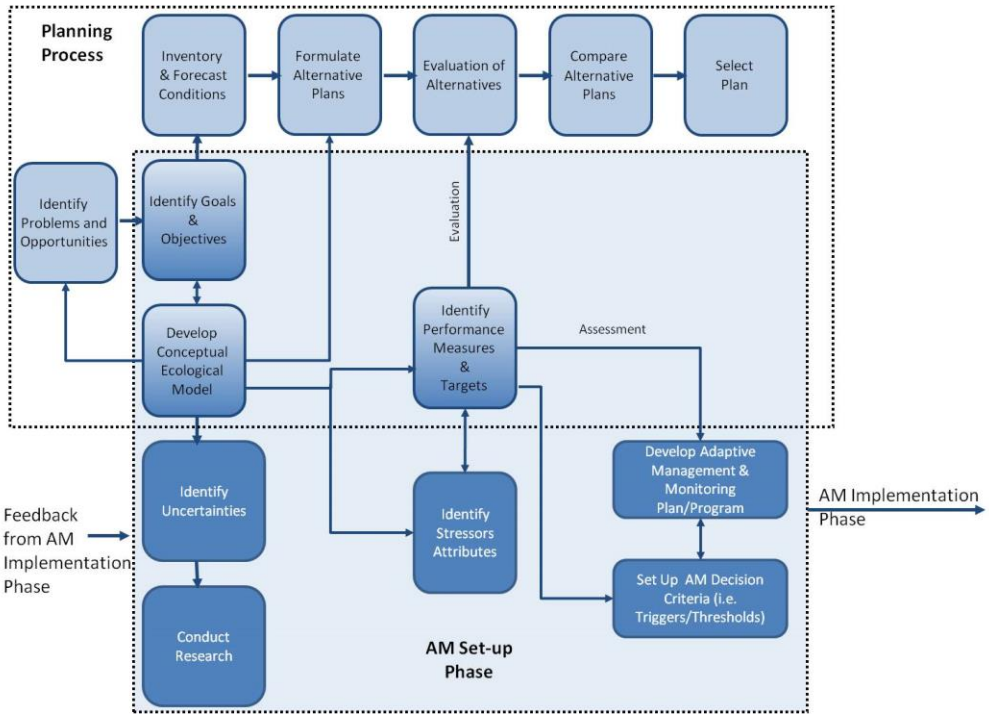


Figure 3: Set-up phase of adaptive management and monitoring program framework.

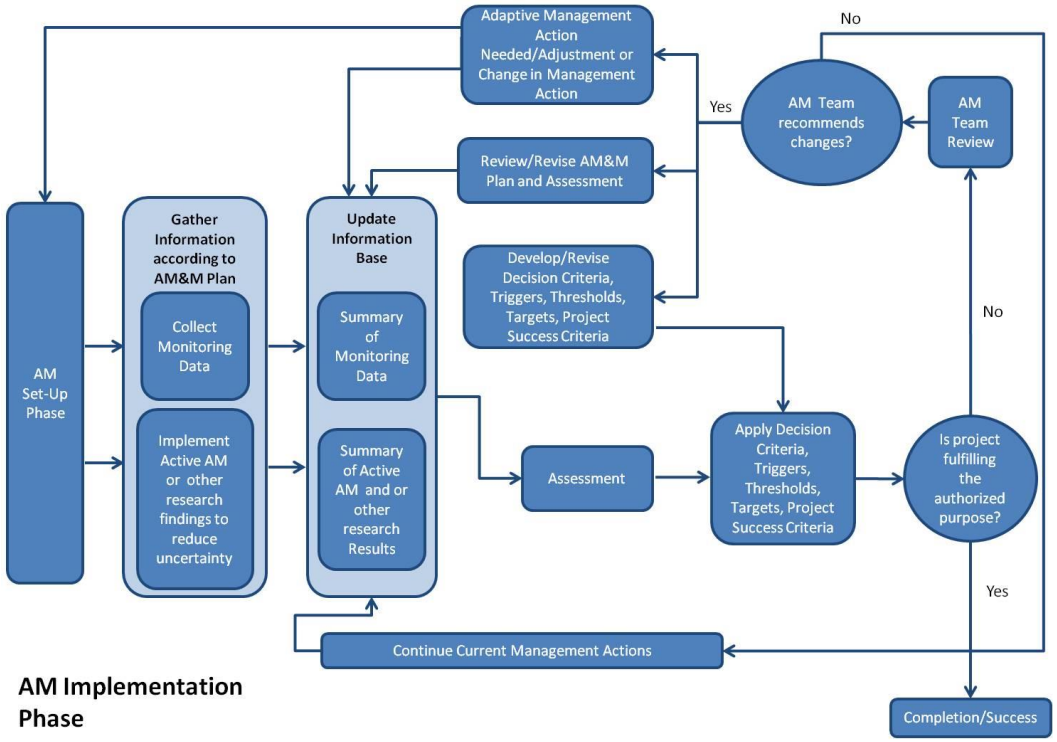


Figure 4: Implementation phase of adaptive management and monitoring program framework.

1.4 Communication Structure for Implementation of Adaptive Management

An implementation structure has been identified (Figure 4) to execute AM&M for USACE Regional Planning Division South (RPEDS) Ecosystem Restoration projects. The structure establishes lines of communication that facilitates coordination between Program Management, the PDT, the Adaptive Management and Monitoring Planning Team, the USACE Science Advisor, and stakeholders. Please note that a detailed governance structure and decision making process for RPEDS AM&M is being developed. This information once approved will be included in subsequent revisions to this AM&M plan.

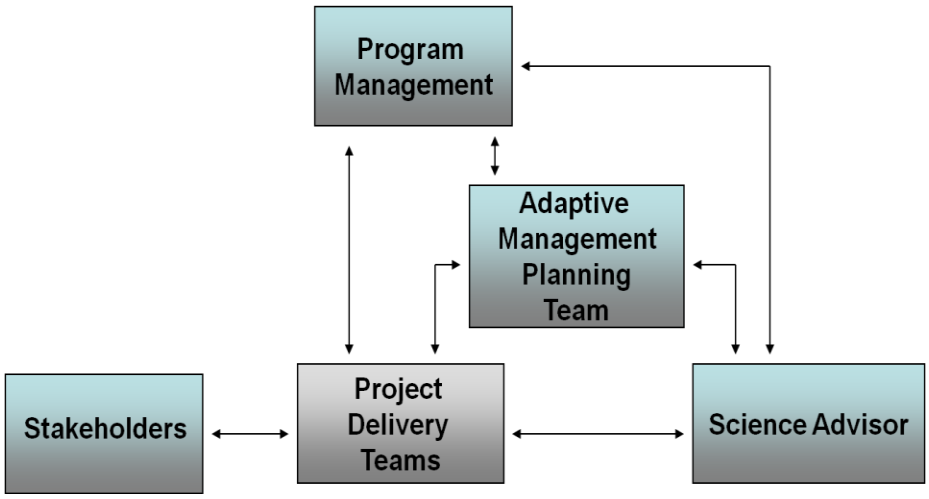


Figure 5: Communication structure for implementation of adaptive management and monitoring.

Adaptive Management and Monitoring Team- An interagency Adaptive Management and Monitoring Team (AM&M Team) will be established as part of the implementation structure (Figure 4). The AM&M Team, in collaboration with the PDT, will lead all project and program efforts to determine AM and monitoring recommendations. The AM&M Team is responsible for ensuring that monitoring data and assessments are properly used in the AM decision-making process. If the AM&M Team determines specific AM actions are needed, the AM&M Team will coordinate a path forward with the PDT, USACE Science Advisor and Program Management Team. The AM&M Team will also facilitate coordination between restoration projects and coordination among PDTs, and Program Management.

Program Management Team- The Program Management Team is composed of the Executive Director of the non-federal sponsor and the District Commander of USACE-MVN. The Program Management Team will vet program and project level issues, consider recommendations for AM actions, make final decisions on whether AM actions are required, and implement recommended final management actions.

Science Advisor- The purpose of the USACE Science Advisor will be to effectively address system-wide coastal ecosystem restoration needs and to provide a strategy, organizational structure, and process to facilitate integration of science and technology into the system-wide planning and the AM process.

Project Delivery Team- It is not necessary that the PDT, Project Managers, Plan Formulators, Environmental Planners or Engineers become AM&M experts. However, they need a general understanding of AM&M principles as they are key players in the integration of AM into planning and project development and implementation. The PDT is responsible for the development of the AM&M Plans in coordination with the AM&M Team. The PDT is also responsible for integrating Project-level AM&M activities into Project Management Plans, SMART Planning project documents, Feasibility Reports, NEPA and permit documents, Project Operating Manuals, and other project-related documentation.

To accomplish these tasks, the PDT will:

- lead the discovery of uncertainties;
- lead the engagement of stakeholders;
- consult with Program Management and the AM&M team;
- develop and execute strategies for resolving uncertainties; and
- develop, review, and update the AM&M Plan as necessary.

The PDT will likely be re-established during the project implementation phase to further refine monitoring, assessment and AM decisions; identify new uncertainties; re-evaluate and re-formulate and implement, as necessary, specific or overall project performance and management measures and features.

Stakeholders- Engagement with stakeholders throughout a project's planning and implementation phases is critical to developing and maintaining common understandings of the goals and objectives, expectations of results, and potential commitment of resources. All phases of the AM&M process must be open, transparent and accessible to stakeholders. Such interaction fosters the mutual understanding of events and appreciation of the time and patience required to fully realize the benefits of restoration projects and to manage unrealized expectations. A strong effort must be made to identify and engage all appropriate stakeholders. PDTs should continually seek to identify governmental and non-governmental organizations, groups and other interested parties who could affect, be affected by, and/or be able to contribute knowledge, data, and/or resources to project-related activities (e.g., planning, design, implementation, and monitoring).

ADAPTIVE MANAGEMENT AND MONITORING PLANNING

A small team with members from the USACE and the US Geological Survey (USGS) developed the draft AM&M plan for the project for review by the interagency PDT. The level of detail in this plan is based on currently available project data and information developed during plan formulation as part of the feasibility

study. Some uncertainties remain concerning the exact project features, project implementation, monitoring elements, and adaptive management opportunities. As uncertainties are addressed in the latter stages of the feasibility study and as specific project measures are developed, the AM&M Team will be formed and a detailed AM&M plan, including detailed cost estimates, monitoring protocols, AM triggers and thresholds and AM actions will be developed.

2.1 Conceptual Ecological Model for Monitoring and Adaptive Management

As part of the AM and project planning process, a conceptual ecological model (CEM; Appendix A; Annex L; Attachment 1) was developed to help explain the general functional relationships among the essential components of the Southwest Coastal Louisiana area. The Director of Civil Works 13 August 2008 Memorandum "Policy Guidance on Certification of Ecosystem Output Models" adopted recommendations from the Ecosystem Planning Center of Expertise (ECO-PCX) regarding the importance, use and review of conceptual models in ecosystem planning. CEMs are a means of:

(1) simplifying complex ecological relationships by organizing information and clearly depicting system components and interactions;
(2) integrating to more comprehensively implicit ecosystem dynamics;
(3) Aids in identifying which species will show ecosystem response;
(4) interpreting and tracking changes in restoration/management targets; and
(5) communicating these findings in multiple formats.

This CEM assists with identifying those aspects where the project can effect change. Specifically, the CEM identifies those major stressors, ecosystem drivers, and critical thresholds of ecological processes and attributes of the natural system likely to respond to restoration features. This project CEM was used to help identify problems, opportunities, and help refine project objectives and restoration management actions as well as selecting those attributes to be used as performance measures, modeling for alternative analysis, and monitoring for project success. The project CEM represents the current understanding of these factors and will be updated and modified, as necessary, as new information becomes available to assist with developing AM and monitoring during project planning and implementation.

Factors identified for the Southwest Coastal project area are listed below and further detailed in Appendix A, Annex L, Attachment 1.

Drivers

D1: Relative Sea Level Rise (Sea Level Rise and Subsidence)
D2: Numerous *Hurricanes and Storms*
D3: Hydrologic Alteration
D4: Sediment Supply to the Chenier Plain
D5: Mineral and Sediment Extraction

Ecological Stressors

ES1: Increased Flood Duration
ES2: Storm Surge
ES3: Saltwater/Salinity
ES4: Shoreline Erosion
ES5: Marsh fragmentation.
ES6: Increased Tidal Prism or Amplitude.
ES7: Altered Circulation

Ecological Effects

EE1 Wetland Loss
EE2 Decreased Primary Productivity
EE3 Habitat Conversion and Changes in Biological Community Composition

EE4 Loss of Ridges and Cheniers

Attributes and Performance Measures

A1 Land Cover/ Land Change

Performance Measures: Relative Change in Land Cover

A2 Vegetation Distribution and Diversity

Performance Measures: Community Composition and Relative Abundance

A3 Elevation

Performance Measures: Surface Elevation and Vertical Sediment Accretion

2.2 Project Goals, Objectives and Constraints

The study goals, objectives, and constraints were developed to comply with the study authority and to respond to the problems and opportunities for the Southwest Coastal Study Area. In consultation with the non-Federal sponsor and other interested parties, goals and objectives were developed during steps one and two of the planning process. These goals, objectives and constraints, and the CEM were used during the AM&M planning process to develop the performance measures and risk endpoints for the project. See Section 3.1.

Overarching Project Goal: To reduce storm surge flooding and coastal storm surge damagesand to provide sustainable ecosystem restoration.

Planning Objectives:

- NED Objective 1. Reduce the risk of damages and losses from hurricane and storm surge flooding.
  Metric: reduction in annual damage costs.
  Data required: average annual expenditures on repairs due to hurricane storm surges.
  Data collection: inputs for HEC-FDA, HEC-RAS, state master plan, and ADCIRC.

Please note that Objective 1 is not addressed by the NER components and is therefore not addressed within this AM&M plan.

- NER Objective 2. Manage tidal flows to improve drainage and prevent salinity from exceeding 2 ppt for fresh marsh and 6 ppt for intermediate marsh.

Please note that Objective 2 will not be monitored as it would be addressed by the hydrologic and salinity control project features recommended for further study.

- NER Objective 3. Increase wetland productivity in fresh and intermediate marshes to maintain function by reducing the time water levels exceed marsh surfaces.

Please note that Objective 3 will not be monitored as it would be addressed by the hydrologic and salinity control project features recommended for further study.

- NER Objective 4. Reduce shoreline erosion and stabilize canal banks to protect adjacent wetlands.

- NER Objective 5. Restore landscapes, including marsh, shoreline, and cheniers to maintain their function as wildlife habitat and improve their ability to serve as protective barriers.

Planning Constraints

The NED and NER plans are limited by the following constraints that are to be avoided or minimized:

- Commercial navigation. The Calcasieu and Sabine Ship Channels and the Gulf Intracoastal Waterway (GIWW) carry significant commercial navigation traffic. Measures that would cause shipping delays would result in negative NED impacts. In addition, the ability of authorized navigation projects to fulfill their purpose, such as the operation of locks along the GIWW, may be impacted by project features.
- Federally threatened and endangered species and their critical habitats includes consideration of dredge pipeline placement onto designated piping plover critical wintering habitat and consideration of dredging operations with regard to sea turtles.
- Must include consideration of other species of concern and development of a bird abatement plan to prevent nesting by shorebirds during construction activities.
- Marine Mammal Protection Act Best Management Practices (BMP) guidance; sea turtle and gulf sturgeon Protection Measures during dredging activities; avoidance of bald eagle nests, and colonial nesting waterbirds rookeries.

- Essential fish habitat (EFH), especially intertidal wetlands. Conversion of one EFH type to another should be done without adversely impacting various fish species.
- Historic and cultural resources. Ninety-nine archeological sites have been identified within a one-mile buffer of NED and NER alternatives, including one historic site ("Arcade Theater") listed on the National Register of Historic Places (NRHP) and six potentially eligible prehistoric sites. Twelve historic properties listed on the NRHP have been identified within the one-mile buffer, including the Charpentier (Lake Charles) Historic District, as well as four eligible standing structures. Hundreds of standing structures in the area have a minimum age of 50 years and have not been assessed for eligibility.

2.3 Management and Restoration Actions — Recommended Plan

The PDT performed a thorough plan formulation process to identify restoration and management actions that best meet project goals and objectives. For more information on the plan formulation process see Chapter 2 of the Feasibility Report. For more information on the NER Recommended Plan (RP) see Chapter 4 of the Feasibility Report.

The NER RP is comprised of 3 ecosystem restoration measure types as follows and described in Table 1:

- 9 Marsh restoration features totaling 7,900 acres.
- 35 Chenier reforestation locations totaling 1,413 acres. Measures would reforest chenier forests and improve a net total of 1,132 acres of habitat in the Calcasieu-Sabine Basin and 282 acres of habitat in the Mermentau/Teche-Vermilion Basin.
- 5 shoreline protection projects (6,135 acres).

Other project feature recommendations include:

- The Calcasieu Ship Channel Salinity Barrier Feature is recommended for long-term study.
- The Cameron-Creole Spillway Control Structure feature is recommended for long-term study.

Two marsh creation features at Mud Lake (124d) and Cameron Creole (3c1) and located partially on U.S. Fish and Wildlife Service property are recommended for Congressional authorization and funding by the USFWS.

Table 1. NER Project Features

Feature	Description	Acres Restored/ Nourished/ Protected
Marsh Restoration		
47a1	Marsh restoration using dredged material south of LA-82, about 4.5 miles west of Grand Chenier. 933 marsh acres would be restored and 88 acres would be nourished from 3M cubic yards of dredged material with one renourishment cycle.	895
47a2	Marsh restoration using dredged material south of LA-82, approximately 4.5 miles west of Grand Chenier. 1,297 marsh acres would be restored and 126 acres would be nourished from 8.8M cubic yards of dredged material with one renourishment cycle.	1,218
47c1	Marsh restoration using dredged material south of LA-82, approximately 4.5 miles west of Grand Chenier. 1,304 marsh acres would be restored and 4 acres would be nourished from 8.6M cubic yards of dredged material with one renourishment cycle.	1,135
127c3	Marsh restoration at Pecan Island, west of the Freshwater Bayou Canal and approximately 5 miles north of the Freshwater Bayou locks. 832 marsh acres would be restored and 62 acres would be nourished from 7.3M cubic yards of dredged material with one renourishment cycle.	735
306a1	Rainey marsh restoration at Christian Marsh, east of the Freshwater Bayou Canal and approximately 5 miles north of the Freshwater Bayou locks. 627 marsh acres would be restored	743

Feature	Description	Acres Restored/ Nourished/ Protected
	and 1,269 acres would be nourished from 8.1M cubic yards of dredged material with one renourishment cycle.	
3a1	Beneficial use of dredged material from the Calcasieu Ship Channel. Located adjacent to the south shore of the GIWW west of the Calcasieu Ship Channel near Black Lake. Restore 599 marsh acres with 5.3M cubic yards of dredged material with one renourishment cycle.	454
3c1	Beneficial use of dredged material from the Calcasieu Ship Channel. Located adjacent to the eastern rim of Calcasieu Lake and situated within the Cameron-Creole Watershed area. 1,765 marsh acres would be restored and 450 acres would be nourished from 10.2M cubic yards of dredged material with one renourishment cycle.	1,324
124c	Marsh restoration at Mud Lake. Located adjacent and north of Highway 82 and east of Mud Lake. 1,908 marsh acres would be restored and 734 acres would be nourished from 11.1M cubic yards of dredged material with one renourishment cycle.	1,228
124d	Marsh restoration at Mud Lake. Located west of the Calcasieu Ship Channel and adjacent to the south rim of West Cove. 159 marsh acres would be restored and 448 acres would be nourished from 1.4M cubic yards of dredged material with one renourishment cycle.	168
Chenier Reforestation		
CR	35 separate chenier locations would be replanted. Approximately 435 seedlings per acre, at 10 ft x 10 ft spacing, with invasive species control incorporated.	1,413
Shoreline Protection/ Stabilization		
5a	Holly Beach Shoreline Stabilization Breakwaters. Construction of 8.7 miles of rock and low action breakwaters and is a continuation of existing breakwaters. Crown elevation of +1.5 ft with a crown width of 30 ft. Two maintenance lifts will be required.	26
6b1	Gulf shore protection/stabilization from Calcasieu River to Freshwater Bayou. 11.1 miles of Gulf shore protection consisting of a reef breakwater with a lightweight aggregate core. Located ~150 ft offshore consisting of geotextile fabric and stone built to an 18 ft crest width.	2,140
6b2	Gulf shore protection/stabilization from Calcasieu River to Freshwater Bayou. 8.1 miles of Gulf shoreline protection consisting of a reef breakwater with a lightweight aggregate core. Located ~150 ft offshore using geotextile fabric and stone built to an 18 ft crest width.	1,583
6b3	Gulf shore protection/stabilization from Calcasieu River to Freshwater Bayou. 7.2 miles of Gulf shoreline protection consisting of a reef breakwater with a lightweight aggregate core. Located ~150 ft offshore using geotextile fabric and stone built to an 18 ft crest width.	1,098
16b	Fortify spoil banks of Freshwater Bayou. Approximately 15.4 miles of rock revetment at three critical locations to prevent shoreline breaching. Rock revetment would be built to +4 ft with a 4 ft crown. Two maintenance lifts will be required.	1,288

Construction of the NER project features will be phased. The RP project features will be implemented in 3 sequential tiers to avoid potential borrow, staging and construction issues. All projects within a Tier could be constructed concurrently with the exception of shoreline protection features which would be constructed prior to marsh creation features in order to provide immediate protection of the marsh creation features. Subsequent phases of construction would be instituted after completion of projects in the previous Tier. The implementation plan assumes that all construction funds would be available, multiple construction contracts could be let at one time, and an adequate supply of all materials to facilitate construction.

Tier I Projects:

- Holly Beach Shoreline Stabilization – Breakwaters (5a)
- Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou (6b1)
- Fortify Spoil Banks of the GIWW and Freshwater Bayou (16bSE)
- Fortify Spoil Banks of the GIWW and Freshwater Bayou (16bNE)
- Fortify Spoil Banks of the GIWW and Freshwater Bayou (16bW)

- Beneficial Use of Dredged Material from the Calcasieu Ship Channel (3a1)
- Marsh Restoration at Mud Lake (124d)[1]
- Marsh Restoration at Pecan Island (127c3)
- Chenier Ridges: Grand Chenier Ridge (416)[2]
- Restore Bill Ridge (509c)[2]
- Chenier Ridges: Cheniere au Tigre (509d)[2]
- Restore Blue Buck Ridge (510a)[2]
- Restore Hackberry Ridge (510b)[2]
- Restore Front Ridge (510d)[2]

Tier II Projects:
- Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou (6b2)
- Marsh Restoration at Mud Lake (124c)
- Rainey Marsh Restoration Southwest Portion (Christian Marsh) (306a1)

Tier III Projects:
- Beneficial Use of Dredged Material from the Calcasieu Ship Channel (3c1)[1]
- Gulf Shoreline Restoration: Calcasieu River to Freshwater Bayou (6b3)
- Marsh Restoration Using Dredged Material South of Highway 82 (47a1)
- Marsh Restoration Using Dredged Material South of Highway 82 (47a2)
- Marsh Restoration Using Dredged Material South of Highway 82 (47c1)

Recommended for Further Study:
- Calcasieu Ship Channel Salinity Control Structure
- Cameron-Creole Spillway Structure

[1]- *Recommended for independent Congressional authorization and appropriation for construction by USFWS*
[2]- *Individual features that comprise the chenier reforestation measure*

2.4 Sources of Uncertainty and Associated Risks

A fundamental tenet underlying AM is decision making and achieving desired project outcomes in the face of uncertainties. The AM&M Program provides a framework for identifying, analyzing and managing the uncertainties for the Southwest Coastal Restoration Project. Scientific uncertainties and technological challenges are inherent with any large-scale restoration project with the principal sources of uncertainty typically including (1) incomplete description and understanding of relevant ecosystem structure and function, (2) imprecise relationships between project management actions and corresponding outcomes, (3) engineering challenges in implementing project alternatives, and (4) ambiguous management and decision-making processes. It is important to determine the type of risk each uncertainty comprises and to discern what constitutes sufficient knowledge to proceed considering those risks.

Identified uncertainties and risks associated with the Southwest Coastal Restoration Project include:
- Relative sea level rise (subsidence plus eustatic variability)
- Climate change, such as drought conditions and variability of tropical storm frequency, intensity, and timing
- Inherent natural variability in ecological and physical processes
- Subsidence, accretion salinity, and water level trends and impacts:
    - Subsidence rates (+/-) throughout the project life and the impacts on constructed project features

    - Accretion rates (+/-) throughout the project life and the impacts on constructed project features
    - Water level trends (+/-) throughout the project life and the impacts on constructed project features
    - Variable salinities that impact vegetation
- Wetland water, sediment, and nutrient requirements:
    - Magnitude and duration of inundation
    - Annual sediment requirements
    - Nutrients required for desired productivity
- Impacts to belowground and aboveground biomass due to changes in hydro period and duration
- Vegetation impacts due to herbivory, grazing and girdling
- Potential failure of vegetative plantings due to salt water intrusion
- Vegetation impacts due to invasive species removal including spraying
- Ability to infer operational changes based on data collected, especially from variable metrics such as aboveground and belowground biomass measurements (applies to the hydrological and salinity control projects recommended for long term study)
- Unanticipated cumulative effects
- Impacts of existing mitigation areas within project area
- Potential sinking of construction project features including shoreline protection and breakwaters
- Socio-economic and cultural
    - Changes to commercial activity
    - Effect on recreational activities
    - Potential impacts to historic and cultural resources
    - Ramifications to traditional activities, especially for indigenous and minority groups
    - Changes to community structure and integrity
- Development in or near the restoration sites, in particular oil and gas development, mining, and vegetation removal from cheniers
- Ecological and engineering challenges of hydrologic and salinity control in southwest Louisiana
- Project feature implementation including schedule and timeline, availability of construction funds, availability or multiple construction contracts and an adequate supply of all materials to facilitate construction and dredge plant availability.
- Potential loss of additional land during project feature implementation due to implementation plan and schedule. For example delaying construction of shoreline protection features until Tier II or Tier III may result in additional land loss.
- Potential unintended construction impacts to existing marsh and critical habitat for species such as of piping plover and red knot
- Implementation of marsh creation features 124d and 3c1. Currently these features are recommended to be independently authorized and funded by Congress at the recommendation of USFWS for its implementation
- Potential development of hypoxic conditions by dredging borrow areas
- Construction of the shoreline protection features may create tombolos and impact longshore sediment transport. There is a possibility that longshore transport may be disrupted by the creation of tombolos. In other words, sediment may eventually fill in the lee of the breakwater and form a tombolo; the breakwater-tombolo formation may then act as a groin which might disrupt the longshore sediment transport in the area.

Issues such as climate change, sea level rise, and regional subsidence are significant scientific uncertainties for all coastal Louisiana projects. These uncertainties were incorporated in the plan formulation process and will be monitored by gathering data on water levels, salinities, and land elevation. Specifically, for relative sea level rise (RSLR) USACE EC-1165-2-21 provides an 18-step process for developing a "low", "intermediate" and

"high" future relative sea level rise scenario and provides guidance to incorporate these potential effects into project management, planning, engineering, design, construction, operation and maintenance. The PDT evaluated the final array of alternatives under three potential future RSLR scenarios in accordance with EC-1165 (See Feasibility Study Engineering Appendix B). This information will be assessed and will inform AM actions (see Section 6). In addition, procedures to evaluate sea level change impacts, response and adaptation will continued to be examined under USACE ETL 1100-2-1 which provides guidance for understanding the direct and indirect physical and ecological effects of projected future sea level change on USACE projects and systems of projects and considerations for adapting to those effects.

2.5 Rationale for Adaptive Management/ Uncertainty and Risk Management

The primary reason for implementing AM&M is to increase the likelihood of achieving desired project outcomes given the uncertainties identified in Section 2.4. Adaptive management works best when it is tailored to the specific problem(s), designed to ensure accountability and enforceability, used to promote useful learning, and supported by sufficient funding (Doremus *et al.*, 2011). Although all restoration projects are required to consider AM, there may be some projects or increments of a project for which AM may not be applicable. AM is warranted when there are consequential decisions to be made, when there is an opportunity to apply learning, when the objectives of management are clear, when the value of reducing uncertainty is high, and when a monitoring system can be put in place to reduce uncertainty (Williams *et al.*, 2007). Adaptive management should not be used where or when mistakes may be irreversible, when learning is unlikely on the relevant time scale, or where no opportunity exists to revise or reevaluate decisions (Doremus *et al.*, 2011).

Several questions were considered to determine if AM should be applied to the project, given identified uncertainties:

1) Are the ecosystems to be restored sufficiently understood in terms of hydrology and ecology, and can project outcomes be accurately predicted given recognized natural and anthropogenic stressors?
2) Can the most effective project design and operation to achieve project goals and objectives be readily identified?
3) Are the measures of this restoration project performance well understood and agreed upon by all parties?
4) Can project management actions be adjusted in relation to monitoring results?

There are significant ecological and engineering challenges associated with hydrologic and salinity control in southwest Louisiana, especially when confronting critical uncertainties associated with the effects of climate change and relative sea level rise. Previous hydrologic restoration efforts in southwest Louisiana have illustrated the sensitivity of these coastal marsh systems to hydrologic modification, whether through natural or anthropogenic events, and the importance of sufficient data to actively make decisions regarding management actions over time.

A 'NO' answer to questions 1-3 and a "YES" answer to question 4 qualifies the project as a candidate that could benefit from AM. The AM&M Team and the PDT determined that the Southwest Coastal Restoration Project meets these qualifications, and, therefore, is a candidate for AM and the AM&M plan would be developed to reduce critical uncertainties and provide the data necessary to make decisions to adjust project performance in response to monitoring results.

3. MONITORING

Independent of AM, an effective monitoring program is required to determine if project outcomes are consistent with original restoration goals and objectives. The strength of a monitoring program developed to support AM lies in the establishment of feedback between continued project monitoring and corresponding project management. The CECW-PB Memo dated 31 August 2009, requires monitoring that: *"…includes the systemic collection and analysis of data that provides information useful for assessing project performance, determining whether ecological success has been achieved, or whether Adaptive Management may be needed to attain project benefits."*

Pre-construction/baseline date, during construction, and post-construction monitoring will be utilized to determine restoration success. Monitoring will continue until the trajectory of ecological change and/or other measures of project success are determined as defined by project-specific objectives. Section 2039 of the WRDA 2007 allows ecological success monitoring to be cost-shared for up to ten years post-construction. Once ecological success has been achieved, which may occur in less than ten years post-construction, no further monitoring would be performed. If ecological success cannot be determined within the ten-year post construction period of monitoring, any additional required monitoring will be a non-Federal responsibility.

Monitoring activities will utilize all existing data where possible and available, such as remotely sensed data, where necessary to assess changes resulting from restoration. When possible, project monitoring and information needs will be integrated with existing monitoring efforts that are underway in coastal Louisiana. For example, the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) program has been monitoring restoration and coastal wetland protection projects throughout coastal Louisiana since 1990 (Steyer and Stewart 1992, Steyer et al., 1995). The CWPPRA monitoring program incorporates a system-level wetland assessment component called the CRMS (Wetlands, Steyer et al., 2003). CRMS-Wetlands provides system-wide performance measures that are evaluated to help determine the cumulative effects of restoration and protection projects throughout much of coastal Louisiana. Consequently, the project Monitoring Plan incorporates existing monitoring networks to the extent practicable. Such participation can maintain the data consistencies necessary to conduct not only individual restoration project but also coast wide programmatic AM&M. Additional data will be collected as part of Southwest Coastal (1) if required (i.e., if CRMS data is unavailable), or (2) only if scientifically defensible to achieve a complete dataset in which to compare post-restoration success.

3.1 Monitoring Plan Elements

Defining and assessing progress towards meeting project objectives are crucial components of the AM&M program. Project Objectives are specified in Chapter 2 Section 2.1 of the main report. Table 2 outlines the proposed performance measure metrics, desired outcomes and monitoring design needed to measure restoration progress, determine ecological success and support the AM program should changes need to be made to improve project performance. The elements described in this section are based on the available project information and will be updated and refined further during the detailed feasibility level of design phase as the details of the individual project measures are available. Regional/Basin and feature specific plans and details will be developed in PED.

Table 2: Proposed NER performance measures, desired outcomes and monitoring design

Project Objective 1. Reduce the risk of damages and losses from hurricane storm surge flooding. (Objective 1 is related to the NED project component and will not be monitored or adaptively managed and thus is not incorporated into this MAM plan design).	
Project Objective 2. Manage tidal flows to improve drainage and prevent salinity from exceeding 2 ppt for fresh marsh and 6 ppt for intermediate marsh. (Objective 2 will not be monitored as it would be addressed by the hydrologic and salinity control project features recommended for further study).	
Project Objective 3. Increase wetland productivity in fresh and intermediate marshes to maintain function by reducing the time water levels exceed marsh surfaces. (Objective 3 will not be monitored as it would be addressed by the hydrologic and salinity control project features recommended for further study).	
Objective 4.* Reduce shoreline erosion and stabilize canal banks to protect adjacent wetlands.** ***NER Project features: This objective would be addressed by 5 shoreline protection features under the Recommended Plan.	
Performance Measure:	Reduce Post-Construction Shoreline Erosion Rates as compared to pre-Construction by 50% by year 5.
Desired Outcome:	All offshore breakwater measures are expected to reduce shoreline erosion rates by approximately 50% based on previous experiences with this type of structure at Holly Beach and other nearby areas (See Section 3.3.1 of the main report).
Monitoring Design:	Historic erosion rates at each shoreline protection site will be established from historic aerial photography. Photography and DGPS surveys will be

Table 2: Proposed NER performance measures, desired outcomes and monitoring design	
	used to determine post construction erosion rates at each shoreline protection site at years TY1, TY3, and TY5. Shoreline surveys will be conducted at each shoreline protection sites and in immediately surrounding and to-be-identified reference areas. One pre-construction and three post-construction surveys (years TY1, TY3, and TY5) will be obtained.
Objective 5. **Restore landscapes, including marsh, shoreline, and cheniers to maintain their function as wildlife habitat and improve their ability to serve as protective barriers.** ***NER Project features: This objective would be addressed by the 9 marsh restoration features, 5 shoreline protection features, and 35 Chenier reforestation features under the Recommended Plan.***	
Performance Measure:	Provide 251,528 linear feet of shoreline protection by year 1.
Desired Outcome:	Success will be protection of 6,135 acres of marsh in year 6.
Monitoring Design:	To determine the linear feet or shoreline protection satellite and aerial imagery will be used. For each shoreline protection site, land:water acreage will be classified using satellite Landsat TM scenes. Vegetated habitats (protected by shoreline features) will be classified using digital orthophoto aerial imagery for 1 pre- and 2 post-project years (years TY1 and TY6).
Performance Measure:	Increase acreage of marsh by 7,900 acres by year 6.
Desired Outcome:	Success will be measured by an increase of marsh acreage by 7,900 acres by year 6.
Monitoring Design:	To determine the increase in acreage, satellite and aerial imagery will be used. For each marsh restoration site, land:water acreage will be classified using satellite Landsat TM scenes. Vegetated habitats will be classified using digital orthophoto aerial imagery for 1 pre- and 2 post-project years (years TY1 and TY6).
Performance Measure:	Establish Marsh Elevation Post Construction sufficient for healthy marsh; elevation between 12.6 to 26.8 cm for brackish marsh, and 16.3 to 31.0 cm for saline marsh consistent with (Couvillion and Beck 2013).
Desired Outcome:	Based on local conditions, the scientific literature of the area and especially with consideration of the factors causing high wetland land loss throughout the project area, the interdisciplinary/interagency PDT determined the following necessary for sustainability: Marsh elevation on restored marsh acreage (following de-watering and settlement) sufficient to support vegetation and marsh establishment is between 12.6 to 26.8 cm for brackish marsh, and 16.3 to 31.0 cm for saline marsh consistent with Couvillion and Beck (2013).
Monitoring Design:	To measure elevation (including accretion and subsidence) at each marsh restoration site, one rod-surface elevation table (SET), replicate feldspar stations and settlement plates will be established within the constructed marsh footprint to measure changes in elevation. Elevation will be sampled bi-annually for a period of 2 years pre-project and for a period of 10 years post-project or until desired ecological success is achieved, whichever occurs first. Elevation, accretion and subsidence measured at existing CRMS stations located near each marsh restoration site will also be utilized, as appropriate.
Performance Measure:	Average cover of 80% vegetation on marsh restoration sites at year 5 compared to pre-construction.
Desired Outcome:	One year following completion of final construction activities achieve a minimum average cover of 25%, comprised of native herbaceous species. Three years following completion of construction achieve a minimum average cover of 75% native species. For the period beginning 5 years following completion of final mitigation construction activities and continuing through project success, maintain a minimum average cover of 80%, comprised of native herbaceous species.

Table 2: Proposed NER performance measures, desired outcomes and monitoring design	
Monitoring Design:	Vegetation will be sampled annually, at the 9 marsh restoration sites and the 5 sites where marsh will be protected by constructed shoreline stabilization. Permanent vegetation monitoring stations be established for assessing the vegetation community at each site. In addition to community composition, these stations will be sampled for above and below ground biomass, water level, salinity, and soil characteristics. Sites will be sampled for a two year period pre-construction (to assess pre-project conditions) and sampled annually during the post construction period until success is determined. Stations at each restoration site will be co-located at existing CRMS stations if appropriate and possible.
Performance Measure:	Increase Chenier Tree Coverage on 1,413 acres by year 5.
Desired Outcome:	Success will be measured by restoration of 1,413 acres of chenier forest at year 5. Planting survival and an increase in diameter of chenier plantings is required for success. Planting and survivorship criteria: Each chenier measure site would be planted with live oak (Quercus virginiana) and hackberry (Celtis occidentalis). Bare-root seedlings would be planted on 10x10-foot spacing (435 trees per acre), which assumes 57% survival. For a given planting, a minimum of 250 seedlings/saplings per acre must be present (with a 60:40 hard mast to soft mast ratio) at the end of the fourth year (i.e., TY5) following successful attainment of the one year survivorship criteria. Trees established through natural recruitment may be included in this tally; however, no less that 125 hard mast-producing seedlings per acre must be present. Surviving hard mast seedlings must be representative of the species composition and percentage identified in this Plan. Exotic/invasive species may not be included in this tally. By Year 5 (four years following successful attainment of the one-year survivorship criteria) the perimeter would be virtually free (approximately 5% or less on an acre-by-acre basis) of exotic/invasive vegetative species.
Monitoring Design:	At each chenier reforestation site diameter at breast height (dbh) and overstory tree % cover will be measured two pre-construction years and two post-construction years estimated at TY1 and TY5. At each chenier reforestation site, understory vegetation (herbaceous, seedling, and sapling) will be measured at two pre-construction and two post-construction years estimated at TY1 and TY5, to assess regeneration and changes in cover classes. At each chenier reforestation site, exotic/invasive vegetation will be measured at two pre-construction and two post-construction years estimated at TY1 and TY5, to determine if exotic/invasive species control efforts are needed to meet performance measures.

4. ASSESSMENT

The assessment phase of the implementation framework (Figure 3) compares the results of the monitoring efforts to the desired project performance measures and/or acceptable risk endpoints (i.e., decision criteria) that reflect the goals and objectives of the management or restoration action.

This assessment process will regularly measure the progress of the project in relation to the stated project objectives, performance measures and desired outcomes. Thorough and complete assessments are critical to the AM&M Program. The assessments will continue through the life of the project or until it is has been determined that the project has successfully achieved (or cannot achieve) its goals and objectives (Figure 2).

4.1 Assessment Process

During PED, the Assessment Team assigned will identify a combination of qualitative (i.e., professional judgment) and quantitative methods for comparing the values of the performance measures produced by monitoring with the selected values of these measures that define criteria for decision-making.

Appropriate statistical comparisons (e.g., hypothesis testing, ANOVA, multivariate methods, etc.) will be used to summarize monitoring data and compare these data with the stated metrics. These continued assessments will be documented as part of the project reporting and data management system.

The Assessment Team will collaborate with project managers and decision-makers to define magnitudes of difference (e.g., statistical differences, significance levels) between the values of monitored performance measures and the desired values that will constitute variances. Meaningful comparisons between monitoring results and desired performance will require characterization of historical and current spatial-temporal variability that define baseline conditions. Variances (or their absence) will be used to recommend AM actions, including (1) continuation of the project without modification, (2) modification of the project within original design specifications, (3) development of new alternatives, or (4) termination of operation of the Southwest Coastal project.

The CEM (Attachment 1) helps describe the linkages between stressors and performance measures and may be used to further define management actions based on the monitored results. The assessments will help determine if the observed responses are linked to the project; if the responses are undesirable (e.g., are moving away from restoration goals); or if the responses have met the specified success criteria. If performance measures are not responding as desired, for example because the stressor has not changed enough in the desired direction, then recommendations should be made for modifications to the project. If the stressor has changed as expected/desired and the performance measure has not, additional research may be necessary to understand why.

During the PED phase, the frequency of assessments for the Southwest Coastal project will be determined by the relevant ecological scales of each performance measure. The project technical support staff will identify for each performance measure the appropriate timescale for assessment. An initial project assessment will be completed before construction. There will be post-construction project assessments as needed during the post-construction period; however the level of detail will depend on the timescale of expected responses, and frequency of data collection. At this time it is estimated that assessments will be, on average, every three years.

4.2 Documentation and Reporting

The Assessment Team will document each of the performed assessments and communicate the results of its deliberations to the managers and decision-makers designated for the Southwest Coastal Restoration Project. The Assessment Team will produce periodic reports that will measure progress towards project goals and objectives as characterized by the selected performance measures. The reporting of monitoring results and AM evaluations will be in the form of both Assessment Reports to include a high level of detail and science and management friendly summary Report Cards.

5. DATA MANAGEMENT

Data management is a vital component of the long-term monitoring plan and the overall adaptive management process. To maintain lasting value of the data collected, the data must be stored, organized, and archived in an efficient and intuitive structure, so that it may be used in the Assessment process (Section 4) to determine progress towards meeting project goals and be used to inform decision making and adaptive management actions (Section 6). Each distinct data type collected must comply with its specific data format, delivery, and metadata standard. These standards will be prescribed by the Data Management Team and managed by the AM&M Team. The detailed Data Management Plan will be developed during PED.

6. ADAPTIVE MANAGEMENT AND DECISION MAKING PROCESSES

Scientific, technological, socio-economic, engineering, and institutional uncertainties are challenges inherent with any large-scale ecosystem restoration project. A structured monitoring design for the Southwest Coastal Restoration Project will be implemented to provide the feedback necessary to inform decisions about future project adjustments. The project report card, drafted by the Assessment Team, will be used to evaluate project status and any potential adaptive management needs. The Assessment Team may submit recommendations for AM actions to the AM&M Team. The AM&M Team will investigate and further refine AM recommendations and present them to the Program Management Team. During project implementation and operation, it will be up to the District Commander and Non-Federal Sponsor to make a recommended AM action. If Project monitoring determines that a management trigger has been "activated" then there are three possible response pathways:

1. determine that more data is required and continue (or modify) monitoring;
2. identify and implement a remedial action; or
3. modify project goals and objectives (this option would *only* be considered as a last resort and upon careful consideration by and consensus of the Project Management Team).

The Phased Implementation and Tiering of the project features as described in Section 2.3 will allow for Adaptive Design and implementation of subsequent project features and Tiers. Lessons learned during the implementation of the initial project features in the earlier Tiers can be used to adjust the design and implementation of the later projects to better ensure project success. For example Marsh elevation targets can be revised based on amount of compaction and dewatering that occur in different marsh types/soil types/subsidence zones.

Additionally, potential adaptive management actions have been identified to account for the identified risks, uncertainties and unexpected environmental conditions that have been identified for the project. Implementation of these actions as a contingency plan will better ensure that the project is successful and able to meet the project stated objectives. These potential AM actions/contingency plan actions are presented below. The actions will be further evaluated and refined for inclusion in the final AM&M plan once the necessary project feature details become available. At that time specific triggers and thresholds will be developed for implementing the AM/contingency actions:

1. Early implementation of all shoreline protection features in Tier I to reduce risk of potential land loss to the interior marsh.
2. Increasing wetland elevation by re-nourishment (sediment lifts) of marsh creation areas with dredge material.
3. Vegetative plantings for marsh features may be needed due to risks such as herbivory, inundation and salinity impacts.
4. Additional vegetative plantings for Chenier features may be needed due to risks such as grazing, saltwater impacts, harvesting, and lack of available diverse plant stock at time of initial plantings.
5. Repair or reinforcement of shoreline protection features as needed to protect interior marsh
6. Vegetative invasive species control on the marsh and Chenier features maybe needed in cases where the success of native species are impacted.
7. Further degradation of spoil banks to ensure successful ingress and egress for aquatic species if they do not degrade naturally within 3-5 years.

Project planning was based on the intermediate RSLR scenario. Based on the October 2011 guidance below projects adjustments to high RSLR may fall under AM. Potential options for AM actions based on RSLR increases include raising wetland elevation (AM Action #2).

CECW Guidance Memorandum "Policy Guidance Request for Addressing Sustainability of Ecosystem Restoration Projects in Louisiana" (October 2011), indicates *while different levels of RSLR are evaluated during the*

course of a study to determine the robustness of the proposed solution, our current investment decisions are based on a discrete level of RSLR. Conceptually, if the rate of RSLR exceeds the rate used as the basis for the investment decision, then adaptive management measures above and beyond OMRR&R may be appropriate. This concept will have to be carefully vetted on a project by project basis so as to negate inappropriate transfers of cost from OMRR&R to adaptive management.

Under this project potential adaptive management actions will continue to be developed in consideration of the guidance provided in the USACE ETL 1100-2-1 titled "Procedures to Evaluate Sea Level Change Impacts, Response and Adaption. The technical letter provides guidance for understanding the direct and indirect physical and ecological effects of projected future sea level change on USACE projects and considerations for adapting to those effects including consideration of a longer planning horizon and incorporating more robust management actions. Relevant sections are included below.

"Longer Planning Horizon. The planning, design, and construction of a large water resources infrastructure project can take decades. Though initially justified over a 50-year economic period of analysis, USACE projects can remain in service much longer. The climate for which the project was designed can change over the full lifetime of a project to the extent that stability, maintenance, and operation may be impacted, possibly with serious consequences, but also potentially with beneficial consequences. Given these factors, the project planning horizon (not to be confused with the economic period of analysis) should be 100 years, consistent with ER 1110-2-8159."

"Responses or Management Approaches. Uncertainty about the future can be identified not just with regard to sea level change or wider climate change processes but also with regard to morphological, ecological, and socioeconomic change. An overall adaptive management approach provides a process for dealing with all of these uncertainties and involves developing plans for the future that envisage a range of futures, incorporate ongoing monitoring, and permit transitions from one engineering approach to another. The approach gives freedom for different decision pathways to be followed depending on the magnitude and rate of sea level and other changes. This flexible and responsive adaptive management philosophy may require the consideration of modifications to how we think about project life, maintenance actions, ongoing decision-making, and funding methods, including increasing use of nonstructural measures for reducing the consequence element of risk."

7. LESSONS LEARNED

Collecting, identifying and documenting lessons learned is a goal of the AM&M program. The AM&M planning team will help develop and compile lessons learned, best practices and experiences concerning the implementation of the restoration program, technical and organizational challenges, and monitoring and adaptive management. Lessons and experiences will be clearly documented with recommendations where applicable so that they can be easily applied to future ecosystem restoration programs and projects. Documenting the lessons learned ultimately aims to reduce recurring, technical or programmatic issues that negatively impact cost, schedule, restoration project performance and success.

8. COSTS FOR IMPLEMENTATION OF ADAPTIVE MANAGEMENT AND MONITORING

The AM&M program establishes a feedback mechanism whereby monitored conditions will be used to adjust or refine construction and or maintenance actions to better achieve project goals and objectives. This AM&M Plan includes the minimum monitoring actions determined necessary to evaluate project success and provide the information needed to inform the adaptive management program. Section 2039 of the WRDA 2007 allows monitoring to be cost-shared for up to ten years post-construction.

Monitioring and adaptive management are not to be used as a substitute for Operations, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R). Per WRDA 1986, as amended by Section 210 of WRDA 1996, the non-Federal sponsor would be responsible for all OMRR&R. This includes routine O&M that provides day-to-day activities necessary to properly operate a component of a system and routine maintenance activities needed to keep the system operating as designed. This also includes non-routine or beyond the scope of typical O&M activities of repair or fixing damage caused by an event; rehabilitation or fixing long-term wear and tear; and replacement of component when useful life is exceeded. In contrast, periodic

monitoring of performance indicators which contains trigger values informs the iterative process of implementing specified adaptive management measures to help achieve ecological success. CEMVN's experience with marsh creation and shoreline protection has determined that the ecological success of marsh restoration and shoreline protection is generally realized within three to five years post-construction. However, the project area is susceptible to several uncertainties that could significantly impact the ecological success of constructed restoration features including: high energy associated with Gulf waters, hurricanes and storms, subsidence and sinking of placed rock for shoreline. Section 2039 of the WRDA 2007 allows monitoring to be cost-shared for up to ten years post-construction. Therefore for cost estimating purposes the maximum cost-shared period of monitoring of 10 years will be assumed for all features. Based on previous restoration experience with marsh creation and shoreline protection, it is anticipated that ecological success would be much less than ten years (likely five to six years post-construction). Once ecological success has been established, monitoring would cease. The need for additional monitoring would be assessed at the end of the cost-shared period, and any additional required monitoring would be a 100 percent non-Federal responsibility.

Costs (Table 3) associated with implementing this AM&M Program were estimated based on available data and additional details regarding the proposed monitoring, AM opportunities and management actions and detailed costs estimates will continue to be revised and developed as additional information becomes available. Because uncertainties remain as to the exact project features, monitoring elements, and AM opportunities and management actions and detailed costs estimates, will need to be developed during the feasibility study in the feasibility level of design phase. For planning purposes cost for AM&M costs are currently budgeted at approximately $62,807,000. This estimate includes the monitoring necessary to determine project success, data management and program and potential adaptive management actions.

The cost estimate was identified based on the large geographic scale of the project, costs for similar programs, and accounts for the identified risks and uncertainties described in Section 2.4 and the potential need for the Adaptive Management actions described in Section 6. The significant ecological and engineering challenges of restoration in southwest Louisiana, especially when confronting critical uncertainties associated with the effects of climate change and relative sea level rise were considered when developing the estimated costs. Previous restoration efforts in southwest Louisiana have illustrated the sensitivity of these coastal marsh systems to modification, whether through natural or anthropogenic events, and the importance of sufficient data to actively make decisions regarding management actions over time.

Table 3. Monitoring and Adaptive Management Cost Estimates

Element	Cost
Monitoring Plan Implementation and Management*	$1,200,000
Data Collection*	$12,904,000
Data Management & Visualization*	$1,000,000
Data Assessment & Decision Making*	$1,200,000
Adaptive Management Contingency Actions	$46,503,000 (Range $13,153,000- $61,159,000)**
Total AM&M Costs	$ 62,807,000 (Range $29,457,000-$92,679,000)***

**Costs are included to cover pre-construction, during and 10 years post construction and may vary depending on the duration of the construction period.*
***There is a 90% chance the proposed AM actions as outlined will range between $29,457,000 - $63,029,000.*
****Although not a requirement, traditionally 3% of the total project cost has been used as a guideline to develop AM&M costs; 3% of the NER cost are equal to $52,301,792, which is within the above expected cost range.*

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Southwest Coastal Louisiana Feasibility Study

Conceptual Ecological Model

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1. INTRODUCTION

1.1 Conceptual Ecological Model (CEM) Definition

A conceptual model is a tentative description of a system or sub-system that serves as a basis for intellectual organization and represents the modeler's current understanding of the relevant system processes and characteristics (Fischenich 2008). These models, as applied to ecosystems (Conceptual Ecological Models or CEMs), should be simple, qualitative models, represented by a diagram which describes general functional relationships among the essential components of an ecosystem. CEMs typically document and summarize current understanding of, and assumptions about, ecosystem function. When applied specifically to ecosystem restoration projects, these models can be used as a basis for establishing the "Future-without Project Condition" and the benefits of proposed alternatives. To describe ecosystem function, a CEM usually diagrams relationships between major anthropogenic and natural stressors, biological indicators, and target ecosystem conditions.

A 2008 USACE Ecosystem Planning Center of Expertise White Paper on the certification of ecosystem output models recommended that conceptual models "be developed for all ecosystem restoration projects" (USACE 2008a). Further, they recommended that these models be reviewed as part of the normal ITR process and do not need certification". The 2008 Memorandum on Policy Guidance on Certification of Ecosystem Output Models (USACE) adopted this recommendation (USACE 2008b).

1.2 Purpose and Function of Conceptual Ecological Models

Conceptual Ecological Models have been widely used in other regions of North America in planning several large-scale restoration projects (Rosen et al 1995, Gentile 1996, Chow-Fraser 1998, Ogden and Davis 1999, Ogden et al 2003). The same approach can be used for a variety of restoration scales as the elements of conceptual models are common. CEMs created for restoration programs/projects should include:

- Those physical, chemical, and biological attributes of the system that determine its dynamics;
- The ways in which ecosystem drivers, both internal and external cause change with particular emphasis on those aspects of the system where the proposed project can effect change;
- Critical thresholds of ecological processes and environmental conditions;
- Assumptions and gaps in the state of knowledge, especially those that limit the predictability of restoration outcomes; and
- Current characteristics of the system that may limit the achievement of management outcomes.

The USACE is using CEMs to provide assistance with ecosystem simplification, communication, plan formulation, and science, monitoring, and adaptive management. The CEM format utilized here follows a top-down hierarchy of information using the format established by Ogden and Davis (1999) (Figure 1). It should be noted that CEM development is an iterative process, and that CEMs developed for USACE projects during early plan formulation may be modified through the life of the project.

1.2.1 Model Components

The schematic organization of the CEM is depicted in Figure 1 and includes the following components:

Drivers - This component includes major external driving forces that have large-scale influences on natural systems. Drivers may be natural (e.g., eustatic sea level rise) or anthropogenic (e.g., hydrologic alteration) in nature.

Ecological Stressors - This component includes physical or chemical changes that occur within natural systems, which are produced or affected by drivers and are directly responsible for significant changes in biological components, patterns, and relationships in natural systems.

Ecological Effects - This component includes biological, physical, or chemical responses within the natural system that are produced or affected by stressors. CEMs propose linkages between one or more ecological stressors and ecological effects and attributes to explain changes that have occurred in ecosystems.

Attributes- This component (also known as indicators or end points) is a prudent subset of all potential elements or components of natural systems representative of overall ecological conditions. Attributes may include populations, species, communities, or chemical processes. Performance measures and restoration objectives are established for each attribute. Post-project status and trends among attributes are measured by a system-wide monitoring and assessment program as a means of determining success of a program in reducing or eliminating adverse effects of stressors.

Performance Measures - This component includes specific features of each attribute to be monitored to determine the degree to which attribute is responding to projects designed to correct adverse effects of stressors (i.e., to determine success of the project).

This CEM does not attempt to explain all possible relationships or include all possible factors influencing the performance measure targets within natural systems in the study area. Rather, the model attempts to simplify ecosystem function by containing only information deemed most relevant to ecosystem monitoring goals.

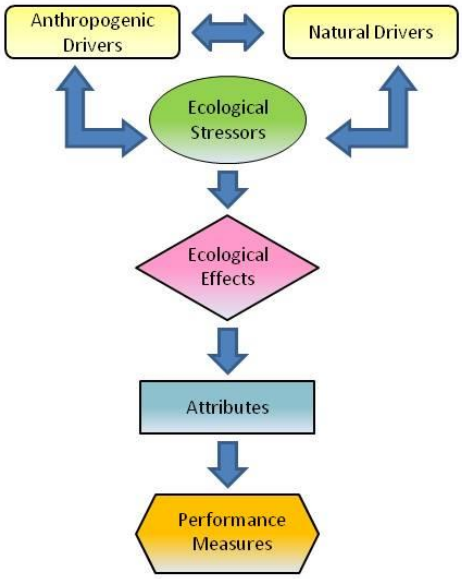

Figure 1: Conceptual ecological model schematic diagram

2. PROJECT BACKGROUND

2.1 Project Goals and Objectives

The goal of the study is to formulate a comprehensive plan for Southwest Coastal Louisiana that provides hurricane and storm damage risk reduction and coastal restoration measures to achieve ecosystem sustainability. Specific objectives include:

- Objective 1. Reduce the risk of damages and losses from hurricane and storm surge flooding.
- Objective 2. Manage tidal flows to improve drainage and prevent salinity from exceeding 2 ppt for fresh marsh and 6 ppt for intermediate marsh.
- Objective 3. Increase wetland productivity in fresh and intermediate marshes to maintain function by reducing the time water levels exceed marsh surfaces.
- Objective 4. Reduce shoreline erosion and stabilize canal banks to protect adjacent wetlands.
- Objective 5. Restore landscapes, including marsh, shoreline, and cheniers to maintain their function as wildlife habitat and improve their ability to serve as protective barriers.

The project area of the Southwest Coastal Louisiana study includes the Parishes of Cameron, Calcasieu, and Vermilion (Figure 2). This area includes approximately 4.700 square miles and a population of 117,100.

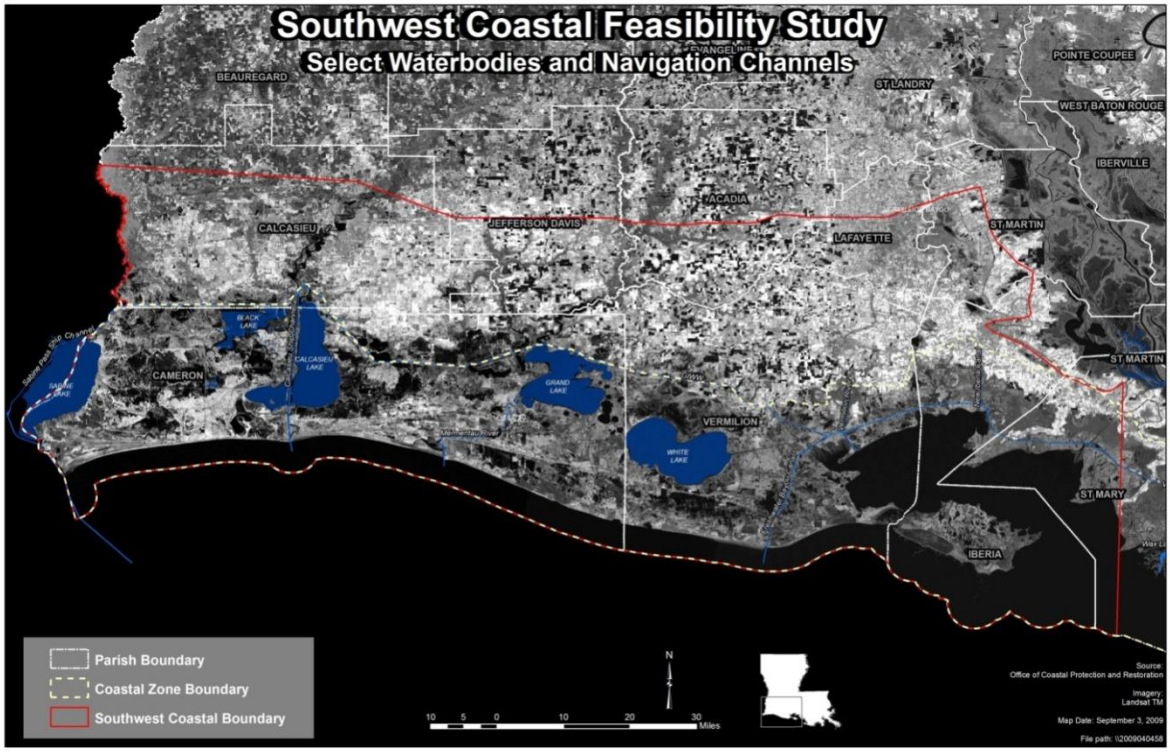

Figure 2: Southwest Coastal Louisiana – case study area map

3. CONCEPTUAL ECOLOGICAL MODEL DEVELOPMENT

The Southwest Coastal Louisiana CEM was developed by a New Orleans District led interagency team assisted by the Engineer Research and Development Center (ERDC) Environmental Lab. Prior to development of the model, the team reviewed existing information on ecological conditions in the project area. Using a workshop format, the team met to identify and discuss anthropogenically and naturally-driven alterations in the study area, stressors caused by these alterations, and consequent ecological effects. Additionally, key ecological attributes and indicators of project success were identified, along with potential performance measures. This information was used to form a set of working hypotheses and to consider the importance of each relationship **(Table 1**).

The project team used these hypotheses and lists of components to develop the model and to prepare this supporting narrative document to explain the organization of the model and science supporting the hypotheses.

Table 1: Working Hypotheses

NATURAL DRIVERS	
Hurricanes and Storms	The storm surge associated with hurricanes and storms causes increased erosion and subsequently a direct loss of the ridge /Chenier barrier system.
	The storm surge associated with hurricanes and storms causes increased saltwater intrusion to the coastal system which results in reduced primary productivity.
	Increased frequency and intensity of hurricanes and storms results in fragmentation of and eventually loss of wetlands.
Relative Sea Level Rise	The combination of sea level rise and subsidence leads to an amplification of the tidal prism/amplitude which can result in wetland degradation and an eventual conversion to open water.
	The combination of sea level rise and subsidence over the long term leads to saltwater intrusion into areas that would otherwise be fresh or brackish. This will cause changes in the biological community composition and an eventual conversion of marsh habitat to open water.
	The combination of sea level rise and subsidence over the long term leads to marsh fragmentation and eventually loss of wetlands.
ANTHROPOGENIC DRIVERS	
Hydrologic Alteration	Alterations in the natural hydrology of coastal Louisiana, including the creation of navigation channels and water control structures, have resulted in altered circulation patterns which have led to habitat conversion and changes in the biological community composition.
	Alterations in the natural hydrology of coastal Louisiana, including the creation of navigation channels and water control structures, have resulted in an increased tidal prism/amplitude which has led to an increase in wetland loss.
	Alterations in the natural hydrology of coastal Louisiana, including the creation of navigation channels and water control structures, have resulted in saltwater intrusion which has led to habitat conversion and changes in the biological community composition.
	Alterations in the natural hydrology of coastal Louisiana, including the creation of navigation channels and water control structures, have caused an increase in flood duration which has led to habitat conversion and changes in the biological community composition.
	Alterations in the natural hydrology of coastal Louisiana, including the creation of navigation channels and water control structures, have caused an increase in flood duration which has led to a reduction in primary productivity.
	Alterations in the natural hydrology of coastal Louisiana, including the creation of navigation channels and water control structures, have resulted in marsh fragmentation and eventually wetland loss.
Mineral/Sediment Extractions	Mineral and Sediment extractions from the Chenier Plain has resulted in a direct loss of the ridge and Chenier barrier system.
	Mineral and Sediment extractions from the Chenier Plain has resulted in an increase susceptibility to saltwater intrusion into areas that would otherwise be fresh or brackish. This will cause changes in the biological community composition and an eventual conversion of marsh habitat to open water.
	Mineral and Sediment extractions from the Chenier Plain has resulted in an increase susceptibility to storm surge from hurricanes and storms which could result in a direct loss of the ridge and Chenier barrier system.
Sediment Supply	A decrease in sediment supply due to alterations in the Mississippi River for flood control and navigation exacerbates shoreline erosion. This results in an increase in the loss of the ridge and Chenier barrier system and coastal wetlands.
	A decrease in sediment supply due to alterations in the Mississippi River for flood control and navigation contributes to the fragmentation and ultimately the loss of coastal marshes.

4. CONCEPTUAL ECOLOGICAL MODEL

The CEM developed by the team for the Southwest Coastal Louisiana Feasibility Study is presented below (**Figure 3**). The model depicts the series of working hypotheses formed by the team (**Table 1**), arranged in a conceptual diagram. Relationships expressed with thicker or bolder arrows are more certain than those represented by thinner arrows. Model components are identified and discussed in the following subsections along with further explanation of the relationships between the components.

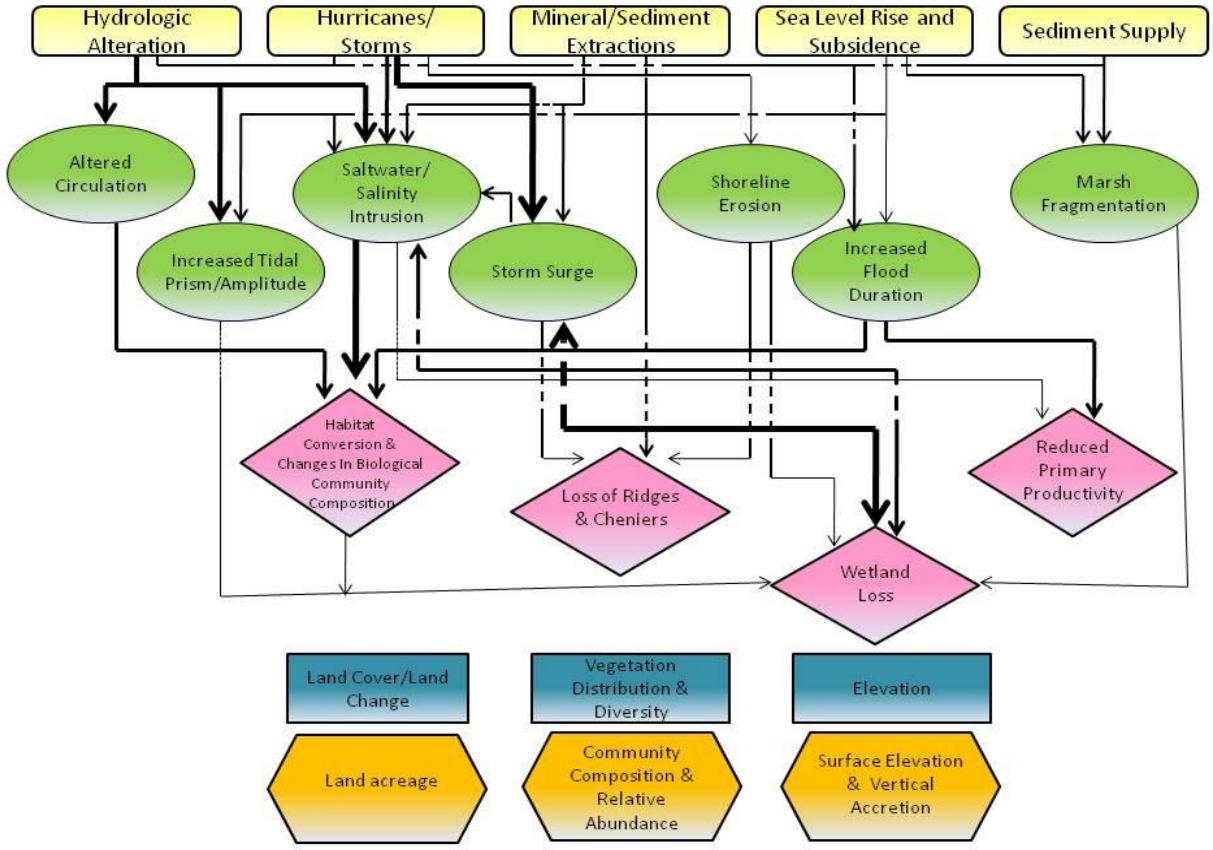

Figure 3. Southwest Coastal Louisiana conceptual model

4.1 Drivers

Drivers are the major external driving forces that have large-scale influences on Southwest Louisiana's coastal system. Anthropogenic drivers (e.g., hydrologic alteration) provide opportunities for finding solutions to problems. For instance, hydrologic alterations can be undone through modification of channels and canals either temporarily or permanently, and mineral/sediment extraction practices can be changed. Natural drivers, however, cannot be influenced directly; e.g. we cannot change the frequency or intensity of tropical storms or change how high or fast sea level rises. Some drivers are both anthropogenic and natural in nature. On a large, historical scale, sediment deposition has been determined by geological forces. On a local scale, sediments can be brought into the system from outside the system, or can be moved from where they are a hindrance (navigation channels) to where they are beneficial (marsh restoration sites).

The study team identified five main drivers that influence the project area on a large scale.

D1: Relative Sea Level Rise (Sea Level Rise and Subsidence)

D2: Numerous Hurricanes and Storms

D3: Hydrologic Alteration

D4: Sediment Supply to the Chenier Plain

D5: Mineral and Sediment Extraction

4.1.1 Relative Sea Level Rise

Relative sea level rise (RSLR) consists of eustatic sea level rise combined with subsidence. Eustatic sea level rise is defined as the global increase in oceanic water levels primarily due to changes in the volume of major ice caps and glaciers, and expansion or contraction of seawater in response to temperature changes. The International Panel on Climate Change (IPCC) estimates that average eustatic sea level rise since 1961 has been 1.8 mm per year, and since 1993, 3.1 mm per year (IPCC 2007). Additionally, there is a projected rise between 182 and 610 mm in the next century (IPCC 2007). In coastal Louisiana, this rise in sea level is exasperated by rapid changes in land elevation.

Subsidence is the decrease in land elevations due to compaction of Holocene deposits, consolidation of sediments, and faulting. Anthropogenic activities such as sub-surface fluid extraction and drainage for agriculture, flood protection, and development are also contributors to land elevation decreases. Forced drainage of wetlands results in lowering of the water table resulting in accelerated compaction and oxidation of organic material Areas under forced drainage can be found throughout coastal Louisiana and the study area. Each process produces a range of subsidence rates dependent on local environmental factors and each process occurs across a unique set of scale (Reed and Yuill 2009). The mean subsidence rate for Louisiana is 11 mm (0.43inches) per year (Berman 2005).

This combination of sea level rise and rapid subsidence, as well as natural and man induced erosional processes, has resulted in extensive wetland loss in coastal Louisiana. Rates for RSLR along coastal Louisiana are currently estimated to be between 1 to 1.2 m/century (USACE 2004). These are the highest rates of RSLR along the contiguous United States.
RSLR affects project area marshes by gradually inundating marsh plants. Marsh soil surfaces must vertically accrete to keep pace with the rate of relative sea level rise. Changes in land elevation vary spatially along coastal Louisiana, however in areas where subsidence is high and riverine influence is minor or virtually nonexistent wetland habitats sink and convert to open water.

Land elevations increase as a result of sediment accretion (riverine and littoral sources) and organic deposition from vegetation. Vertical accretion in most of the study area, however, is insufficient to offset subsidence. The combination of subsidence and eustatic sea level rise is likely to cause the landward movement of marine conditions into estuaries, coastal wetlands, and fringing uplands (Day and Templet 1989; Reid and Trexler 1992).

4.1.2 Hurricanes and Storms

The Gulf Coast region is affected by tropical and extra-tropical storms. These atmospherically driven storm events can directly and indirectly contribute to coastal land loss through: 1) erosion and breaches from increased wave energies; 2) removal and/or scouring of vegetation from storm surges; and 3) storm induced saltwater intrusion into interior wetlands. These destructive processes can result in the loss and degradation of large areas of coastal habitats in relatively short periods of time (days and weeks versus years). Since 1893, over 130 tropical storms and hurricanes have struck or indirectly impacted Louisiana's coastline. On average, a tropical storm or hurricane affects Louisiana every 1.2 years. The most recent tropical cyclones to affect the study area were Hurricanes Katrina and Rita, which occurred in August 2005 and September 2005, respectively, and Hurricanes Gustav and Ike, which occurred in September 2008. Storm surge and wave field associated with the 2005 storms eroded 527 km^2 of wetlands within the Louisiana coastal plain (Barras et al 2008).

Hurricane Rita was the fourth-most intense Atlantic hurricane ever recorded and the most intense tropical ever observed in the Gulf of Mexico. The storm generated a surge of up to 5 meters in some areas, driving saltwater tens of kilometers inland killing wetlands in artificially impounded areas. Rita made landfall between Sabine Pass, Texas and Johnson's Bayou, Louisiana causing extensive damage to Louisiana's southwest coastal parishes. Coastal communities in Cameron Parish were destroyed; the communities of Holly Beach, Hackberry, Creole, Grand Chenier, and Cameron were severely impacted. The Calcasieu Parish communities of Sulphur, Westlake, and Vinton also suffered significant damage and parts of the City of Lake Charles experienced 2 to 3 meter deep flooding associated with surge propagating up a ship channel.. Six people lost their lives and 10,000 structures were flooded. Rita caused $9.4 billion in damage along the Louisiana and southeastern Texas coasts.

Additionally, hurricane impacts to coastal environments can include sediment overwash, ripped and torn marsh, erosion of pond and lake margins, wrack (large amounts of plant debris) deposition, and lateral compression of marshes. Substantial sediment deposition associated with the passage of the storm can result in the burial of the pre-storm surface and the smothering of vegetation (Dunbar et al. 1992, Jackson et al. 1992). This same effect may occur as a result of burial by wrack. Extensive areas of marsh can be pushed against firm barriers (for example, levees and firmly grounded marsh) and can result in a ridge and trough. Freshwater marsh species can experience a "burning" effect (aboveground portions of the plants are killed) if exposed to saline waters (Dunbar et al. 1992, Jackson et al. 1992, Stone et al. 1993, Stone et al. 1997). In some marsh zones, unconsolidated or weakly rooted marsh has been eroded. Storms and hurricanes, depending on strength and intensity, can also blow over, defoliate, and/or cause major structural damage to trees well beyond the coastal zone (Lovelace 1998).

4.1.3 Hydrologic Alterations

Hydrologic alterations, including navigation channels and water control structures, are predominant sources of stress on the southwest Louisiana coastal system. These alterations cause disruptions in the natural coastal hydrological processes causing changes in circulation and tidal prism, and by increasing saltwater intrusion into the freshwater interior.

Altered hydrology is exacerbated by additional physical changes made in the watershed, which include canal, roads, and levees. Canals and associated spoil banks, constructed for navigation and/or oil and gas development, can be found throughout the project area. Canals impact wetlands by changing the normal hydrologic pattern. Canals deprive existing natural channels of water and allow more rapid runoff of water than the slower shallower natural channels do. This allows for greater fluctuation in the marsh and a lowering of the minimum water level which dry the marsh (Mitsch and Gosslink 2000).

These hydrologic alterations (e.g. cutting channels and canals, and the artificial creation of spoil banks) have also led to increased coastal habitat fragmentation. Hydrologic connectivity in the Chenier Plain has been disrupted by several activities, most notably the creation of navigational channels, such as the Sabine/Neches Waterway, Calcasieu Ship Channel, GIWW, Mermentau Ship Channel, and Freshwater Bayou Canal Navigational channel, and the creation of water control structures, such as the Calcasieu and Leland Bowman locks, the Freshwater Bayou Canal Lock, the Schooner Bayou Canal Structure, and the Catfish Point Control Structure. These channels have disrupted the hydrology of the region by facilitating saltwater intrusion into the historic freshwater interior. Water control structures were subsequently constructed in part to control the amount of saltwater intrusion into the interior, but further altered the hydrology by managing water flow. Together, these alterations have acted to change the hydrologic pattern of the Chenier Plain.

Through the creation of dredge material banks, roads and highways, and flood protection levees, some wetland habitats within the Chenier Plain have also become hydrologically isolated. During extreme water events, such as tropical storms, these habitats are particularly vulnerable due to their slow drainage patterns and the often resultant ponding of salt water throughout the wetlands. In such cases, the typical result has been ponding of water over the wetlands, often with high salinity content. This excessive ponding over an extended period of time in certain types of wetland habitats can kill the vegetative communities and result in wetland loss and

eventual conversion to open water. Near 100percent mortality of marsh vegetation in many areas has been documented as a result of high salinity water brought in by storm surge.

The spoil banks associated with these channels and canals reduce sheetflow of water across the wetlands (Swenson and Turner 1987) and prevent the exchange of sediment and nutrients and cause artificially prolonged flooding. These effects combine to eliminate soil-building processes necessary to counteract subsidence (USACE 2004, USACE 2010). In addition canal constructions can cause secondary indirect impacts such as accelerating erosion rates along the channel and canal banks.

Channels and canals provide avenues for higher salinity water to move into previously freshwater marshes, which ultimately leads to habitat degradation and land loss. By altering salinity gradients and patterns of water and sediment flow through marshes, channel and canal dredging indirectly changed the processes essential to a healthy coastal ecosystem and led to habitat conversion. Channels and canals that stretch from the Gulf of Mexico inland to freshwater areas allow saltwater to penetrate much farther inland, particularly during droughts and storms, which has had severe effects on freshwater wetlands (Wang 1987). Extreme salinity changes can stress fresh and intermediate marshes to the point where vegetation dies and the wetlands convert to open water (Flynn et al. 1995).

4.1.4 Sediment Supply

The Chenier Plain was developed as the result of the interplay of three coastal plain rivers (Sabine, Calcasieu, and Mermentau Rivers), cycles of Mississippi River Delta development, and the Gulf of Mexico. During periods of active Mississippi River delta building, Gulf of Mexico currents transported fine-grained sediments (clay and silt) in an East to West direction along the Louisiana coast. When delta formation occurred in shallow waters of bays or the inner continental shelf along the western reaches of the Deltaic Plain, longshore currents carried the fine-grained sediment west in a mudstream towards the Chenier Plain. These sediments were then brought into coastal estuaries and marshes along the gulf shoreline by tidal processes and storms which were deposited along the shore to form mudflats (Gagliano and van Beek 1970). This newly formed land was colonized by wetland vegetation, which further promoted the land-building process. Wave action and occasional storm events also deposited sand and shells onto the newly built land.

Alteration of the Mississippi River for navigation and flood control now limits the delivery of sediments onto the continental shelf and, thus, the redistribution of those sediments westward through littoral processes., with wide-ranging secondary effects. However, since 1973, delta-building processes at the mouth of the Atchafalaya River have initiated a new interval of land building via the formation of extensive mudflats along the eastern part of the Chenier Plain.

4.1.5 Mineral and Sediment Extraction

The production, refinement, and transport of oil and gas have resulted in both short- and long-term negative environmental impacts to coastal Louisiana. Recent findings have indicated that oil and gas fluid withdrawal has resulted in regional subsidence and fault reactivation causing wetland losses in coastal Louisiana (Morton et al. 2005). This induced subsidence coupled with sea level rise can lead to elevation changes, increased flooding, and eventual habitat switching and loss.

Secondary impacts result from canal construction for oil and gas extraction and the subsequent associated spoil banks which have altered the hydrology of the area (Jones et al. 2002). These barriers limit the exchange of water sediment, nutrients between the water pathways and the marsh. Hydrologic barriers such as roads, levee, and culverts obstruct the flow of water and can modify inundation patterns on either side of the barrier (Harvey et al. 2010).

4.2 Ecological Stressors

ES1: Increased Flood Duration

ES2: Storm Surge

ES3: Saltwater/Salinity

ES4: Shoreline Erosion

ES5: Marsh fragmentation.

ES6: Increased Tidal Prism or Amplitude.

ES7: Altered Circulation

4.2.1 Increased Flood Duration

Hydrologic modifications in the project area, especially the construction of roads, levees, and other similar features has altered normal drainage patterns. This had led to a condition whereby flood durations are increased in many wetland areas. This is especially problematic in the wake of a hurricane, when highly saline storm surge waters are impounded for long periods, causing stress and eventual loss of the affected wetland communities.

4.2.2 Storm Surge

Tropical cyclone events exert a stochastic but severe stress upon the swamp habitat through salinity spikes associated with saline storm surge events. The introduction of saline storm surge water into impounded areas results in reduced biomass production and impaired health, which in turn causes increased vegetation mortality, decreased soil production and integrity, and a consequent increase in relative subsidence. Saline storm surge waters become impounded by the spoil banks, roads and levees in the area. Consequently, these periodic influxes of saline storm surge waters result in cumulative increases in salinity in impounded waters and soils in the study area. Saltwater introduction into freshwater wetlands has been demonstrated to reduce productivity for short-term periods and cause the loss of wetland vegetation altogether for longer periods of inundation.

The elevation of the storm surge within a coastal basin depends upon the meteorological parameters of the hurricane as well as the physical characteristics existing within the basin. The physical factors include the basin bathymetry, roughness of the continental shelf, configuration of the coastline, and the existence of significant natural or man-made barriers. With the loss of marsh and chenier features, storm surge can become larger at points further inland, including areas of dense development.

While the study area has periodically experienced localized flooding from excessive rainfall events, the primary cause of the flooding events has been the tidal surges from hurricanes and tropical storms. During the past eight years, the planning area has been greatly impacted by storm surges associated with three Category 2 or higher hurricanes—Lili, Rita, and Ike, which inundated structures and resulted in billions of dollars in damages to southwest coastal Louisiana.

Hurricane surge also causes significant damage to wetlands. Hurricane surge has formed ponds in stable, contiguous marsh areas and expanded existing, small ponds, as well as removed material in degrading marshes (Barras 2009). Fresh and intermediate marshes appear to be more susceptible to surge impacts (Barras 2006, Howes et al. 2010).

4.2.3 Saltwater/Salinity Intrusion

Salinity levels exist along a gradient, which declines as the saltwater moves inland from the Gulf of Mexico. Distinct zones of plant communities, or vegetative habitat types, differing in salinity tolerance, exist along that gradient, with the species diversity of those zones increasing from salt to fresh environments. Saltwater intrusion changes the salinity gradient, which results in habitat changes.

The combined effects of hydrologic alterations and hurricanes in the near term as well as sea level rise and subsidence over the long term lead to saltwater intrusion into areas that would otherwise remain fresh or intermediate.

Decreased freshwater inputs and increase channelization allows tidal water to intrude farther upstream, causing significant damage to freshwater wetland systems and changing freshwater wetlands to brackish or saline

marshes. This is the principle factor in the conversion of freshwater systems and in extreme cases salt intolerant vegetation cannot replaced the freshwater species before the marsh converts to open water (Mitsch and Gosslink 2000, Flynn et al. 1995).

Changes to the salinity gradient are caused by a number of factors, including: the construction of levees, man-made channels, and canals, and degraded wetland areas. Tropical storm events can introduce saltwater into fresher areas, damaging large amounts of habitat in a short period of time.

4.2.4 Shoreline Erosion

Shoreline erosion is a normal consequence of natural tidal processes, wind generated waves, and surge from storm events, but can be accelerated by marsh breakdown and stress from other factors such as saltwater intrusion, flooding, and relative sea level rise. When these natural causes are combined with man-made activities (navigation/access channels) inland areas are subjected to more dramatic tidal forces and wave action, increasing erosion.

In the past 100 years, the total barrier island area in Louisiana has declined 55percent at a rate of 155 acres per year (Williams et al. 1992), largely due to storm overwash and wave erosion. In many ways the bays and lakes and the banks of canals and streams are even more vulnerable to erosion than the barrier islands. The Louisiana coast has approximately 350 miles of sandy shoreline along its barrier islands and gulf beaches; however, there are about 30,000 miles of land-water interface along bays, lakes, canals, and streams. Most of these consist of muddy shorelines and bank lines, and virtually all are eroding. In many instances, rims of firmer soil around lakes and bays, and natural levees along streams have eroded away leaving highly organic marsh soils directly exposed to open water wave attack.

4.2.5 Increased Tidal Prism or Amplitude

Tidal currents in Louisiana are relatively small, due to the small tidal amplitude. In the absence of wind, density effects and barometric pressure gradients, these currents reach magnitudes of approximately 10 – 15 cm/s (0.3 - 0.5 ft/s). Although small in magnitude in open coastal waters, tidal currents can reach speeds of approximately 50 cm/s (1.7 ft/s) at estuary and barrier island inlets, depending on the inlet dimensions. Generally, tidal exchange between back-barrier bays and the Gulf of Mexico has increased along the delta plain since at least the 1880s due to widespread conversion of wetlands and salt marsh to open water areas.

4.2.6 Altered Circulation Patterns

Circulation of coastal waters depends on driving forces such as tides, wind, and atmospheric pressure. Along the complex Louisiana coast, circulation mechanisms go beyond these driving forces to include high rainfall; the large volume of fresh water introduced by the Mississippi and Atchafalaya Rivers; currents induced by density differences and mixing processes of these two masses of water; local shoreline and bathymetric features such as the Mississippi River mouth, barrier islands, marshes, inlets, bays, and so forth. More locally, the loss of wetlands coupled with the effects of canals, ridge gapping, and other landscape alterations can significantly alter circulatory patterns.

4.2.7 Marsh Habitat Fragmentation

Habitat fragmentation is the disruption of continuous blocks of habitat into less continuous habitat as a result of human disturbances and conversion of vegetation from one type to another. Climate change, hydrologic alterations, and diminishing sediment supply individually or combined are causes of coastal degradation and habitat fragmentation in Louisiana. These impacts are worsened by human intervention at various scales

Two components of climate change that will continue to effect ecosystem connectivity are sea level rise and the increased frequency and intensity of wind-driven storm events (Hitch and Leberg 2008). Impacts are and will continue to be exasperated by human activities that have modified water and sediment delivery from watersheds to the coastal systems. Relative sea level rise is key factor contributing to the fragmentation of coastal marshes. Inundation, resulting from seal level rise and subsidence, cause conversion of vegetated surfaces to open water thus decreasing the amount of available wetland habitat.

Marshes of the project area provide habitat and a food source for fish and wildlife species. Marsh loss implies an imbalance between sea level and marsh accretion rates – a primary factor is a decrease in or lack of sediment supply (Blum and Roberts 2009). Additionally, dredging of channels has increased water depths thereby strengthening tidal currents, enhancing erosion, and trapping sediments that would otherwise be deposited on the marsh surfaces in deeper areas.

4.3 Ecological Effects

EE1 Wetland Loss

EE2 Decreased Primary Productivity

EE3 Habitat Conversion and Changes in Biological Community Composition

EE4 Loss of Ridges and Cheniers.

4.3.1 Wetland Loss

Wetland loss in the project area can be the result of gradual decline of marsh vegetation due to inundation and saltwater intrusion eventually leading to complete loss of marsh vegetation or the result of storm surge events. As marsh vegetation is lost, underlying soils are more susceptible to erosion and are typically lost as well, leading to deeper water and precluding marsh regeneration. Significant accretion of sediments is then required in order for marsh habitat to reestablish.

The accelerated loss of Louisiana's wetlands has been ongoing since at least the early 1900s with equal harmful effects on the ecosystem and possible future negative impacts to the economy of the region and the Nation (LCA 2004).

The LCA Study (2004) estimated coastal Louisiana would continue to lose land at a rate of approximately 6,600 acres per year over the next 50 years. It is estimated that an additional net loss of 328,000 acres may occur by 2050, which is almost 10 percent of Louisiana's remaining coastal wetlands.

Wetland degradation and loss are the result of both natural factors and anthropogenic activities, producing conditions where wetland vegetation can no longer survive and wetlands are lost (Barras et al. 2003, Barras et al. 1994; Dunbar et al. 1992). Natural causes contributing to coastal land loss include: wave erosion, sea level rise, subsidence resulting from compaction of muddy and organic sediment, geologic faulting, river floods, and tropical storm events. Human activities that have impacting coastal wetland loss include: flood control modifications including the Mississippi River levee system, navigation channels and structures, oil and gas infrastructure, and direct water quality impacts.

In the project area, the process for wetland loss can start with the be the result of gradual decline of marsh vegetation due to inundation and saltwater intrusion eventually leading to complete loss of marsh vegetation or the result of storm surge events. As marsh vegetation is lost, underlying soils are more susceptible to erosion and are typically lost as well, leading to deeper water and precluding marsh regeneration. Significant accretion of sediments is then required in order for marsh habitat to reestablish.

Perhaps the most serious and complex problem in the study area is the rate of land and habitat loss. The Louisiana coastal plain contains one of the largest expanses of coastal wetlands in the contiguous United States and accounts for 90 percent of the total coastal marsh loss in the nation (USACE 2004). Across much of the Louisiana coast, wetland loss and shoreline erosion continue largely unabated, resulting in accelerated coastal land loss and ecosystem degradation.

4.3.2 Reduced Primary Productivity

Decreased productivity in vegetative communities in the study area is thought to be a biological response to the lack of nutrients and sediment inputs, and saline stress from flooding following storm surge.

There has been a reduction in frequency of nutrient and sediment rich waters into and across the wetlands as a result of flood protection and water control structures, and channelization for navigation and oil and gas infrastructure. Instead, the nutrient rich water is delivered directly into the coastal bays or into the Gulf of Mexico, and often as a result, coastal wetlands lack the required nutrients necessary to maximize productivity. Increased productivity results in higher organic soil formation, which then leads to increased deposition and vertical accretion.

Salinity induced stress decreases primary production and biomass in freshwater marshes (Smart and Barko 1980, Linthurst and Seneca 1981, Pezeshki et al. 1987, McKee and Mendelssohn 1989, Spalding and Hester 2007) and therefore organic matter and vertical accretion rates are compromised following saltwater intrusion. Maintaining a balanced position in the coastal landscape requires that marshes accrete vertically as sea level rises and the marsh surface sinks because of subsidence. In coastal Louisiana, the amount of sedimentation required to keep pace with sea level rise is high compared to regions of the United States (Stevenson et al. 1986).

4.3.3 Habitat Conversion and Changes in Biological Community Composition

Habitat conversion can be the result of several drivers acting independently or collectively. The conversion of habitat can make an area more susceptible to storms and erosion as well as altering the type of fauna expected to occur in the area. Freshwater marsh can be susceptible to saltwater intrusion. The effects of invasive species can damage or displace native vegetation.

Coastal marshes also provide habitat for a variety of vertebrate wildlife including fish, birds, mammals, and reptiles. Teal (1986) stated that one of the most important functions of coastal marshes was to provide habitat for migrant and resident bird populations. Some wildlife species inhabiting tidal marshes are also important game animals, valuable furbearers, and provide recreational opportunities for birdwatchers, nature enthusiasts, and wildlife photographers (USACE 2010).

The majority of species that utilize the wetlands have neither commercial nor recreational value, but simply are ecologically important members of the ecosystem. Many of the organisms that use the marsh ecosystem are highly mobile and serve as a transfer mechanism for nutrients and energy to adjacent terrestrial or aquatic ecosystems. Some of the larger vertebrates, including the muskrat and nutria, consume large amounts of forage and, at high densities, can have significant impacts on marsh vegetation structure (USACE 2008).
Tidal marshes provide forage habitat, spawning sites, a predation refuge, and a nursery for resident and nonresident fishes and macrocrustaceans. These organisms use tidal marshes or adjacent subtidal shallows either year round or during a portion of their life history. These organisms are consumed by nektonic and avian predators and are considered to represent an important link in the marsh-estuarine trophic dynamics (USACE 2008).

4.3.5 Loss of Ridges and Cheniers

The Chenier Plain of SW Louisiana consists of multiple shore-parallel, sand rich ridges that are balanced on and physically separated from one another by relatively finer grain, clay-rish sediments. Cheniers are unique and critical components of the local environment. They support a diversity of wildlife and, because of their location along important migration pathways, are especially significant for migrating birds, as well as providing natural protection against salt water intrusion, storm surge, and flooding (Providence Engineering Group Cheniers and Natural Ridges Study 2009).

Formed over thousands of years by the deltaic processes of the Mississippi River and other streams, the chenier ridges of southwest Louisiana run laterally to the modern shoreline and rise above the surrounding marshes by as little as a few inches or as much as 10 ft (Gould and McFarlan 1959, Byrne et al. 1959). These ridges range from 2 to 15 ft thick and from 100 to 1,500 ft wide, with some ridges extending along the coast for a distance of up to 30 miles. Live oak and hackberry are dominate canopy species, and others common species are red maple, sweet gum, water oak, green ash, and American elm.
Cheniers have been severely impacted by human activities such as deforestation for conversion to cattle pasture or development. They have also been threaten by coastal erosion and wetland loss resulting from salt water

intrusion, subsidence, hurricanes, debris from oil and gas infrastructure by storms, navigation channels, and invasive species.

4.4 Attributes and Performance Measures

A1 Land Cover/ Land Change

Performance Measures: Relative Change in Land Cover

A2 Vegetation Distribution and Diversity

Performance Measures: Community Composition and Relative Abundance

A3 Elevation

Performance Measures: Surface Elevation and Vertical Sediment Accretion

4.4.1 Land Cover

Land cover has been identified as a key indicator of project success with respect to preventing habitat conversion and future land loss. Comparison of pre-project land cover characteristics with post-project land cover characteristics would serve to determine if the current trend in habitat conversion and land loss within the study area experiences a post-project decline or ceases altogether. Additionally, post-project land cover analysis would determine if areas within the study area that had previously gone through a conversion, undergo a post-project reversion.

Spatial analysis has been identified as an assessment performance measure for the determination of the response of land cover to the proposed project. Spatial analysis may involve comparative analysis of pre-project and post-project aerial or satellite imagery and may utilize Landsat Thematic Mapper analysis to determine relative changes in land cover within the study area.

4.4.2 Vegetation Distribution and Diversity

Plant distribution and diversity has been identified as a key indicator of project success with respect to preventing, reducing, or reversing wetland loss in the study area. Comparison of pre-project vegetation monitoring data with post-project vegetation monitoring data would serve to determine if plant communities within the study area change in response to project features.

Relative abundance is a measure of the abundance or dominance of each species present in a sample. Relative abundance can be used to document the degree of impact in an area by measuring both species dominance and evenness. Relative abundance can be used to assess ecosystem health by comparing plant density before and after project implementation. The Braun-Blanquet method (Mueller-Dombois and Ellenberg 1974) as described in Steyer et al. (1995) will be utilized to measure relative abundance.

A post-project stabilization of relative abundance within the study area would be an indication of significant project success, while a post-project reduction in the rate of decline of relative abundance would be an indication of moderate project success. Conversely, no change in the rate of decline of relative abundance post-project would indicate that the project did not succeed in increasing vegetation productivity.

4.4.3 Elevation

Ground surface elevation has been identified as a key indicator of project success with respect to increasing sediment and nutrient load within the study area. Comparison of pre-project elevations with post-project elevations would serve to determine if sediment input and soil accretion is occurring within the study area in response to project features. A post-project decrease in the rate of elevation decline would implicitly indicate the introduction of nutrients and sediment into the marshes as a result of the project. Two performance measures have been identified for this attribute, including surface elevation table (SET) measurements and feldspar marker horizon measurements.

Surface Elevation Table (SET) measurements provide a constant reference plane in space from which the distance to the sediment surface can be measured by means of pins lowered to the sediment surface. Repeated

measurements of elevation can be made with high precision because the orientation of the table in space remains fixed for each sampling. Elevation change measured by the SET is influenced by both surface and subsurface processes occurring within the soil profile.

Feldspar marker horizon measurements involve the placement of a cohesive layer of feldspar clay on the ground surface. Soil borings are extracted at the marker horizon location periodically to measure the amount of soil deposition and/or accretion that has occurred above the horizon since placement. Significant quantities of soil atop marker horizons are indicative of soil building within the area, which in turn indicates an increase in relative elevation. A post-project stabilization of elevation as evidenced by SET measurements or documented soil accretion atop a marker horizon within the study area would be an indication of significant project success, while a post-project decrease in the rate of decline in elevation would be an indication of moderate project success. Conversely, no change in the rate of elevation decline post-project within the study area would indicate that the project did not succeed in offsetting subsidence and, by extension, habitat conversion and future land loss.

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SOUTHWEST COASTAL LOUISIANA
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex M

Reserved

SOUTHWEST COASTAL LOUISIANA
INTEGRATED FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex N

Recreational Resources

1. RECREATION RESOURCES

Historic and Existing Conditions

Recreational features and opportunities vary throughout the coastal zone, habitat and culture playing significant roles in the diversity of activities. From the games and competitions of Native Americans, to the influence of diverse immigrant cultures, traditional recreation in Louisiana has been a product of its people. Nearly 10,000 years ago, people began living off the ample resources of Louisiana. The means by which Louisiana's early residents lived, hunting and fishing for food, utilizing high ground for camps, and building vessels for transportation, shaped what is now recognized as traditional recreation in southern Louisiana.

State parks *within the Gulf Coast Prairie and Forested Terraced Uplands* physiographic regions include Palmetto Island and Sam Houston Jones parks. There are no Federal National Wildlife Refuges (NWR) or Wildlife Refuges (WR) within the regions. Sixteen boat launches are located within these regions.

Federal NWRs or State WRs within or adjacent to the Gulf Coast Marsh physiographic region include Sabine, Cameron Prairie, and Lacassine NWR and White Lake Wetlands Conservation Area. Public and private boat launches are located throughout the study area.

Recreation areas within or adjacent to the Gulf Coast Marsh physiographic region that provide access to high quality recreational resources include three National Wildlife Refuges, one Wildlife Management Area, one State Wildlife Refuge, and one State Park. See Map N1. From east to west, the region includes the 13,000-acre State Wildlife Refuge, the 71,544-acre White Lake Wetlands Conservation Area, the 76,000-acre Rockefeller WR, the Lacassine National Wildlife Refuge NWR, Cameron Prairie NWR, and the 124,511-acre Sabine NWR. Outside but adjacent to the area is Cypremont State Park, Shell Keys NWR and Marsh Island WR. These areas represent more than 329,000 acres that are visited more than 460,000 times annually. Recreation areas include trails for hiking and biking, five boat ramps (within recreation parks), three visitor centers, picnic shelters, one classroom, and one campground that is rented more than 36,700 times annually. Recreation areas also provide opportunities for hunting, boating, bird watching, fishing, crabbing, crawfishing, education, picnicking, education, camping, and playing.

Access into the WMAs and Refuges is generally by car or boat. Consumptive recreation includes hunting, fishing for freshwater and saltwater species and trapping alligators and nutria. Non-consumptive recreation includes bird watching, sightseeing, boating and environmental education/interpretation. Many of the parks offer hiking trails, camping and picnic shelters.

In addition to the high quality recreational fishing and hunting in the parks in the region, several lakes and inland marshes offer opportunities for hunting and catching both freshwater and saltwater species. Grand, White, Sabine and Calcasieu Lakes, Freshwater Bayou and Vermillion Bay are prime fishing spots for recreational species such as redfish and speckled trout as well as flounder and brown and white shrimp. White Lake is a remote open lake and can only be accessed by the Schooner Bayou Canal, the old Intracoastal Canal north of Pecan Island or via the Superior Canal west of Pecan Island. The Calcasieu Lake area offers 10 of the 35 public or private boat launches in the area.

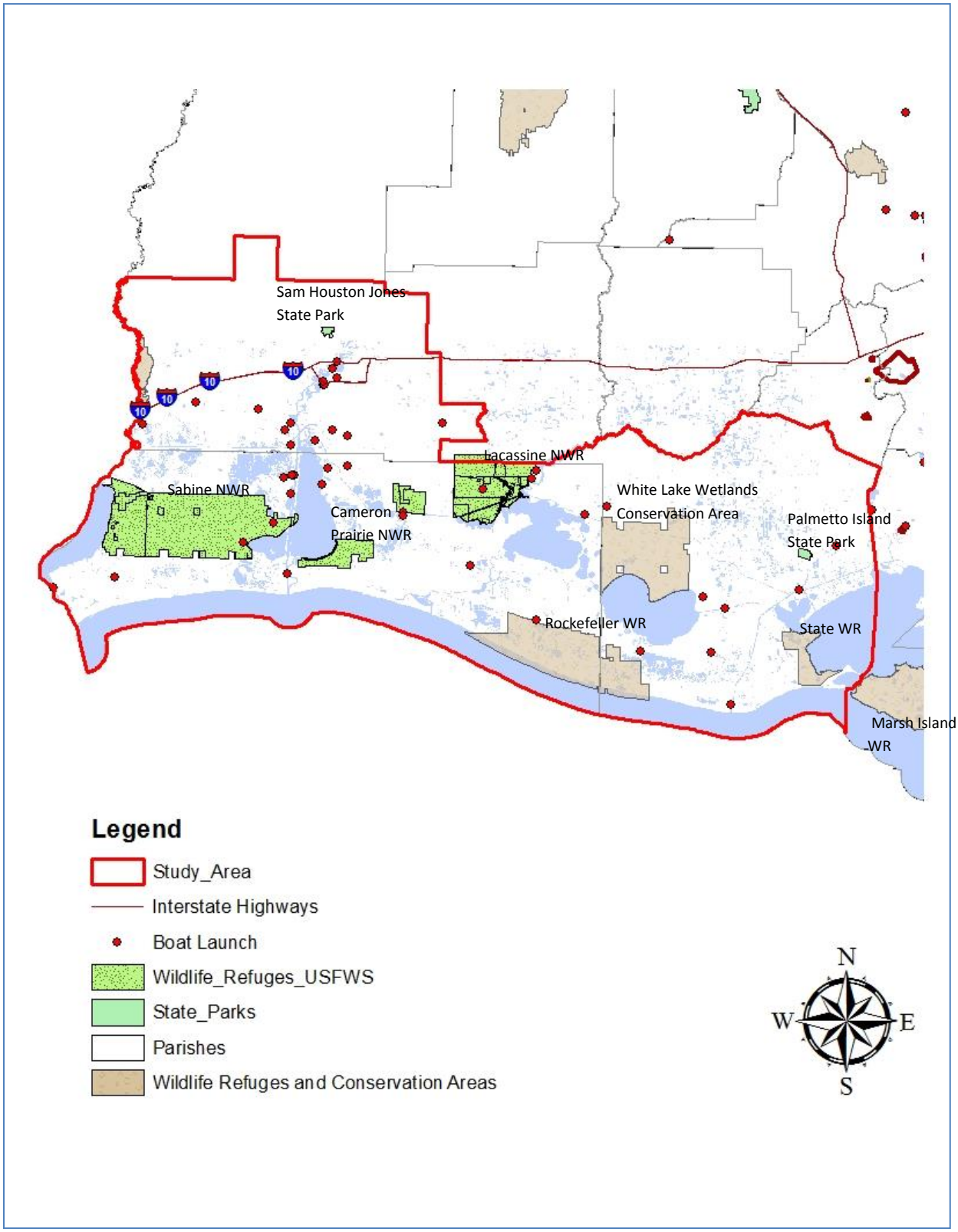
Bird watching is also an important recreational resource in southern Louisiana. A global initiative of BirdLife International, implemented by Audubon and local partners in the United States, the Important Bird Areas Program (IBAs) is an effort to identify and conserve areas that are vital to birds and other biodiversity. In the NER area, Audubon lists the entire Chenier Plain as a globally IBA (source: http://netapp.audubon.org/iba, accessed 25 September 2013). Many of the IBAs recognized are located within state or federally operated areas. Federal parks within the Chenier Plain that are globally IBAs include Lacassine NWR, Cameron Prairie NWR and Sabine NWR. The sanctuary provided at Lacassine Pool, a very popular birding site, is critical to the long-term viability of continental pintail populations and is one of the key pintail wintering areas in the continent, with a wintering pintail population that has reached almost 400,000 (source: http://www.fws.gov/

swlarefugecomplex/lacassine/, accessed 25 September 2013). Also in the area is the Baton Rouge Audubon Society 40-acre Peveto Woods Sanctuary located along the Louisiana coast in Cameron Parish. The Peveto Woods Bird & Butterfly Sanctuary site is the most heavily birded locale in Louisiana and was the first Chenier sanctuary for migratory birds established in Louisiana. Each spring and fall, Peveto Woods hosts most migratory songbirds native to eastern North America (source: http://www.braudubon.org/peveto-woods-sanctuary.php, accessed 25 September 2013). The sanctuary is a favorite birding spot in southwest Louisiana, as well as a location for viewing the many butterfly species that migrate to the region.

The State of Louisiana owns and operates the White Lakes Conservation Area, Rockefeller WR and the State Wildlife Refuge (SWR), all located in the Chenier Plain and all globally IBAs. Rockefeller Wildlife Refuge is one of the most biologically diverse wildlife areas in the nation. Historically, Rockefeller wintered as many as 400,000-plus waterfowl annually, but severe declines in the continental duck population due to poor habitat quality on the breeding grounds have altered Louisiana's wintering population (source: http://www.wlf.louisiana.gov/refuge/ rockefeller-wildlife-refuge, accessed 25 September 2013). The Audubon/Paul J. Rainey Wildlife Sanctuary is located to the west and the Marsh Island Wildlife Refuge to the east of the SWR. The Little Pecan Island Preserve, located between Lacassine and Rockefeller WRs near White Lake is managed by The Nature Conservancy and contains 1,810 acres of gulf coast prairies and marshes in Cameron Parish. Palmetto Island State Park is an IBA.

Designated within the area is the Creole Nature Trail National Scenic Byway, a 105- mile driving and walking tour touching four state and national wildlife refuges and a bird sanctuary. Finally, public and private boat launches are located throughout the entire NER area.

Map N1: National and state parks in the SWC area



Future Without-Project Conditions (No Action Alternative)

Direct, Indirect, and Cumulative Impacts: Recreational resources in the Louisiana coastal zone that will be most affected in the Future Without Action are those related to loss of wetlands/marshes and habitat diversity. Many recreational activities are based on aquatic resources and directly related to the habitat and species in an area.

There would be no direct impacts. Indirectly, the continued loss of wetlands/marshes and habitat diversity affects recreational opportunities. Storm surge and saltwater could have a negative impact on freshwater forests and habitats and could reduce recreational resources (e.g., fishing, hunting, bird watching, and other). In general, further degradation of area marshes will continue and its associated negative impacts on recreation activities will increase.

Recreational infrastructure would remain vulnerable to surges. Another major impact of storm surge is land loss and the possible loss of facilities and infrastructure that support or are supported by recreational activities. Land loss can result in the loss of park land, boat launches, parking areas, access roads, as well as marinas and supply shops. In general, further degradation of area marshes will continue and its associated negative impacts on wildlife activities will increase. Additionally, saltwater intrusion and predicted sea-level rise will continue to cause land loss. As existing freshwater wetland/marsh areas convert to saltwater marsh, then to open water, the recreational opportunities will change accordingly.

HURRICANE STORM DAMAGE RISK REDUCTION NATIONAL ECONOMIC DEVELOMENT (NED) PLAN

Alternative —Nonstructural 0-25-Year Floodplain - Recommended Plan (RP)

Nonstructural measures as part of the RP include elevation of residential structures and flood proofing of non-residential structures. There would be no direct impacts on recreational resources from structure elevation that results in storm surge passing safely below a structure. By elevating residential recreational structures, such as camps, damage from storm surge is less likely to occur. Additionally, elevated structures should create less debris that must be removed following a storm surge event. Elevation requirements may lead to fewer camps and hunting clubs in the region because elevated structures would most likely be more costly to erect. This may negatively affect recreation opportunities because people would have to travel further to access locations for activities such as hunting, fishing, boating, and birding.

A direct impact from flood proofing park buildings is the recreational use may be temporarily unavailable during flood proofing activities. Flood proofing at parks could affect recreational structures at the White Lake Wetlands Conservation Area, the Lacassine, Cameron Prairie, and Sabine National Wildlife Refuges and Sam Houston Jones State Park. Once flood proofing is complete, park structures would reopen more quickly following storm surge events.

See Map N2 for National and State Parks in the study area and NED RP structures.

Cumulative Impacts: Depending on the number of structures affected, recreational resources impacts could include fewer camps and features at parks as cost associated with elevation or flood proofing may result in fewer recreational opportunities, outside of fishing and hunting.

ECOSYSTEM RESTORATION (NER) PLANS

Alternative CM4 — Comprehensive Small Integrated Restoration (RP)

Direct and Indirect Impacts:

Marsh Restoration: Any direct impacts to recreational fishing, hunting and other recreational resources would be temporary and occur during construction activities. However, since there are many other areas for recreational fishing and hunting in the coastal region, impacts are expected to be minimal.

An indirect effect of marsh restoration and nourishment is the potential for limiting access to fishing areas as boaters would have to navigate around newly created land area. Recreationalists may have to circumvent the marsh restoration project area when traveling to a destination due to construction activities limiting or delaying access. It is assumed floating pipelines would convey dredge material from borrow areas to sites being restored. These pipelines may, in some cases, block access to fishing areas and fisherman may have to travel longer distances to arrive at their preferred destination. However, canals that are frequently used by fisherman should not be blocked as the pipeline crossing these locations may be submerged.

Marsh restoration projects proposed for Cameron Prairie NWR East Cove Unit and to a lesser extent in Sabine NWR may improve fishing and hunting opportunities once the projects have a chance to mature into productive fishery and wildlife habitats. See Map N2 for National and State Parks in the study area and NER RP Measures. Marsh restoration measures proposed along Freshwater Bayou should provide additional habitat to birds and other wildlife in the Paul J. Rainey Wildlife Sanctuary. In general, measures that create marsh habitat and improve hydrology of wetlands are more likely to improve recreational fishing opportunities by enhancing the sustainability of productive nursery habitats. Marsh restoration, while improving nursery habitat for juveniles in the interior marshes, could improve recreational fishing opportunities in off-shore waters as adults move to deeper depths. Development of additional marsh habitat is potentially beneficial to bird watching as it would support more birds and increase the diversity of species in the area. Potential negative effects include temporary turbidity associated with construction of marsh projects and excavation of borrow material in the Calcasieu Ship Channel, Calcasieu Lake, Freshwater Bayou, and the Gulf of Mexico.

Shoreline Protection: Any direct impacts to recreational fishing and hunting would be temporary and occur during construction activities. Bank fishing in areas proposed for shoreline protection or spoil bank fortification measures could be affected. Holly Beach shoreline stabilization offshore breakwater along the Gulf of Mexico shoreline from the western jetty of the Calcasieu Ship Channel to just west of the town of Holly Beach may temporarily disrupt recreational use on the beach during construction activities as will the reef breakwater along the Gulf of Mexico shoreline of the Rockefeller Wildlife Management Area and Game Preserve. The breakwaters would help reduce the risk of storm surge and saltwater damage to recreational opportunities within the preserve thereby helping preserve recreational resources of the park.

Indirect impacts of the spoil bank fortification projects for the GIWW and Freshwater Bayou Canal, designed to reduce erosion of canal banks, could help protect recreational resource lands from effects of coastal storm surge and minimize the loss of valuable fishery habitat. Potential effects of shoreline protection measures would include the temporary displacement of fish populations due to increased turbidity both near the shorelines and near borrow areas during project implementation. Spoil bank fortification with rock dikes along the Freshwater Bayou Canal may cause temporary disruption to recreational use in the project vicinity.

Cheniers: Chenier reforestation measures support wildlife and system structure. Restoration of natural ridges would improve bank stabilization and potentially provide additional habitat for deer, small game and birds, which could be beneficial for hunting and bird watching. Restored ridges would also enhance protection available to adjacent swamps and marshes during coastal storms, which could also potentially benefit recreational resources and infrastructure such as boat launches.

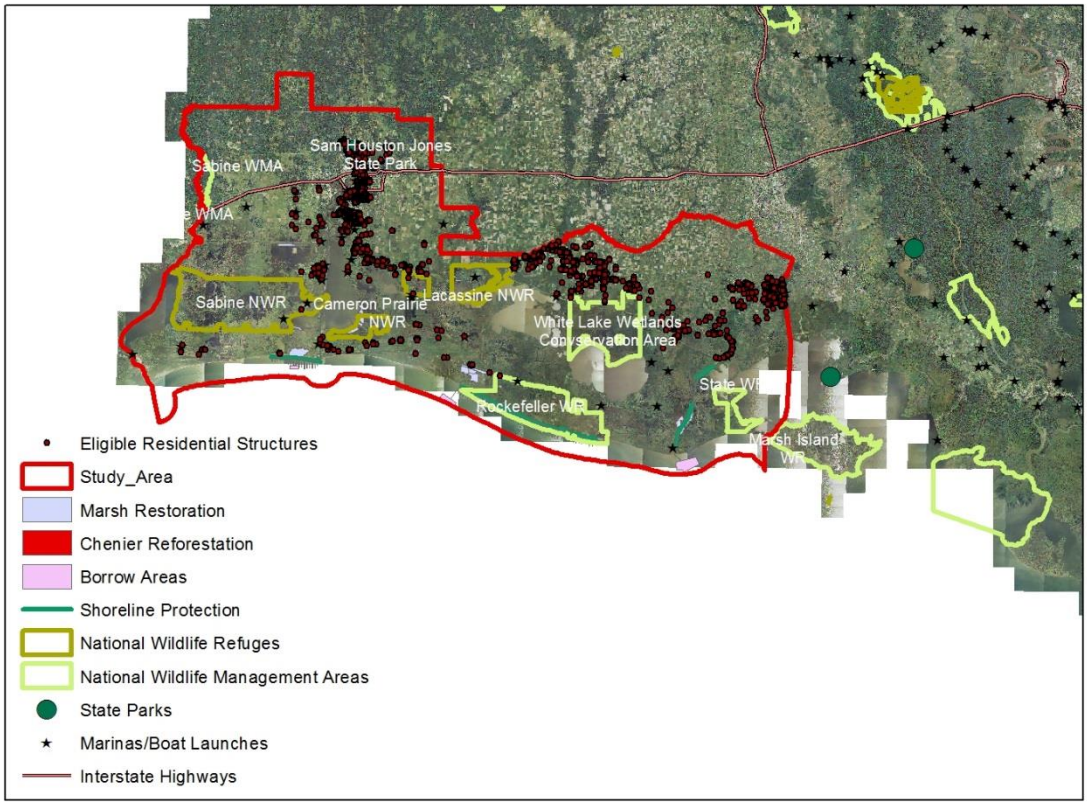
Cumulative Impacts:
The cumulative impacts of other ongoing and planned ecosystem restoration measures are expected to be generally beneficial to recreation as the risk of destruction of recreation resources by storm surge is reduced and habitat areas supporting fish and wildlife resources are enhanced. Temporary negative impacts of restoration activities due to construction activities, increased turbidity and possible boating access issues are mediated by the presence of other productive and popular recreation areas throughout the coastal region of Louisiana. Long-term positive cumulative impacts are expected to occur as restoration enhances the sustainability of valuable nursery habitats.

Alternative M4 Comprehensive Small Integrated Restoration for Mermentau Basin

Direct and indirect impacts to recreational resources from the restoration measures for Alternative M4 would be similar to and less than impacts described for the RP. Additionally, impacts are less than those expected for the RP because Alternative M4 has fewer restoration measures and therefore more minimal direct and indirect impacts to recreational resources.

Cumulative Impacts: Cumulative impacts to recreational resources from Alternative M4 would be similar to impacts described for the RP.

Map N2: National and State Parks in SWCL Area and NED/NER Measures



SOUTHWEST COASTAL LOUISIANA
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APPENDIX A

Annex O

Environmental Justice

CONTENTS

1. INTRODUCTION

An environmental justice (EJ) analysis was conducted which focused on the potential for disproportionately high and adverse impacts to minority and low-income populations during the construction and normal operation of the proposed risk-reduction system. The assessment identified the occurrence of minority and low-income populations within the study area. Overall, the assessment used Census Tract and block group level data. Environmental Justice Communities are identified within the study area. This analysis details whether the proposed federal action would disproportionately impact the EJ communities as defined by minority composition and percent of population below the federal poverty level.

A disproportionately high and adverse effect means the impact is appreciably more severe or greater in magnitude on minority or low-income populations than the adverse effect suffered by the non-minority or non-low-income populations after taking offsetting benefits into account.

This appendix will provide information on Census Tract and block group EJ analysis. As the National Economic Development (NED) implementation process is further assessed prior to implementation, additional EJ-related analysis will be performed to ensure adequate consideration of the potential for EJ-related impacts across the study area.

2. METHODOLOGY

Environmental Justice is institutionally significant because of Executive Order 12898 of 1994 (E.O. 12898) and the Department of Defense's Strategy on Environmental Justice of 1995, which direct Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of Federal actions to minority and/or low-income populations. Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American Indian/Alaskan Native, Pacific Islander, some other race, or a combination of two or more races. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population.

Low-income populations as of 2010 are those whose income are $22,113 for a family of four and are identified using the Census Bureau's statistical poverty threshold. The Census Bureau defines a "poverty area" as a census tract or block group with 20 percent or more of its residents below the poverty threshold and an "extreme poverty area" as one with 40 percent or more below the poverty level. This resource is technically significant because the social and economic welfare of minority and low-income populations may be positively or disproportionately impacted by the proposed actions. This resource is publicly significant because of public concerns about the fair and equitable treatment (fair treatment and meaningful involvement) of all people with respect to environmental and human health consequences of Federal laws, regulations, policies, and actions.

The methodology, consistent with E.O. 12898, to accomplish this EJ analysis includes identifying low-income and minority populations within the study area using up-to-date economic statistics, aerial photographs, and U.S. Census Bureau 2007-2011 American Community Survey (ACS) estimates. The newly released ACS estimates provide the latest socioeconomic community characteristic data, including poverty level, released by the U.S. Census Bureau and are based on data collected between January 2007 and December 2011. Race and ethnicity data at the Census block group level was compiled from the 2010 U.S. Census data. The 2010 U.S. Census dataset was chosen because it is more complete and based on actual counts.

All Census Tracts and Census block groups located within the study area are identified as the EJ study area. Calcasieu, Cameron, and Vermilion Parishes are considered the reference communities of comparison.

2.1 Historic and Existing Conditions:

High poverty rates negatively impact the social welfare of residents and undermine the community's ability to provide assistance to residents in times of need. The 2007-2011 ACS data indicate that 17% of households in Calcasieu Parish, 9% in Cameron Parish, and 18% in Vermilion Parish fell below the poverty line. The 2007-2011 ACS data indicate that there are:

- 17 poverty areas and 2 extreme poverty areas (block groups) in Calcasieu Parish
- 0 poverty areas or extreme poverty areas (block groups) in Cameron Parish
- 7 poverty areas and 1 extreme poverty areas (block groups) in Vermilion Parish

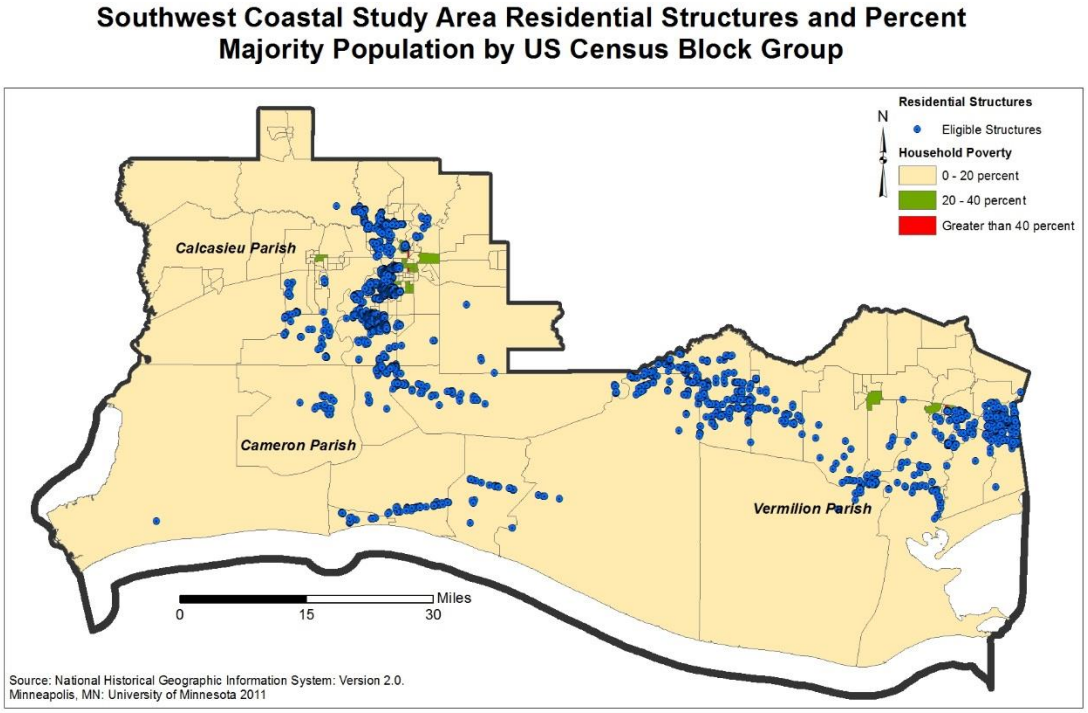

Figure 1: EJ percent below poverty by block group

Race and Ethnicity continue to play an important role in the everyday lives of Americans. Unequal access to social and political resources may affect preparing for and recovering from storm damage and flood events for certain groups. **Table 1** shows the racial characteristics of the three parishes according to the 2010 U.S. Census.

Table 1: Racial characteristics of the three affected parishes

Racial Characteristics							
Parish	White	African American	American Indian/ Alaska Native	Asian	Hawaiian/ Pacific Islander	Total	Percent Minority
Calcasieu	136,514	47,782	898	2,073	93	192,768	29%
Cameron	6,546	119	36	6	0	6,839	4%
Vermilion	46,922	8,286	209	1,160	5	57,999	20%

According to the 2010 U.S. Census data there are 41 block groups in Calcasieu Parish where 50% or more of the population identify themselves as part of a minority group. There are no block groups in Cameron Parish where more than 1% of the population identify themselves as part of a minority group. There are 8 block groups in Vermilion Parish where 50% of the population identify themselves as part of a minority group. See

Figure 2.

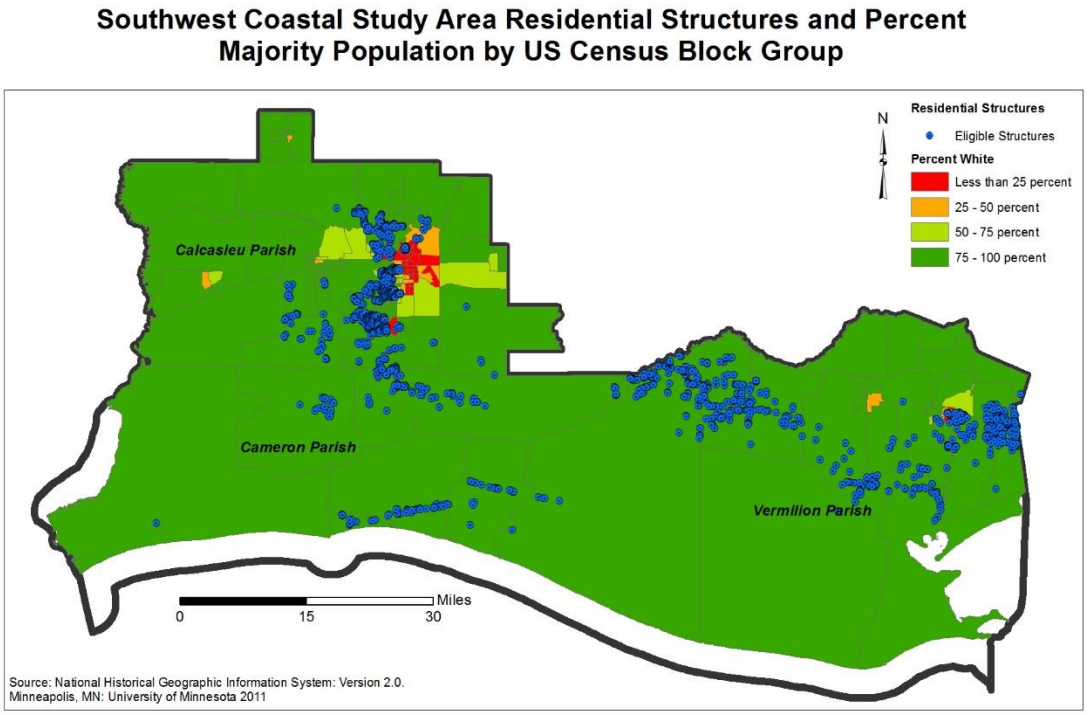

Figure 2- EJ racial majority by block group

2.2 Future Without-Project Conditions (No Action Alternative)

Direct, Indirect, and Cumulative Impacts: The No Action Alternative would not provide hurricane storm damage risk reduction, or reduce flooding induced by storm surge, or provide ecosystem restoration that improves ecosystem sustainability. There would be no direct impact on minority and/or low-income populations under this alternative. Indirect impacts under the No Action Alterative include a higher potential for temporary displacement of minority and/or low-income populations because residents within the study area would remain vulnerable to flooding and may be forced to relocate to areas with risk reduction measures in place. Storm surge increase due to subsidence and sea level rise will exacerbate the vulnerability to flooding across the area. Low-income populations may find it more difficult to bear the cost of evacuation. This alternative would not contribute to any additional EJ issues when combined with other Federal, state, local, and private risk reduction efforts.

3. ENVIRONMENTAL CONSEQUENCES

3.1 Alternative —Nonstructural 0-25-Year Floodplain Recommended Plan (RP)

The EJ assessment of the nonstructural plan to reduce storm surge risk includes all residential structures located in the 0-25 year floodplain. Owners of residential structures in the floodplain can voluntarily take part in the plan to receive financial assistance in raising/elevating their residential structure. Relocations benefits are not available under Public Law 91646 to those receiving nonstructural measures under the Project (except for tenants living in structures at which nonstructural measures would be implemented).

Direct, Indirect, and Cumulative Impacts:

A direct impact to those who benefit from the nonstructural measures includes reduced risk of hurricane storm surge-related damage due to the home being elevated. Direct impacts to owners of eligible structures include having to temporarily relocate during the elevation of the residential structure. Residents would be required to leave their home during the elevation and seek temporary quarters for the period of time necessary to elevate the structure. Temporary relocation benefits would not be made available to these residents (except for tenants living in these structures). Household income could be a factor in the decision to pursue nonstructural measures since temporary relocation costs could potentially be cost prohibitive for lower income residents. A direct impact to those whose homes are not eligible for the nonstructural measures or to those who choose not to pursue the nonstructural measures includes continuing vulnerability to hurricane storm surge related damage. This vulnerability may increase based on the actual rate of relative sea level rise (RSLR).

Indirect impacts to those choosing to forego the nonstructural measures include the potential to experiencing storm surge related damage from a 25-year storm event or possible even a lesser storm. Indirect impacts to those who benefit from the nonstructural measures would include a decrease in risk of damage from 1 percent (and more frequent) exceedance storm events. Population groups residing or working near the construction site (elevating homes) itself may experience direct impacts due to the added traffic congestion and construction noise and dust. Finally, indirect impacts may include effects on residential market value, insurability, potential impacts to community cohesion, and a more sustainable local economy and tax base as more fully detailed in Chapter 3 of the Report.

Positive cumulative impacts to minority and/or low-income populations associated with providing risk reduction are expected to occur as a result of the lower hurricane storm surge–related risk in the area under this alternative. If this alternative encourages regional economic growth, any additional jobs created may benefit minority and/or low-income groups living within the study area.

Identifying EJ Communities:

According to guidance set forth in Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, minority and low-income residential communities must be identified and a determination made if these communities suffer a disproportionate impact. A comparison of minority residents and low-income households in the larger study area and in the impact area helps determine if there is a proportionate or disproportionate distribution of impacts.

EJ Study Area
The EJ study area includes the three-parish area of Calcasieu, Cameron, and Vermillion. The total population of the study area is approximately 256,000 people, an estimated 26% of which are minority. The number of low-income households in the study area is approximately 8,800, an estimated 9% of which are households at or below the poverty threshold. In the event that significant adverse impacts are identified, these two percentages, 26% minority and 9% low-income, provide a baseline against which we would measure impact when determining whether the impacts would be disproportionate. See Table 2.

EJ Impact Area
The EJ impact area is defined as those Census Block Groups within the three-parish study area that contain the 3,445 residential structures within the 0-25-year floodplain that are eligible for the nonstructural plan (Note: there are additional structures located in these Census Block Groups that are not located within the 0-25 year floodplain). Currently, a vast majority of these structures would be able to pursue non-structural measures if their structures meet the eligibility requirements.

There are approximately 105,000 residents in the impact area, as defined by the Census Block Groups; approximately 26% are minority residents. See Table 2. The larger study area also is made up of about 26% minority residents, indicating no potential for a disproportionate impact.

Table 2. Relationship between the Study Area and the Impact Area for EJ Analysis

Criteria	Three Parish Study Area*	Impact Area**	Percent in Study Area	Percent in Impact Area
Total Population	255,634	104,846	100%	41%
White	189,945	87,974	74%	46%
Minority***	65,689	16,872	26%	26%
Total Households	96,259	39,995	100%	42%
Low-Income Households****	8,783	659	9%	7%

*Study Area data is for Calcasieu, Vermillion and Cameron Parishes.
**Impact Area consists of Block Groups within 0-25 year floodplain
***Minority includes non-Hispanic black and other non-white races and Hispanics.
**** Below poverty level
Source: US Census 2010 Data, US Census ACS 2007 - 2011

The following analysis identifies if there is a disproportionate impact on low-income residents from Project implementation.

To determine if there is a disproportionate impact on low-income residents, the eligible structures located in census block groups identified as EJ communities/poverty areas are considered. If an eligible owner of a residential structure in the 0-25-year floodplain is below the poverty level, they are less likely to be able to afford the temporary relocation costs and therefore less likely to benefit from this Project than those above the poverty threshold. Additionally, residents below the poverty level may not have adequate transportation to their jobs if the only affordable temporary relocation option is not near public transit.

There are approximately 660 structures in the 0-25-year floodplain that are located within census block groups that meet the EJ criteria for "poverty areas" or that at least 20% of the households are below the poverty threshold.

About 9% of the households in the study area are low-income (below the poverty threshold). Seven percent of households in the impact area are below the poverty threshold. There is a similar percentage of low income residents in the impact area compared to the study area. The analysis does not show a disproportionate impact to low-income residents in the impact area.

However, this determination is made using Census Block Group (CBG) income data which reveals the percentage of households in the geographic area with incomes below the poverty threshold. The specific households that are below the threshold are unknown. We assume all 660 eligible structures that are located within block groups where at least 20% are below the poverty threshold are in fact low-income. Structures that are located in CBG that are above the poverty threshold but may in fact be occupied by low-income residents are not included in this analysis. Only those eligible structures (660) in CBG with at least 20% of individuals below poverty are included in the EJ analysis. In this case, 7% of all impact area households and 9% of all study area households are at least 20% below the poverty level which are very comparable rates and a proportionate impact.

3.2 Alternative C4+M4 — Comprehensive Small Integrated Restoration – Recommended Plan (RP)

Direct, Indirect, and Cumulative Impacts: Many of the areas in which these activities will occur are sparsely populated or devoid of permanent structures and/or population. Access to some areas due to marsh restoration and nourishment activities may be temporarily interrupted. Impacts due to shoreline protection construction would also be temporary. Temporary impacts from construction activities due to increased turbidity, noise, and access interruption are compensated for by the opportunity for long-term positive cumulative impacts as other restoration programs improve the habitat and sustainability of coastal Louisiana. The long-term benefits of

marsh restoration, shoreline protection, bank stabilization, and chenier reforestation would improve wetland habitat which would subsequently improve leisure and recreation opportunities to all residents of the area. The proposed action would have no disproportionate adverse impacts on minority and low-income populations.

3.3 Alternative M4 — Comprehensive Small Integrated Restoration for Mermentau Basin

Direct, Indirect, and Cumulative Impacts: The direct, indirect, and cumulative impacts would be similar to those described for the RP but smaller given the fewer number of measures in this alternative.

4. MITIGATION FOR ADVERSE IMPACTS

At this time, no EJ issues have been identified and as such, no mitigation measures are necessary.

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Annex P

Other Social Effects

CONTENTS

5. INTRODUCTION

This appendix presents a socioeconomic evaluation of the alternatives being considered for coastal storm damage risk reduction for the Southwest Coastal Louisiana evaluation area, which includes three parishes in the state of Louisiana. It was prepared in accordance with Engineering Regulation (ER) 1105-2-100, Planning Guidance Notebook, ER 1105-2-101, Planning Guidance, Risk Analysis for Flood Damage Reduction Studies, and Engineering Circular (EC) 1105-2-409.

Given the area's low elevation, flat terrain, and proximity to the Gulf of Mexico, the people, economy, unique environment and cultural heritage of Southwest Louisiana are at risk of storm surge flooding and wave impacts from tropical storms. Land subsidence, combined with rising sea level, is expected to increase the potential for coastal flooding, shoreline erosion, saltwater intrusion, and loss of wetland and Chenier habitats in the future.

Because of that risk, alternatives to provide hurricane storm surge risk reduction have been evaluated for Southwest Louisiana. Opportunities to incorporate non-structural solutions to reduce vulnerability, damages, and economic losses have been studied through the Southwest Coastal Louisiana Feasibility Study conducted by the U.S. Army Corps of Engineers (USACE) New Orleans District (MVN) and Regional Planning and Environmental District South (RPEDS).

1.1 Purpose

The purpose of this appendix is to describe the Other Social Effects (OSE) account of the SWC Project. The OSE account considers the potential social ramifications of Corps actions so that decision makers and stakeholders are able to evaluate the social implications of each alternative and choose an alternative that will be judged as complete, effective, and fair.

1.1.1 Study Area

The area covers over 4,700 square miles in Louisiana's Chenier Plain. It lies in the southwest corner of the state in Calcasieu, Cameron, and Vermilion parishes. The Gulf Intracoastal Waterway (GIWW) dissects the area horizontally, mostly coterminous with the existing coastal zone boundary.

The Gulf of Mexico coastline is another major water resource of the area. The major highways are LA Highway 82 and LA Highway 27. Population centers include many small towns, the largest of which are Lake Charles, Sulphur, Grand Lake, and Abbeville.

Communities located within the study area include the city of Lake Charles, the towns of Sulphur, Vinton, Iowa, and Bell City in Calcasieu Parish, the towns of Cameron, Creole, Grand Chenier, and Grand Lake in Cameron Parish, the city of Abbeville, and the towns of Erath, Delcambre, Kaplan, and Pecan Island in Vermilion Parish. All three parishes have historically suffered extensive hurricane and tropical storm surge damage. The impact of preparing for, mitigating, and recovering from these damages has placed a significant physical and emotional burden on individuals and has been devastating for communities. The goals of the proposed project are to provide storm damage risk reduction to residents within the study area from the damaging effects of storm surges while also protecting and preserving the fragile and rapidly deteriorating coastal wetlands.

1.1.2 Overview of Other Social Effects

The USACE views "social well-being factors as constituents of life that influence personal and group definitions of satisfaction, well-being, and happiness. The distribution of resources; the character and richness of personal and community associations; the social vulnerability and resilience of individuals, groups, and communities; and the ability to participate in systems of governance are all elements that help define well-being and influence to what degree water resources solutions will be judged as complete, effective, acceptable, and fair." (USACE 2009). It is the OSE account that considers these elements and assures that they are properly weighted, balanced, and considered during the planning process under the USACE's Four Accounts Planning Framework.

This appendix follows the guidance set forth by the USACE Institute for Water Resources (IWR) in *Applying Other Social Effects In Alternatives Analysis* (USACE, 2013). The handbook describes the procedures for analyzing and using OSE criteria in the planning process by identifying seven social factors that describe the social fabric of a community. The social factors are based on conventional psychological Human Needs Theory and Abraham Maslow's Hierarchy of Needs. Table 1 lists and describes the social factors. These social factors are covered in the Socioeconomic and Other Social Effects sections of the main report.

Table 1: Social Factors

Social Factor	Description
Health and Safety	Refers to perceptions of personal and group safety and freedom from risks
Economic Vitality	Refers to the personal and group definitions of quality of life, which is influenced by the local economy's ability to provide a good standard of living
Social Connectedness	Refers to a community's social networks within which individuals interact; these networks provide significant meaning and structure to life
Identity	Refers to a community member's sense of self as a member of a group, in that they have a sense of definition and grounding
Social Vulnerability and Resiliency	Refers to the probability of a community being damaged or negatively affected by hazards, and its ability to recover from a traumatic event
Participation	Refers to the ability of community members to interact with others to influence social outcomes
Leisure and Recreation	Refers to the amount of personal leisure time available and whether community members are able to spend it in preferred recreational pursuits

Source: Applying Other Social Effects In Alternatives Analysis (USACE, 2013)

1.1.3 Organization of Appendix

The OSE appendix is organized as follows:

- Section 1 provides an introduction to OSE.
- Section 2 provides a description of the existing socioeconomic characteristics, and the existing and future without-project social factors of the study area.
- Section 3 provides an OSE analysis of the project alternatives.

2. OTHER SOCIAL EFFECTS STUDY AREA CHARACTERISTICS

This section provides a description of the existing and future without-project socioeconomic characteristics and other social factors of the study area.

2.1 Socioeconomic Characteristics of the Study Area

In this section, socioeconomic data for Calcasieu, Cameron, and Vermilion Parishes are presented in order to provide a context from which to evaluate the potential social impacts of the proposed project. A more detailed explanation of socioeconomic characteristics is available in the main report socioeconomic section.

2.1.1 Population and Households

Population increases in the three parish area between 2000 and 2010 are likely the result of population influx under normal growth conditions. The three parish total population in 2012 was 259,918 residents, although there has been a decline of population in Cameron Parish since 2000. Most of the population is located in the metropolitan areas. Major communities include: Lake Charles, the largest urban area in the study, in Calcasieu Parish; Cameron (which serves as the parish seat) in Cameron Parish; and Abbeville in Vermilion Parish.

2.1.2 Employment Opportunities

Leading employment sectors include education, healthcare, petroleum and petrochemical and service industries. Industries providing employment include education, health and social services (20%), manufacturing (15%), arts, entertainment, accommodations and food services (12%), and retail trade (12%).

2.1.3 Social Profile of Communities

This section provides a baseline profile of existing and future without project conditions for the social communities in the study area. Data for the social profile were obtained from a variety of sources including 2010 U.S. Census records, the 2007-2011 U.S. Census Bureau's American Community Survey (ACS) estimates, ESRI data, public meetings, interviews with local representatives, and aerial photography. The baseline characteristics are considered the existing and future-without project conditions.

2.1.4 Health and Safety (Stress, Loss-of-Life, Health Care and Emergency Facilities)

Severe storm surge events threaten the health and safety of residents living within the study area. Loss of life, injury, and post flood health hazards may occur in the event of catastrophic flooding. For example, the study area was severely impacted by Hurricane Rita in 2006 and Hurricane Ike in 2008. The Louisiana Recovery Authority estimated that 120 fatalities occurred associated with Hurricane Rita (one in Louisiana) and $8 billion in damages in Louisiana alone. Hurricane Ike was more costly in terms of lives lost and damages incurred, claiming 195 deaths in four countries and ranking as the third costliest storm in US history according to the National Hurricane Center. When facilities that provide critical care or emergency services are impacted by storm surge events, residents are at an even greater risk for experiencing negative health outcomes. Hurricanes Rita and Ike reduced the accessibility and availability of health facilities and services and required additional first-responder (fire and police) protection. During Rita and Ike, police stations were destroyed by storm surge and/or required to relocate because of flood risk. In addition to the damages of Rita and Ike to hospitals, police stations, and fire stations, many employees providing related services lost their homes reducing the staff needed to operate health and safety services.

The number of medical facilities, police stations, and fire stations located within the study area were obtained using 2010 ESRI data (latest year available).

Medical Care Facilities: There are 8 medical care facilities within Calcasieu Parish, 4 medical care facilities in Cameron Parish, and 6 medical care facilities in Vermilion Parish.

Police Stations: Calcasieu Parish has 8 police stations/sheriff's offices located within the study area, Cameron Parish has 5 police stations/sheriff's offices, and Vermilion Parish has 6 police stations/sheriff's offices, according to ESRI data.

Fire Stations: There are 29 fire stations (parish and volunteer) located within the study area—9 in Calcasieu Parish, 8 in Cameron Parish, and 12 in Vermilion Parish.

2.1.5 Economic Vitality

Growth in employment, business and industrial activity is expected to follow economic trends in the local, regional, and national economies. An additional 11,940 jobs are projected by the year 2038. However, without flood risk management alternatives, the stability of employment, business and industrial activity could be adversely affected.

2.1.6 Social Connectedness

The degree to which communities are able to instill a shared sense of belonging and purpose among residents is in large part determined by the communities' civic infrastructure. The presence of social institutions such as libraries, places of worship, and schools provide residents an opportunity for civic participation and engagement which allows residents to come together and work toward a common goal. The number of libraries and schools located within the study area were obtained using 2010 ESRI data (latest year available).

Civic Infrastructure: According to ESRI data, Calcasieu Parish has 7 libraries and 34 schools. There are 2 libraries and 2 schools located within the study area in Cameron Parish. ESRI data also show that there are 9 libraries and 9 schools located within the study area in Vermilion Parish.

2.1.7 Social Vulnerability/Resiliency

The devastation left behind after Hurricanes Rita and Ike brought attention to the salience of the related concepts of social vulnerability and resiliency when evaluating water resources projects (USACE 2008). Social vulnerability is a characteristic of groups or communities that limits or prevents their ability to withstand adverse impacts from hazards to which they are exposed.

Resiliency, in turn, refers to the ability of groups or communities to cope with and recover from adverse events. The factors that contribute to vulnerability often reduce the ability of groups or communities to recover from a disaster; therefore, more socially vulnerable groups or communities are typically less resilient.

Several factors have been shown to contribute to an area's vulnerability/resiliency, including poverty, racial/ethnic composition, educational attainment, and proportion of the population over the age of 65.

Poverty Rate: High poverty rates negatively impact the social welfare of residents and undermine the community's ability to assist residents in times of need. The 2007-2011 U.S. Census data indicate that 17 percent of the population of Calcasieu, 9 percent of the population in Cameron Parish, and 18 percent of the population in Vermilion Parish fell below the poverty line.

Racial / Ethnic Composition: Race/ethnicity continues to play an important role in the everyday lives of Americans. Unequal access to social resources and language barriers may affect preparing for and recovering from storm surge events for certain groups. In all parishes, according to the 2010 U.S. Census, the majority of the population is white (71% in Calcasieu Parish, 96% in Cameron Parish, and 80% in Vermilion Parish), followed by black (29% in Calcasieu Parish, 4% in Cameron Parish, and 20% in Vermilion Parish).

Social Vulnerability Index: The Hazards and Vulnerability Research Institute at the University of South Carolina created an index that compares the social vulnerability of U.S. counties/parishes to environmental hazards. The variables included in the index are based on previous research which has found that certain characteristics (e.g., poverty, racial/ethnic composition, educational attainment, and proportion over the age of 65) contribute to a community's vulnerability when exposed to hazards. According to the IWR OSE handbook (USACE, 2008), the Social Vulnerability Index (SoVI®)[1] is a valuable tool that can be used to identify areas that are socially vulnerable and whose residents may be less able to withstand adverse impacts from hazards.

The SoVI® was computed as a comparative measure of social vulnerability for all counties/parishes in the U.S., with higher scores indicating more social vulnerability than lower scores. Calcasieu Parish has a SoVI® 2006-10 score[2] of -1.21 (0.28 national percentile), Cameron Parish has a SoVI® 2006-10 score of -3.59 (.08 national percentile), and Vermilion Parish has a SoVI® 2006-10 score of -0.04 (0.49 national percentile). Calcasieu Parish is more socially vulnerable than roughly 72 percent of counties/parishes in the U.S., Cameron Parish is more socially vulnerable than about 92 percent of counties/parishes in the U.S., and Vermilion Parish is more socially vulnerable than roughly 51 percent of counties/parishes in the U.S. In comparison, Orleans Parish—notorious for its enduring levels of high poverty—has a SoVI® 2005-09 score of -0.92 with making it more socially vulnerable than 33 percent of counties/parishes in the nation ranked more socially vulnerable.

Stated another way, Cameron Parish is the most socially vulnerable to coastal storm damage consequences, Calcasieu Parish is the next most socially vulnerable, and Vermilion Parish is the least socially vulnerable and all three Parishes are more socially vulnerable to coastal storm damage consequences than Orleans Parish.

The study area's social vulnerability, however, is expected to increase over time if subsidence and sea level rise continue to occur, and the population in the study area increases as it is projected to do. The absolute number of socially vulnerable people (e.g., low-income, minority, less-educated, and over the age of 65) at risk for storm

[1] More information on the methodology and data used to calculate the SoVI® can be found here: http://webra.cas.sc.edu/hvri/products/sovi.aspx

[2] Data can be found here: http://webra.cas.sc.edu/hvri/products/sovi2010_data.aspx

surge events will increase. This, in turn, may lead to an increased burden placed on local, state, and federal agencies to ensure that these socially vulnerable populations have access to resources before, during, and after these events.

2.1.8 Leisure and Recreation

Having personal leisure time available and having access to recreational areas contributes to residents' quality of life and is therefore an important aspect of well-being. The number of recreational areas within the study area was obtained using 2011 ESRI data (latest year available).

The three parish study area is home to a State Wildlife Refuge, the 71,544-acre White Lake Wetlands Conservation Area, the 76,000-acre Rockefeller Wildlife Refuge (WR), the Lacassine National Wildlife Refuge (NWR), Cameron Prairie NWR, and the 124,511-acre Sabine NWR. State Parks in the study area include Palmetto Island and Sam Houston Jones parks.

Recreational fishing and hunting are very important to the area. In addition to the high quality recreational fishing and hunting in the wildlife refuges and parks in the study area, several lakes and inland marshes offer opportunities for hunting and catching both freshwater and saltwater species. Grand, White, and Calcasieu Lakes and Vermillion Bay are prime fishing spots. The high quality of the recreational fishery, especially an abundance of red fish and trout, has made this an important leisure time activity for residents. Inland saltwater fish species, crabs, and shrimp are also available in the more brackish water. Game species hunted in the area include waterfowl, deer, rabbit, squirrels, rail, gallinule, and snipe.

3. OTHER SOCIAL EFFECTS EVALUATION OF ALTERNATIVES

3.1 Social Implications of the Alternatives

This section provides an OSE analysis of the project alternatives. The evaluation is based on the differential impact that each alternative is expected to have on the socioeconomic characteristics and other social factors of the study area presented in the previous section.

The study area's social vulnerability is expected to increase over time if subsidence and sea level rise continue to occur, and the population in the study area increases as it is projected to do. The absolute number of socially vulnerable people (e.g., low-income, minority, less-educated, and over the age of 65) at risk for storm surge events will increase. This, in turn, may lead to an increased burden placed on local, state, and federal agencies to ensure that the most socially vulnerable populations have access to resources before, during, and after flood events.

Table 2: Other Social Effects (OSE) Account

Social Factor	No Action	Nonstructural	NER
Health and Safety	High level of flood risk in entire region with associated stress and anxiety, risk to regional health care system, and impacts to emergency access during floods. High potential for loss of life during storm events.	Project would reduce risk of hurricane storm surge damage to regional healthcare system and stress in Southwest Louisiana.	Project would contribute to a lower stress level due to improved habitat.
Economic Vitality	Current regional economy is moderate. If a catastrophic flood occurs, economic impacts will be extensive and long-lasting.	Project would benefit the regional economy.	The regional economy will benefit from improved habitat and increased storm surge resiliency.
Social Connectedness	High levels of instrumental social support will continue throughout the region. Population of coastal communities will continue to decline after storm events	Residents would experience social disruption during storm events or flooding, however social	Residents would benefit socially and economically from improved habitat.

	following historic trends, and social connectedness would be reduced.	connectedness would likely improve population retention.	
Social Vulnerability and Resiliency	Region is highly vulnerable to Storm damage, but residents would likely band together during recovery. Resilience of rural communities may be lower due to lack of temporary housing options. Low -income residents are more vulnerable to short-term impacts of flood fighting.	Project would significantly reduce the area's vulnerability to hurricane storm surge damage for those choosing to participate in the Project. . The ability of lower income groups to participate in the Project could be impacted by out of pocket expenses associated with ineligible Project costs including costs associated with temporary relocation during structure elevation, and any additional costs that would be required in order to meet the Project eligibility criteria, (i.e., costs associated with any necessary structural repair or asbestos abatement). (See Appendix L of the Final Report for Project eligibility criteria and a description of eligible and ineligible Project costs.) This could potentially offset, to some degree, the reduction in overall social vulnerability brought about by the Project at least as it relates to lower income communities	Project would increase the area's resiliency to storm surge events.
Leisure and Recreation	Residents of the region are active. Recreational opportunities would continue to be provided in the communities as currently planned	Project measures would help protect existing recreational opportunities.	Project measures would increase long-term recreational opportunities.

4. SUMMARY OF ALTERNATIVE ANALYSIS

4.1 No Action Alternative

Under the No Action Alternative, hurricane storm surge risk reduction and ecosystem restoration would not be implemented. However, the direct, indirect, and cumulative impacts of other existing, authorized, and reasonably foreseeable future action would continue. These would include hurricane storm damage risk reduction (HSDRR) projects and ecosystem restoration projects expected to be completed near and around the project areas. (See Section 1.9 of the Final Report.) The OSE associated with these have been documented in reports referenced in Section 1.9 and would generally include reduce the risk to health and safety factors, provide or benefit local and regional economies, provide for or enhance social connectedness, and protect existing recreational opportunities. Additional OSE information is available in documents referenced in Section 1.9. Information on the Recommended Plan for NED and NER is presented below.

4.2 NED Alternative — Nonstructural 0-25 Year Floodplain Plan (RP)

Direct, Indirect, and Cumulative Impacts: Under this alternative, the study area would experience storm surge risk reduction via nonstructural measures. This alternative would reduce the risks associated with damages to housing units, public facilities, and commercial structures during storm events as well as improve the health and safety of residents living within the study area. The area's social vulnerability would be reduced under this alternative with the possible exception of populations unwilling to participate or unable to participate in the Project due to ineligible Project costs. Reduced social vulnerability leads to the potential for enhanced long-term growth and sustainability. Also, the area would be at a reduced risk of incurring the costs associated with clean-up, debris removal, and building and infrastructure repair as a result of storm surge events.

Plan 8 Alternative – Nonstructural 100-Year Floodplain

The impacts from this alternative are similar to the impacts identified in connection with the Modified Plan 8 Nonstructural 0-25-Year Floodplain Plan (NED RP) alternative but greater in scale because of the larger numbers of structures that would be included in the Project under this alternative as compared to the NED RP, as described above

4.2.1 NER Alternative CM-4 — Comprehensive Small Integrated Restoration (RP)

Direct, Indirect, and Cumulative Impacts: This alternative would reduce the risks associated with habitat damage via saltwater intrusion, shoreline retreat, and loss of geomorphologic infrastructure. The area's social vulnerability would be reduced under this alternative via improved leisure and recreation opportunities, economic vitality, and reduced stress. Thus, the potential for long-term growth and sustainability would be enhanced.

4.2.2 NER Alternative M4 — Mermentau Small Integrated Restoration

Direct, Indirect, and Cumulative Impacts: The direct, indirect, and cumulative impacts would be similar to those described for the CM4 alternative but to a lesser extent due to the smaller size /fewer number of ecosystem restoration features in the MR as compared to the RP.

5. REFERENCES

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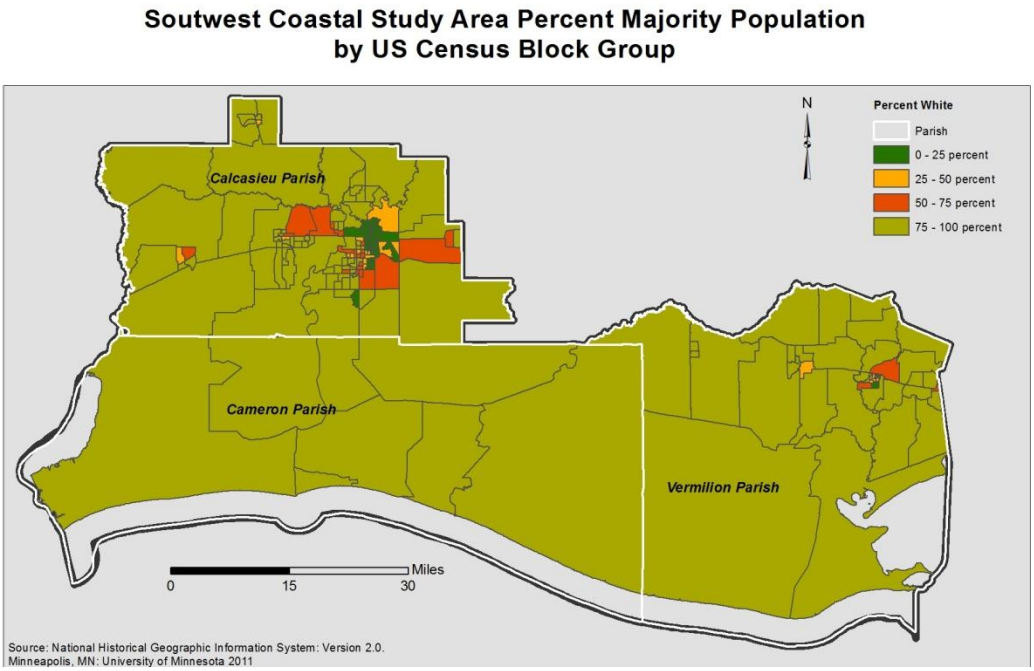


Figure 1. SWC Louisiana Study Area Racial Diversity 2013

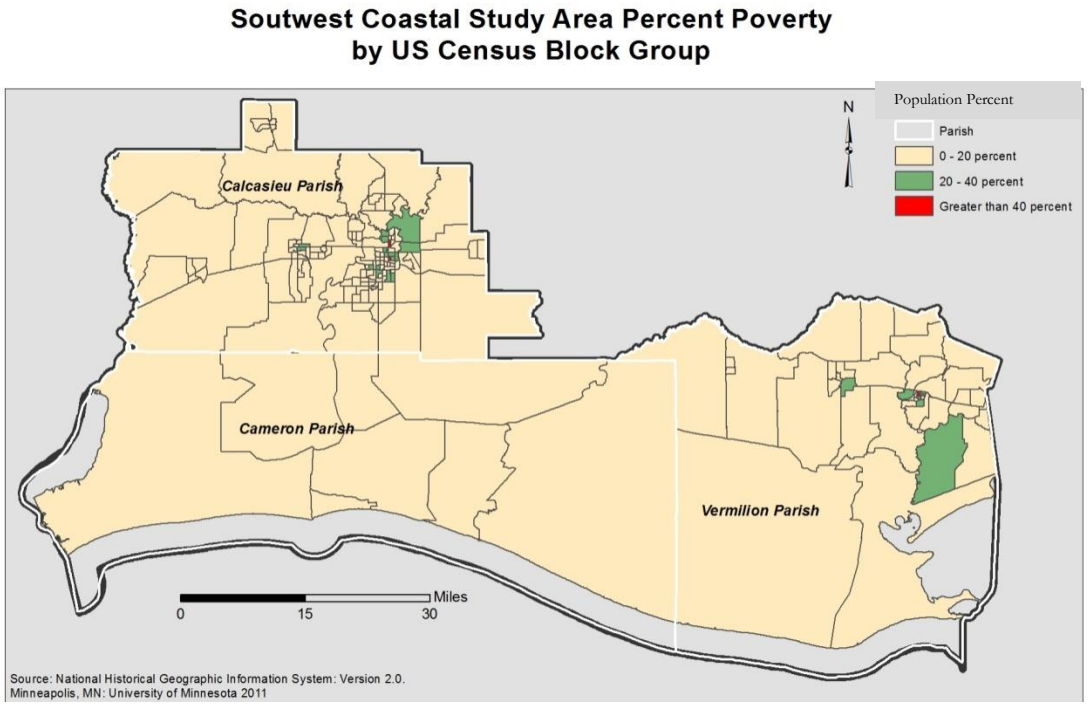


Figure 2. SWC Louisiana Study Area Percent Living Below Poverty 2013

SOUTHWEST COASTAL LOUISIANA
REVISED INTEGRATED DRAFT FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

Annex Q

Best Management Practices and Avoidance Procedures

MIGRATORY BIRD TREATY ACT and
BALD AND GOLDEN EAGLE PROTECTION ACT
BEST MANAGEMENT PRACTICES

Colonial nesting wading birds (including but not limited to, herons, egrets, and Ibis), seabirds/water-birds (including, but not limited to terns, gulls, Black Skimmers, and Brown Pelicans) and bald eagles are known to roost, forage, and nest in the project area. The birds and their nests are protected by the Migratory Bird Treaty Act (MBTA) and must not be disturbed or destroyed. As such, in areas near known rookeries, nesting prevention measures may be necessary in order to insure the success of the nesting season. These measures would be developed by the U.S. Army Corps of Engineers New Orleans District (CEMVN) in coordination with the U.S. Fish and Wildlife Service (USFWS) and Louisiana Department of Wildlife and Fisheries (LDWF) and would be implemented by a trained biologist. The nesting activity period extends from 15 February through 1 September for colonial nesting wading and seabirds/water birds, and September to May for bald eagles. Therefore, the nesting prevention measures should begin well before February.

CEMVN and USFWS biologists will conduct surveys prior to construction to determine the presence and/or location of any eagle's nests, colonial nesting wading/water birds and/or rookeries and if nesting prevention measures would be necessary. Nest prevention measures shall be intended to deter birds from nesting within applicable the designated buffer zone of construction areas without physically harming birds or disturbing any existing nests. Nest prevention measures may be used in combination and/or adjusted to be most effective. At minimum, nest prevention measures shall include, but not be limited to the following:

- Flagging/Streamers
- Vehicular/Pedestrian Traffic
- Clapping and Yelling
- Horn Blowing

Once work has commenced, the presence of nesting eagles, wading birds and/or seabirds/water-birds within the minimum distances from the work area, as specified in paragraph entitled "No Work Distances", shall be immediately reported to the Environmental Technical Manager, Ms. Tammy Gilmore, of the U.S. Army Corps of Engineers at (504) 862-1002 email address tammy.h.gilmore@usace.army.mil

No Work Distances

No-work distance restrictions are as follows:

o Terns, Gulls, and Black Skimmers -1,300 feet;
o Colonial nesting wading birds -1,000 feet;
o Brown Pelicans -2,000 feet; and,
o Bald Eagles -660 feet.

Coordination by CEMVN personnel with the USFWS may result in a reduction or relaxing of these no-work distances depending on the species of birds found nesting at the work site and specific site conditions.

MANATEE PROTECTION MEASURES COORDINATED WITH USFWS:

All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel would be responsible for observing water-related activities for the presence of manatees. Temporary signs would 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., the work area), and at least one sign would be placed where it is visible to the vessel operator. Siltation barriers, if used, would be made of material in which manatees could not become entangled and would be properly secured and monitored. If a manatee

is sighted within 100 yards of the active work zone, special operating conditions would be implemented, including: moving equipment would not operate within 50 ft of a manatee; all vessels would operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions would no longer be necessary, but careful observations would be resumed. Any manatee sighting would be immediately reported to the USFWS (337/291-3100) and the LDWF, Natural Heritage Program (225/765-2821).

SEA TURTLE PROTECTION MEASURES

1. Hopper dredging is being conducted under the "Gulf of Mexico Regional Biological Opinion" (RBO) which can be viewed at the following link: http://el.erdc.usace.army.mil/seaturtles/refs-bo.cfm.

It should be noted that incidental takes of sea turtle and gulf sturgeon are authorized on a Fiscal Year (FY) (October 1 – September 30) basis to be metered out by the Division Commander, South Atlantic Division, U.S. Army Corps of Engineers for the southeastern United States for Federal, military, and permitted projects. If care is not taken, the take limits could be reached by any of these parties and hopper dredging would cease for the remainder of that FY. The Permittee understands and agrees that, even where it is in full compliance with the terms and conditions of the RBO, incidental take by the Permittee may require suspension of the permit by the Corps of Engineers. The amount of incidental take that will trigger suspension, and the need for any such suspensions, shall be determined at the time in the sole discretion of the Corps of Engineers. The Permittee understands and agrees on behalf of itself, its agents, contractors, and other representatives, that no claim, legal action in equity or for damages, adjustment, or other entitlement against the Corps of Engineers shall arise as a result of such suspension or related action.

2. Prior to the commencement of hopper dredging, and throughout the dredging operations, a Corps of Engineers-approved Inspector shall inspect specific sea turtle protection requirements. The list of inspections the Inspector will perform is identified on a sea turtle inspection checklist entitled "USACE Sea Turtle Inspection Checklist for Hopper Dredges" that can be found at the following link: http://el.erdc.usace.army.mil/seaturtles/index.cfm. All identified deficiencies shall be corrected prior to the commencement of hopper dredging activities. An inspection shall also be performed following each sea turtle incidental take. Results of inspections shall be provided to Mr. Edward Creef (Edward.D.Creef@usace.army.mil) as soon as they are completed.

3. No dredging shall be performed by a hopper dredge without the inclusion of a rigid sea turtle deflector device. The Permittee shall electronically submit drawings showing the proposed device and its attachment to Mr. Edward Creef at Edward.D.Creef@usace.army.mil. Mr. Creef can be contacted by phone at (504) 862-2521. These drawings shall include the approach angle for any and all depths to be dredged during the dredging. A copy of the approved drawings and calculations shall be available on the vessel during the dredging. No dredging work shall be allowed to commence until approval of the turtle deflector device has been granted by the New Orleans District U.S. Army Corps of Engineers. Sample turtle deflector design details may be viewed at the web site indicated in condition number 1.

The leading v-shaped portion of the deflector shall have an included angle of less than 90 degrees. Internal reinforcement shall be installed in the deflector to prevent structural failure of the device. The leading edge of the deflector shall be designed to have a plowing effect of at least 6" depth when the draghead is being operated. Appropriate instrumentation or indicator shall be used and kept in proper calibration to ensure the critical "approach angle" (Information only note: The design "approach angle" or the angle of lower draghead pipe relative to the average sediment plane is very important to the proper operation of the deflector. If the lower draghead pipe angle in actual dredging conditions varies tremendously from the design angle of approach used in the development of the deflector, the 6" plowing effect does not occur. Therefore, every effort should be made to insure this design "approach angle" is maintained with the lower drag pipe.).

If adjustable depth deflectors are installed, they shall be rigidly attached to the draghead using either a hinged aft attachment point or an aft trunnion attachment point in association with an adjustable pin front attachment point or cable front attachment point with a stop set to obtain the 6" plowing effect. This arrangement allows fine-tuning the 6" plowing effect for varying depths. After the deflector is properly adjusted there shall be NO openings between the deflector and draghead that are more than 4" X 4".

4. The Permittee shall install baskets or screening over the hopper inflow(s) with no greater than 4" X 4" openings. The method selected shall depend on the construction of the dredge used and shall be approved by the Corps of Engineers-approved Inspector prior to commencement of dredging. The screening shall provide 100% screening of the hopper inflow(s). The screens and/or baskets shall remain in place throughout the performance of the work. The turtle deflector device and inflow screens shall be maintained in operational condition for the entire dredging operation.

5. When initiating dredging, suction through the dragheads shall be allowed just long enough to prime the pumps, and then the dragheads must be placed firmly on the bottom. When lifting the dragheads from the bottom, suction through the dragheads shall be allowed just long enough to clear the lines, and then must cease. Pumping water through the dragheads shall cease while maneuvering or during travel to / from the disposal area (Information Only Note: optimal suction pipe densities and velocities occur when the deflector is operated properly. If the required dredging section includes compacted fine sands or stiff clays, a properly configured arrangement of teeth may enhance dredge efficiency, which reduces total dredging hours, and potential for "turtle takes". The operation of a draghead with teeth must be monitored for each dredged section to insure that excessive material is not forced into the suction line. When excess high-density material enters the suction line, suction velocities drop to extremely low levels causing conditions for plugging of the suction pipe. Dredge operators should configure and operate their equipment to eliminate all low-level suction velocities. Pipe plugging in the past was easily corrected, when low suction velocities occurred, by raising the draghead off the bottom until the suction velocities increased to an appropriate level. Pipe plugging cannot be corrected by raising the draghead off the bottom. Arrangements of teeth and / or the reconfiguration of teeth should be made during the dredging process to optimize suction velocities.

6. Raising the draghead off the bottom to increase suction velocities is not acceptable. The primary adjustment for providing additional mixing water to the suction line should be through water ports. To insure suction velocities do not drop below appropriate levels, production meters shall be monitored throughout the job and adjustments primarily made to the number and opening sizes of water ports. Water port openings on top of the draghead or on raised standpipes above the draghead shall be screened before they are utilized on the dredging project. If a dredge section includes sandy shoals on one end of a tract line and mud sediments on the other end of the tract line, the equipment shall be adjusted to eliminate draghead pick-ups to clear the suction line.

7. During turning operations, the pumps must either be shut off or reduced in speed to the point where no suction velocity or vacuum exists. These operational procedures are intended to stress the importance of balancing the suction pipe densities and velocities in order to keep from taking sea turtles.

8. All hopper dredges shall be equipped with the National Dredging Quality Management Program (DQM) system, formerly known as Silent Inspector, for hopper dredge monitoring. The DQM system must have been certified by the Engineer Research and Development Center (ERDC) within the last year. Questions regarding certification should be addressed to the DQM support team at 877-840-8024. The DQM is an automated dredge monitoring system comprised of both hardware and software developed by the U.S. Army Corps of Engineers (Corps). The Corps developed the DQM as a low cost, repeatable, impartial system for automated dredge monitoring. The DQM consists of three major components: The Dredge Specific System (DSS), the Ship Server, and the Shore Server. The DSS collects and displays various dredge sensor data for the dredge crew to monitor dredge progress and quality control. The other major task of the DSS is to send data to the Ship Server. Most dredging contractors already have a computer system and sensors onboard for control or positioning that can be used as the DSS. The dredging contractor supplies and owns the DSS and all associated

sensors. The Ship Server acts as the dredged-based data archive and report creation center by storing the data from the DSS and performing automated review of the data. The Ship Server can produce many different reports including dredge location history, volume history, and an operational status. Additional information about DQM can be found at: http://dqm.usace.army.mil/. The data collected by the DQM system shall, upon request, be made available to the Operations Division Technical Support Branch of the New Orleans District U.S. Army Corps of Engineers.

All hopper dredge(s) shall be equipped with recording devices for each draghead that capture real time draghead elevation, slurry density, and at least two of the following: Pump(s) slurry velocity measured at the output side, pump(s) vacuum, and / or pump(s) RPM. The Permittee shall record continuous real time positioning of the dredge, by plot or electronic means, during the entire dredging cycle including dredging area and disposal area. Dredge location accuracy shall meet the requirements of the latest version of EM 1110-1-1003. A copy of the EM can be downloaded from the following website: http://www.hnd.usace.army.mil/techinfo/engpubs.htm.The recording system shall be capable of capturing data at variable intervals but with a frequency of not less than every 60 seconds. All data shall be time correlated to a 24-hour clock and the recording system shall include a method of daily evaluation of the data collected. This data shall be made available at the request of the New Orleans District U.S. Army Corps of Engineers.

The practice of dropping an empty dredge bucket can be taken as a precaution during construction to avoid impacts to sea turtles. A bucket (or similar equipment) will be dropped into the water and retrieved empty one time. After the bucket has been dropped and retrieved, a one-minute no work period must be observed. During this no work period, personnel would carefully observe the work area in an effort to visually detect listed species. If listed species are sighted, no bucket dredging would be initiated until the listed species have left the work area. If the water turbidity makes such visual sighting impossible, work would proceed after the one-minute no work period has elapsed. If more than fifteen minutes elapses with no work, then the empty bucket drop/retrieval process would be performed again prior to work commencing.

9. **Dredging operations shall cease immediately upon the first incidental take, and thereafter as directed by the Corps, until the District Engineer, or his designee, notifies the Permittee to resume dredging.** The Permittee shall immediately notify Mr. Edward Creef by phone (504-862-2521) and e-mail (Edward.D.Creef@usace.army.mil) that an incidental take has occurred. The Sea Turtle Mortality Report, available on the web site indicated in condition number 1, will be filled out by the National Marine Fisheries (NMFS)-Approved Protected Species Observer immediately (within 6 hours) and sent to Edward Creef electronically at the e-mail address listed above.

10. During dredging operations, NMFS-Approved Protected Species Observers shall be aboard to monitor for the presence of sea turtles, sturgeon, and whales. Observer coverage shall be 100% (24 hr/day) and shall be conducted year round. During transit to and from the disposal area, the Observer shall monitor from the bridge during daylight hours for the presence of endangered species. During dredging operations, while dragheads are submerged, the Observer shall continuously monitor the inflow and / or outflow screening for turtles and / or turtle parts. Upon completion of each load cycle, dragheads should be monitored as the draghead is lifted from the sea surface and is placed on the saddle in order to assure that sea turtles that may be impinged within the draghead are not lost and unaccounted for. Observers shall physically inspect dragheads and inflow and overflow screening / boxes for threatened and endangered species takes.

11. Monitoring Reports: The results of the monitoring shall be recorded on the appropriate observation sheets. There is a sheet for each load, a daily summary sheet, and a weekly summary sheet. In addition, there will be a post dredging summary sheet. Observation sheets will be completed regardless of whether any takes of sturgeon, whales, or sea turtles occur. In the event of any sea turtle or sturgeon takes by the dredge, appropriate incident reporting forms shall be completed. Additionally, all specimens shall be photographed with a digital camera. These photographs shall be attached to the respective reports for documentation. Dredging of subsequent loads shall not commence until all appropriate reports are completed from the previous dredging load to ensure completeness and thoroughness of documentation associated with the incidental take. Reports

shall be submitted to the Corps within 24-hours of the take. Copies of the form shall be legible. Observer forms may be accessed on the web site indicated in condition number 1.

a. NMFS-Approved Protected Species Observers: A list of protected species observer-biologists that have been NMFS-approved to monitor threatened / endangered species takes by hopper dredges can be obtained by contacting NOAA Fisheries Northeast Region, Protected Resources Division. The main contact is Ms, Julie Crocker; she can be reached at Julie.Crocker@noaa.gov or 978-281-9300 ext. 6530. A current list of NMFS-Approved Protected Species Observer companies is provided at the end of this document.

b. The Contractor shall provide a digital camera, with an image resolution capability of at least 300 dpi, in order to photographically report incidental takes, without regard to species, during dredging operations. Immediately following the incidental take of any threatened or endangered species, images shall be provided via e-mail, CD, or DVD to Mr. Edward Creef electronically at Edward.D.Creef@usace.army.mil in a .JPG or .TIF format and shall accompany incidental take forms. The nature of findings shall be fully described in the incidental take forms including references to photographs.

12. Manatee, Sea Turtle, and Whale Sighting Reports.

Any take concerning a manatee, sea turtle, sturgeon, or whale; or sightings of any injured or incapacitated manatees, sea turtles, or whales shall be reported immediately to the Corps Regulatory Section Chief, Martin Mayer electronically at martin.s.mayer@usace.army.mil, and to Mr. Edward Creef electronically at Edward.D.Creef@usace.army.mil.

13. Disposition of Sea Turtles or Turtle Parts

a. Turtle taken by hopper dredge

(1) Dead turtles – upon removal of sea turtle and / or parts from the draghead or screening, Observers shall take photographs as to sufficiently document major characteristics of the turtle or turtle parts including but not limited to dorsal, ventral, anterior, and posterior views. For all photographs taken, a backdrop shall be prepared to document the dredge name, observer company name, contract title, time, date, species, load number, location of dredging, and specific location taken (draghead, screening, etc.). Carcass / turtle parts shall also be scanned for flipper and Passive Integrated Transponder (PIT) tags. Any identified tags shall be recorded on the "Sea Turtle Incidental Take Form" that is included in the "Endangered Species Observer Program Forms" located on the web site indicated in condition number 1. Turtle parts which cannot be positively identified to species on board the dredge or barge(s) shall be preserved by the observer(s) for later identification. A tissue sample shall be collected from any lethally taken sea turtle and submitted under the process stated in the "Protocol for Collecting Tissue Samples from Turtles for Genetic Analysis" on the web site indicated in condition number 1. After all data collection is complete, the sea turtle / parts should be marked (spray paint works well), weighted down and disposed of in direction of the contracting officer.

(2) Live Turtles - Observer(s) shall measure, weigh, scan for PIT tags, tag (Inconel flipper and PIT tags - if PIT tag is not located during scan and only if observer is qualified to tag using PIT tags), and photograph any live turtle(s) incidentally taken by the dredge. Observer(s), or their authorized representative, shall coordinate with the contracting officer's representative and environmental branch staff to transport as soon as possible the live turtle(s) taken by the dredge to an approved rehabilitation facility such as the Aquarium of the Americas in New Orleans, Louisiana.

14. Relocation Trawling of Sea Turtles

Sea turtle relocation trawling efforts to aid in the prevention of sea turtle takes during dredging operations would be performed by the Permittee as deemed necessary. An initial sea turtle relocation trawling effort would be performed 2 to 3 days prior to the start of hopper dredging activities to determine if sea turtles are present at the dredging site. Based on the results of this trawling effort, the Permittee may be required to implement sea turtle relocation trawling either at the start of hopper dredging activities, or following the first sea turtle take by the hopper dredge. Captured sea turtles either would be relocated approximately 5 miles away from the dredging site, or, if injured, transported to the Aquarium of the Americas located in New Orleans, Louisiana. A NMFS-Approved Protected Species Observer shall supervise the relocation trawling efforts. If relocation trawling in Louisiana territorial waters occurs outside of the shrimping season, the approved sea turtle relocation trawling supervisor must possess a Scientific Collecting Permit from the Louisiana Department of Wildlife and Fisheries (point of contact is Ms. Karen Foote at 225-765-2384).

Trawling operations shall be performed in front of the working hopper dredge, with trawlers operating a safe distance from the hopper dredge. Trawling efforts shall be performed with and against the tidal flow at a speed not to exceed 3.5 knots using repetitive trawls in the dredging area with each trawling effort not to exceed 42 minutes duration.

Methods and equipment shall be standardized including data sheets, nets, trawling direction to tide, length of station, length of tow, and number of tows per station. Data on each tow shall be recorded using the Sea Turtle Trawling Report found at the website (http://el.erdc.usace.army.mil/seaturtles/docs/trawlingforms.pdf). The trawler shall be equipped with 60-foot nets constructed from 8-inch mesh (stretch) fitted with mud rollers and flats as specified in the Turtle Trawl Nets Specifications appended to the end of this Section. Paired net tows shall be made for 24 hours per day. The tows shall be performed in shifts, and the trawler shall be available for operation 24 hours a day. Positions at the beginning and end of each tow shall be determined from GPS Positioning equipment.

At least one crewmember who is a NMFS-Approved Protected Species Observer shall be on board the trawler during the trawl. The Observer shall be responsible for handling of captured sea turtles. Each captured turtle shall be identified, scanned for PIT tags, measured, tagged, tissue sampled and released, and data recorded on the Sea Turtle Tagging and Relocation Report, which can be found at the following website: (http://el.erdc.usace.army.mil/seaturtles/docs/taggingforms.pdf). Presence of PIT tags shall be scanned for by using a multi-frequency scanner capable of reading multiple frequencies (including 125-, 128-, 134-, and 400-kHz tags) and reading tags deeply embedded in muscle tissue. Turtle measurements shall be recorded and shall include, at a minimum, weight, straight-line length, straight-line width, and tail length. Turtles shall be tagged with NMFS #681 Inconel tags in each of the front flippers according to NMFS protocol. Aseptic conditions shall be maintained for tags and tag attachment. The Contractor shall be responsible for obtaining any and all permits related to trawling from the appropriate state and Federal agencies. All aspects of the trawling shall be coordinated with Mr. Edward Creef (504-862-2521).

Anyone handling sea turtles infected with fibropapilloma tumors shall either: 1) clean all equipment that comes in contact with the turtle with mild bleach solution between the processing of each turtle, or 2) maintain a separate set of sampling equipment for handling turtles displaying fibropapilloma tumors or lesions.

Water temperature measurements shall be taken at the water surface each day using a laboratory thermometer. Weather conditions shall be recorded from visual observations and instruments on the trawler. Weather conditions, air temperature, wind velocity and direction, sea state-wave height, and precipitation shall be recorded on the Sea Turtle Trawling Report. High and low tides shall be recorded.

a. Repair and Replacement of Damaged Trawl Nets

The Contractor, at the time of mobilization, shall provide trawl nets that meet the requirements specified in the Turtle Trawl Net Specifications at the end of this section. Tools, supplies and materials for repairing nets shall be kept aboard the trawler. In the event of damage to trawl nets, one hour will be allowed to either repair or replace them. The Contractor shall have at least one set of

replacement nets immediately available at all times, to insure that the dredging work is not adversely delayed due to trawler down-time for replacing damaged nets. It is recommended that a second set of replacement nets be available aboard the trawler.

b. Suspension of Dredging and Relocation Trawling
Should there be a tearing of nets, or breakdown of other equipment that would cause the trawler to leave the area where dredging is underway during any period of time where relocation trawling is required, the dredge may continue to operate for up to 48 hours, as long as no turtles are taken. Should there be dangerously high seas that would cause the trawler to leave the dredging area when relocation trawling is required the dredge may continue to operate, as long as no turtles are taken.

c. Turtle Excluder Devices
Approval for trawling for sea turtles without Turtle Excluder Devices (TEDs) must be obtained from NMFS (contact Eric Hawk at 727-551-5773). Any necessary State or Federal clearances for the capture and relocation of sea turtles must also be obtained. Approvals must be submitted to Mr. Edward Creef electronically at Edward.D.Creef@usace.army.mil prior to trawling.

d. Reporting
Immediately after completing each day of relocation trawling, if possible, the Contractor shall notify Mr. Edward Creef by telephone (504-862-2521) or email (Edward.D.Creef@usace.army.mil) conveying the results of the trawl. The results of each trawl shall be recorded on the Sea Turtle Trawling Report. The Sea Turtle Trawling Report also shall be furnished by the Contractor to Mr. Edward Creef within 24 hours after completing the relocation trawl. Following completion of the project, a copy of the Contractor's log regarding sea turtles shall be forwarded to Mr. Edward Creef within 10 working days.

15. Report Submission.

The Contractor shall maintain a log detailing all incidents, including sightings, collisions with, injuries, or killing of manatees, sea turtles, sturgeon, or whales occurring during the contract period. The data shall be recorded on forms provided at the web site indicated in condition number 1. All data in the original form shall be forwarded directly within 10 days of collection to Mr. Edward Creef at the address provided below. Following project completion, a report summarizing the above incidents and sightings shall be submitted to:

USACE - New Orleans District
Operations Division - Technical Support Branch
Attn Edward Creef
P.O. Box 60267
New Orleans, Louisiana, 70160-0267

Partial List of NMFS-Approved Protected Species Observer Companies

Dr. L. M. Ehrhart Dept. of Biological Science University of Central Florida P.O. Box 25000 Orlando, FL 32816 407-823-2970 Fax: 407-283-5769 lehrhart@pegasus.cc.ucf.edu	A.I.S. Inc. (P.O.C. Arv Poshkus) 19 Camden Street P.O. Box 421 Stoughton, MA 02072-0421 800-230-8032 Fax: 781-297-7669 ARVIDAS1@juno.com	Mary Jo Barkaszi ECOES, Inc. 7341 Glenwood Road Cocoa, FL 32927 321-635-8477 Fax: 321-635-8449 maryjo@ecoes.com www.ecoes.com

Jane Provancha Dynamac Corporation DYN-2 Kennedy Space Ctr., FL 32899 321-759-0935 Fax: 321-730-3455 jprovancha@dynamac.com	R. Eric Martin Ecological Associates, Inc. P.O. Box 405 Jensen Beach, FL 34958 772-334-3729 Fax: 772-334-4925 erikmartin@bellsouth.net	Roxanne Carter REMSA, Inc. * 124 W Queens Way Hampton, VA 23669 757-722-0113 ext. 25 Fax: 757-722-0638 roxy@remsameso.com
Christopher Slay, President ***** Coastwise Consulting (Environmental Consultants - Land, Sea, Air) 173 Virginia Avenue Athens, GA 30601 706-543-6859 904-261-8518 Fax/Tel cslay@att.net	Richard Alboth Tiny's Marine Environmental Services 7 Rogers Street Randolph, MA 02368 781-963-6308 Cellular: 321-863-6561 tinysvc@aol.com	Andrea Balla-Holden, Marine & Marine Life Consulting 5988 SE Kelsey Court Port Orchard, WA 98367 360-769-5934: Office 360-769-4195: Fax MarineMarineLife@aol.com
Trish Bargo, ***** East Coast Observers, Inc. P.O. Box 6192 Norfolk, VA 23508 757-227-5779 757-965-6766 Fax 757-880-7636 Cell tbargo@eastcoastobservers.com		Robert K. Metzger ***** Relocation Trawling Biologist 1327 N. Wheaton Dr. St. Charles, MO 63301-0881 636-946-6464 Tel/Fax 314-265-4806: Cell metzgerr@swbell.net

* Contractors that also provide sea turtle trawling and relocation services.

Turtle Trawl Net Specifications

DESIGN:	4 Seam, 4 Legged, 2 Bridal Trawl Net
WEBBING:	4 inch bar, 8 inch stretch Top – 36 Gauge Twisted Nylon Dipped Side – 36 Gauge Twisted Nylon Dipped Bottom – 84 Gauge Braided Nylon Dipped
NET LENGTH:	60 ft from cork line to cod end
BODY TAPER:	2 to 1
WING END HEIGHT:	6 feet
CENTER HEIGHT:	Dependent on depth of trawl – 14 to 18 ft
COD END:	Length 50 meshes x 4 in equals 16.7 ft Webbing 2 in bar, 4 in stretch, 84 gauge braid nylon Dipped, 80 meshes around, 40 rigged meshes with ¼ x 2 in choker rings, 1 each ½ x 4 in at end Cod End Cover – none Chaffing Gear – none
HEAD ROPE:	60 ft ½ in combination rope (braid nylon with stainless cable center)
FOOT ROPE:	65 ft ½ in combination rope
LEG LINE:	Top – 6 ft, Bottom – 6 ft
FLOATS:	Size – Tuna Floats (football style), Diameter – 7in; Length – 9 in; number 12 each; Spacing – center of top net 2 in apart
MUD ROLLERS:	Size – 5 in Diameter, 5.5 in length Number – 22 each; spacing – 3 ft attached with 3/8 in Polypropylene rope (replaced with snap on roller when broken)
TICKLER CHAINS:	NONE (Discontinued – but previously used ¼ in x 74 ft galvanized chain)
WEIGHT:	20 ft of ¼ in galvanized chain on each wing, 40 ft per net looped and tied
DOOR SIZE:	7 ft x 40 in (or 8 ft x 40 in); Shoe – 1 in X 6 in: bridles – 3/8 in high test chain
CABLE LENGTH:	(Bridle Length, Total): 7/16 in x 240-300 ft varies with bottom conditions
FLOAT BALL:	NONE
LAZY LINES:	1 in nylon
PICKUP LINES:	3/8 in polypropylene
WHIP LINES:	1 in nylon

SEA TURTLE/GULF STURGEON OBSERVER SPECIFICATIONS

As a result of consultation under Section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers has agreed to report any sea turtle/gulf sturgeon activity to the National Marine Fisheries Service (NMFS). The points of contact (listed below) should be notified of any sightings, collisions with, injuries or killing of sea turtles/gulf sturgeons by telephone within 12 hours of the action. The notification should include the number and species of turtles (if known) impacted and the time the activity occurred.

New Orleans District, Operations Division,
Marine Management Section, Dredge Wheeler
Ms. Bethany Walker
(504) 862-2699 and fax (504) 862-1912
After hours number: 504-905-4573 (cell)

New Orleans District, Operations Division,
Operations Technical Support Branch,
Mr. Ed Creef
(504) 862-2521 and fax (504) 862-2317
After hours number: 504-818-0034 (home)

Observers will continuously monitor all of the hopper inflow and/or over-flow screens 24 hours per day during dredging mode, to detect turtles/sturgeons or turtle/sturgeon parts. Screen monitoring shall be conducted as required to effectively watch these screens, based on the design, configuration, and position thereof. The observers will be provided access and use of a facsimile and telephone 24 hours per day to insure, in the event of a take, the observers will be able to fulfill the requirements of the paragraph entitled "Sea Turtle/Gulf Sturgeon Reporting".

In addition to monitoring 24 hours per day during dredging mode, the observers will be responsible for assuring that:

1) temperatures in the waterway are taken, in degrees Fahrenheit, at the surface and at the mid-depth from the surface to the water bottom. The readings shall be made each eight hours for the duration of each dredging assignment. The waterway mileage and latitude/longitude shall be recorded corresponding to each temperature reading.

2) during transit of the dredge to/from the disposal site(s), after dredging has ceased, the screen observer shall assure that the hopper screens are cleaned of debris and correctly re-installed on the dredge for return to dredging mode. The observer shall report damage of the screens to the Dredge Wheeler representative immediately upon detection of such damage, and the screens shall be repaired or replaced before dredging is resumed.

3) complete turtle/sturgeon data reporting is made, as required in paragraph entitled "Sea Turtle/Gulf Sturgeon Reporting".

4) positively identified turtle/sturgeon parts are disposed of at the dredge material disposal site(s). Turtle/sturgeon parts which cannot be positively identified on board the dredge shall be color photographed by the observer(s) using instant developing film or a digital camera. The photos shall be attached to respective reports for documentation and later identification. Observer(s) shall measure, weigh, tag, and release any uninjured turtles incidentally taken by the dredge. Turtle/sturgeon handling and tagging methods shall be performed in accordance with NMFS-approved procedures. Injured turtles shall be transported to a rehabilitation facility, the Aquarium of the Americas at New Orleans, Louisiana. Observer(s) or their authorized representative shall provide NMFS-approved containers for turtle/sturgeon transport.

5) Sea Turtle/Gulf Sturgeon Reporting

The observers shall maintain a log detailing all incidents, including sightings, collisions with, injuries, or killing of sea turtles/sturgeons occurring during the contract period. The results of the monitoring shall be recorded on copies of the observation sheets attached, entitled "Endangered Species Observer Program" or similar forms. For each load, screen watch data shall be consolidated on a single sheet prior to beginning a new sheet for the next load. An observation sheet shall be completed for each load whether or not turtles are sighted in the waterway or turtle/sturgeon parts are detected on the screens. Dredging shall not commence until the consolidated report is completed from the previous dredging load. The observer(s) should notify the District points of contact (listed above) of any sightings, collisions with, injuries or killing of sea turtles by telephone and facsimile within 12 hours of the action. The notification should include the number and species of turtles impacted and the time the activity occurred. Upon completion of the dredging project, all consolidated and completed data reports shall be forwarded to the District points of contact (listed above).

The various endangered species observer program data forms are provided below.

ENDANGERED SPECIES OBSERVER PROGRAM

LOAD DATA FORM

USACE DISTRICT: _____

CONTRACT #: _____ **Maintenance**____/**New Work** _____ **PROJECT start date** _____

PROJECT NAME: _____ **DREDGE NAME:** _____

DREDGE FIRM: _____

LOAD #: _____ **LOAD start date:** _____ **Times (24hrs): Start** _____ **End** _____

Condition of screening : **Port**_____ **Starboard** _____ **Overflow** _____

Number of dragheads in use: _____ **Type of dragheads used:** _____**Size of dragheads:** _____

Draghead deflector? YES ____ **NO** ____ **Condition of deflector:** _____

Type of material dredged: _____

Weather conditions: _____

_____

Tidal stage (CIRCLE ONE): Slack Rising High Falling Low Unknown

Beaufort Sea States (Winds/Wave Height) (CIRCLE ONE)

0 = <1 knot/ 0 ft	**3** = 7-10 knot/ 2 ft	**6** = 22-27 knot/10 ft	**9** = 41-47 knot/23 ft	**12** = >63 knot/45
1 = 1- 3 knot/ 0.25 ft	**4** = 11-16 knot/ 4 ft	**7** = 28-33 knot/14 ft	**10** = 48-55 knot/29 ft	
2 = 4- 6 knot/ 0.5 ft	**5** = 17-21 knot/ 6 ft	**8** = 34-40 knot/18 ft	**11** = 56-63 knot/37 ft	

Waves: _____ **ft** **Wind (speed & direction):** _____

AIR TEMP: _____ **°C/°F** (°F = 9/5 (°C) + 32; °C = 5/9 (°F - 32))

WATER TEMP: Surface _____ **°C /°F** **Column (mid-depth)** _____ **°C /°F** **Bottom** _____ **°C /°F**

SCREEN TYPE

_____	**Inflow screening:**	**None**	**25%**	**50%**	**75%**	**100%**
_____	**Overflow screening:**	**None**	**25%**	**50%**	**75%**	**100%**
_____	**Other screening:**	**None**	**25%**	**50%**	**75%**	**100%**

PORT SCREEN CONTENTS: _____

_____

_____

STARBOARD SCREEN CONTENTS: _____

_____

_____

Estimate number entrained on this load for the following:

Sturgeon (any species) _____

Shark (any species) _____

Horseshoe crab _____

Blue crab _____

TURTLE OR TURTLE PARTS PRESENT THIS LOAD: YES _____ **NO** _____

SPECIES OF TURTLE TAKE: Unknown Loggerhead Green Kemp's ridley Hawksbill Leatherback

Comments: _____

_____

Number observers used/24hrs: _____ **% Monitoring/24 hrs: None 25% 50% 75% 100%**

Observer's name: _____ **Observer firm**_____

Observer signature _____

Endangered Species Observer Program – Daily Report

ENDANGERED SPECIES OBSERVER PROGRAM

DAILY REPORT

USACE DISTRICT: _____

PROJECT NAME: _____ **DREDGE NAME:** _____

Date: _____ **Load #s:** _____ **Areas dredge worked:** _____

Beaufort Sea State: 0 1 2 3 4 5 6 7 8 9 10 11 12

AIR TEMP: _____ °C/° F (°F = 9/5 (°C) + 32; °C = 5/9 (°F - 32))

WATER TEMP: Surface _____ °C /° F **Column (mid-depth)** _____ °C /° F **Bottom** _____ °C /° F

Condition of deflector:_____ **Condition of screening:** _____

Were there incidents involving endangered or protected species? **YES** ____ **NO** ____

Which species? (complete incident form(s))_____

Comments (type of material, biological specimens, unusual circumstances, etc): _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

BRIDGE WATCH SUMMARY

Time	Species	# Sightings/# Animals	Location/Comments
		/	
		/	
		/	
		/	
		/	
		/	
		/	
		/	
		/	
		/	
		/	
		/	
		/	
		/	
		/	
		/	

Observer name _____

USACE Sea Turtle/Dredging Database – Post Hopper Dredging Project Checklist follows.

USACE Sea Turtle/Dredging Database
Post-Hopper Dredging Project Checklist

(1)_____PROJECT SUMMARY

District name_____ **District POC** _____
Contract # _____ **Maintenance** ___ **New Work**____ **Federal** ____**Regulatory** ____

Project name _____ **Dates of project** _____

Dredge name _____ **Dredge firm** _____ **Dates worked** _____
Dredge name _____ **Dredge firm** _____ **Dates worked** _____
Dredge name _____ **Dredge firm** _____ **Dates worked** _____
Dredge name _____ **Dredge firm** _____ **Dates worked** _____

For total project:
 # days dredged: _____ **# hours dredged:**_____ **# loads dredged:** _____**Total CY dredged**_____

For dredge vessel_____
 # days dredged: _____ **# hours dredged:**_____ **# loads dredged:** _____**Total CY dredged**_____
For dredge vessel_____
 # days dredged: _____ **# hours dredged:**_____ **# loads dredged:** _____**Total CY dredged**_____
For dredge vessel_____
 # days dredged: _____ **# hours dredged:**_____ **# loads dredged:** _____**Total CY dredged**_____
For dredge vessel_____
 # days dredged: _____ **# hours dredged:**_____ **# loads dredged:** _____**Total CY dredged**_____

General project description/Disposal method(s):_____
_____
_____

Type of material dredged: (circle) **silt** **clay** **sand** **mud** **shell** **rock** **other**
Type of draghead(s): _____ **Silent inspector: YES** _____ **NO** _____
Mitigation measures:
Dredging within designated environmental window **YES** _____ **NO** _____ **N/A** _____
Draghead deflectors installed **YES** _____ **NO** _____ **N/A** _____
Relocation trawling conducted **YES** _____ **NO** _____ **N/A** _____
Pre-dredge assessment trawling conducted **YES** _____ **NO** _____ **N/A** _____
Monitoring measures:
Screening type(s) : _____ **% material screened: None 25% 50% 75% 100%**
 # observers/24hrs: _____ **% monitoring/24 hrs: None 25% 50% 75% 100%**

For total project:
 # Incidental sea turtle takes **Loggerhead** _____ **Green** _____ **Kemp's ridley** _____ **Other** _____ **Unknown** _____
 # Incidental sturgeon takes **Shortnose** _____ **Gulf** _____ **Other** _____ **Unknown** _____
Description of other endangered/sensitive species incidents: _____
_____

(2)_____ Dredge summary logs associated with dates of incidental takes

(3)_____ Endangered Species Observer Final Report(s)
(Each incidental take reported should include: Incidental Take Form, Load Data Form, Dredge Load Log, Copies of photos)

(4)_____ Relocation and/or assessment trawling Final Report(s)
(Report should include: total #/species of turtles relocated during project; total #/species of turtles relocated on date of dredging incidental take, total #/species of sturgeon collected.)

(5)_____ Reports/descriptions of other related research/studies being done during/related to project.

Endangered Species Observer Program – Sturgeon Incidental Take Data Form

ENDANGERED SPECIES OBSERVER PROGRAM

STURGEON INCIDENTAL TAKE DATA FORM

USACE DISTRICT: _____
PROJECT NAME: _____ **DREDGE NAME:** _____

DATE: _____ **Time sturgeon take recovered (24hr):** _____ **Sturgeon # for project:** _____

LOAD #: _____ **Times (24hrs): Start** _____ **End** _____ **Load start date** _____

SPECIES OF STURGEON TAKE: Shortnose _____ **Gulf** _____ **Other** _____ **Unknown** _____

Channel location of take: Latitude _____ **Longitude** _____
Other location / Channel description (e.g. buoy markers, landmarks): _____
_____

Location take recovered on dredge: _____

Number of dragheads in use at time of incident: _____ **Draghead deflector? YES** ____ **NO** ____
Condition of deflector: _____ **Condition of screening:** _____

Beaufort Sea State: 0 1 2 3 4 5 6 7 8 9 10 11 12

AIR TEMP: _____ **°C/° F** (°F = 9/5 (°C) + 32; °C = 5/9 (°F - 32))
WATER TEMP: Surface _____ **°C /° F Column (mid-depth)** _____ **°C /° F Bottom** _____ **°C /° F**

Condition of specimen: _____
_____
_____
0 = Alive; 1 = Fresh dead; 2 = Moderately decomposed; 3 = Severely decomposed; 4 = skeleton/old bone; 5 = undetermined

Measurements/description of specimen: _____
_____
_____

Genetic samples taken: YES ____ **NO** ____ **Photos taken: YES** ____ **NO** ____
Sample frozen/preserved: YES ____ **NO** ____
Final disposition of specimen: _____

Comments: _____
_____
_____
_____

Load data form attached: YES ____**NO** ____ **Dredge load log attached: YES** ____**NO** ____

Observer's name _____

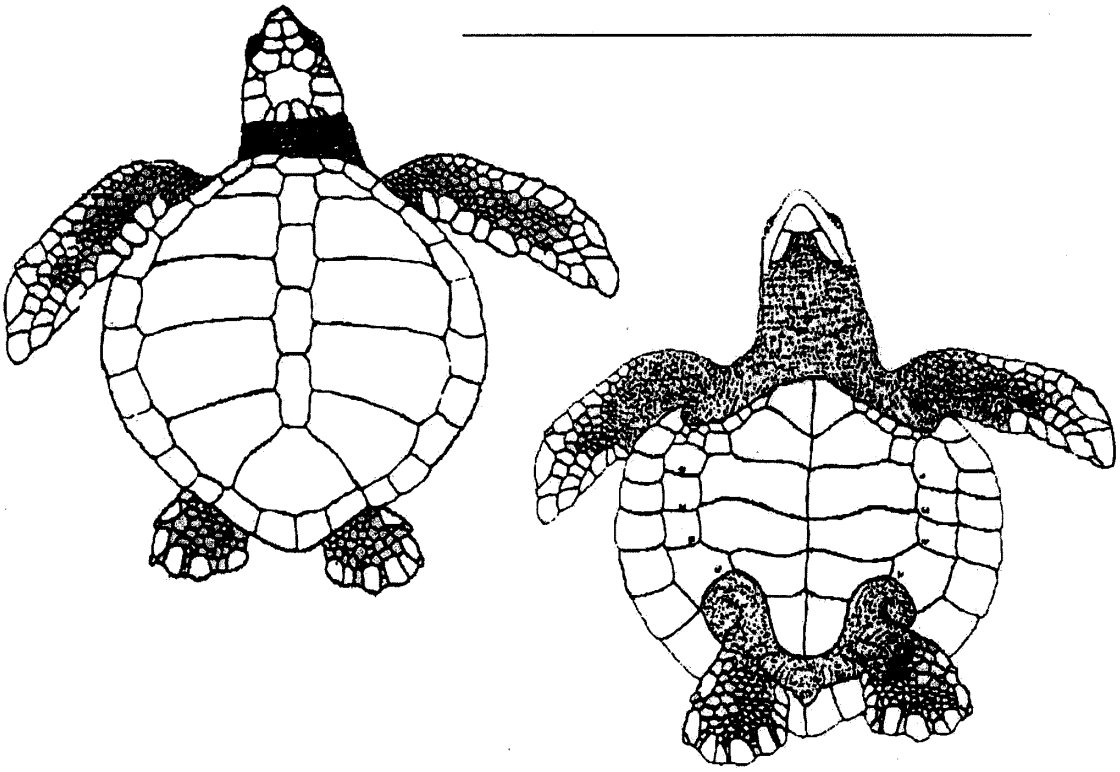
Use diagram below to illustrate specimen/part recovered:

Endangered Species Observer Program Sea Turtle Take Form - Kemp's Ridley follows

Kemp's Ridley (*Lepidochelys kempii*)

Shade areas of turtle that are missing; sketch cracks and lacerations

Comments: _____



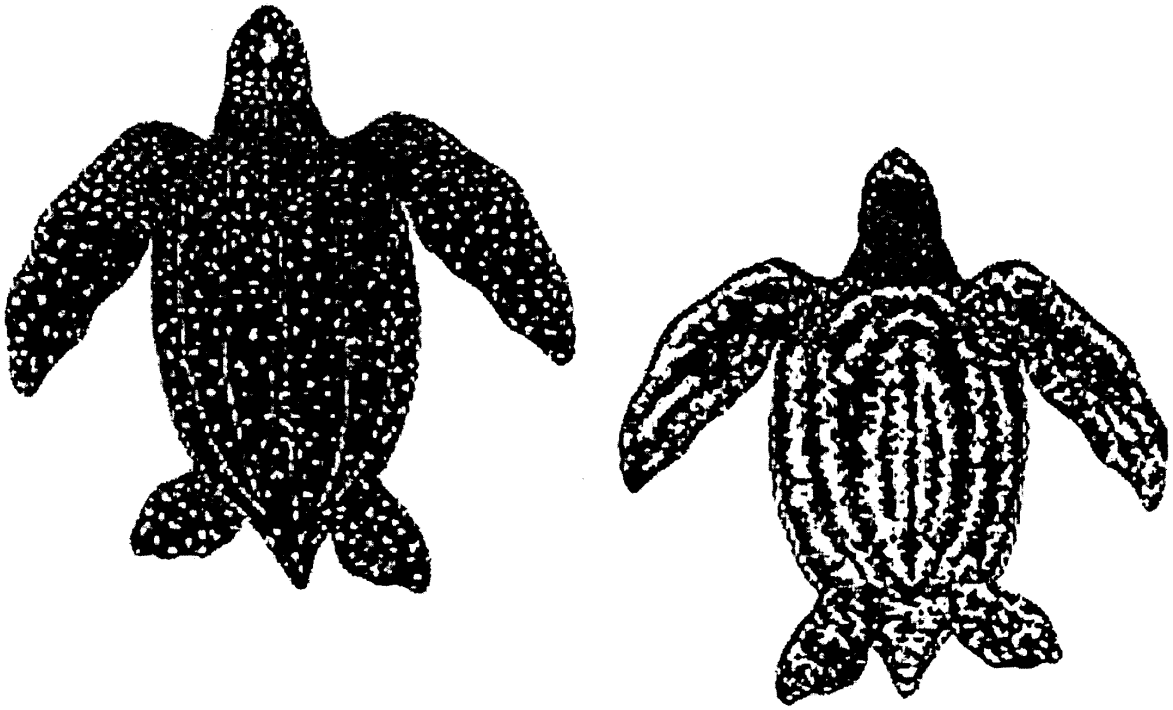
Diagrams by Tom McFarland

Endangered Species Observer Program Sea Turtle Take Form – Leatherback

Leatherback (*Dermochelys coriacea)*

Shade areas of turtle that are missing; sketch cracks and lacerations

Comments: _____



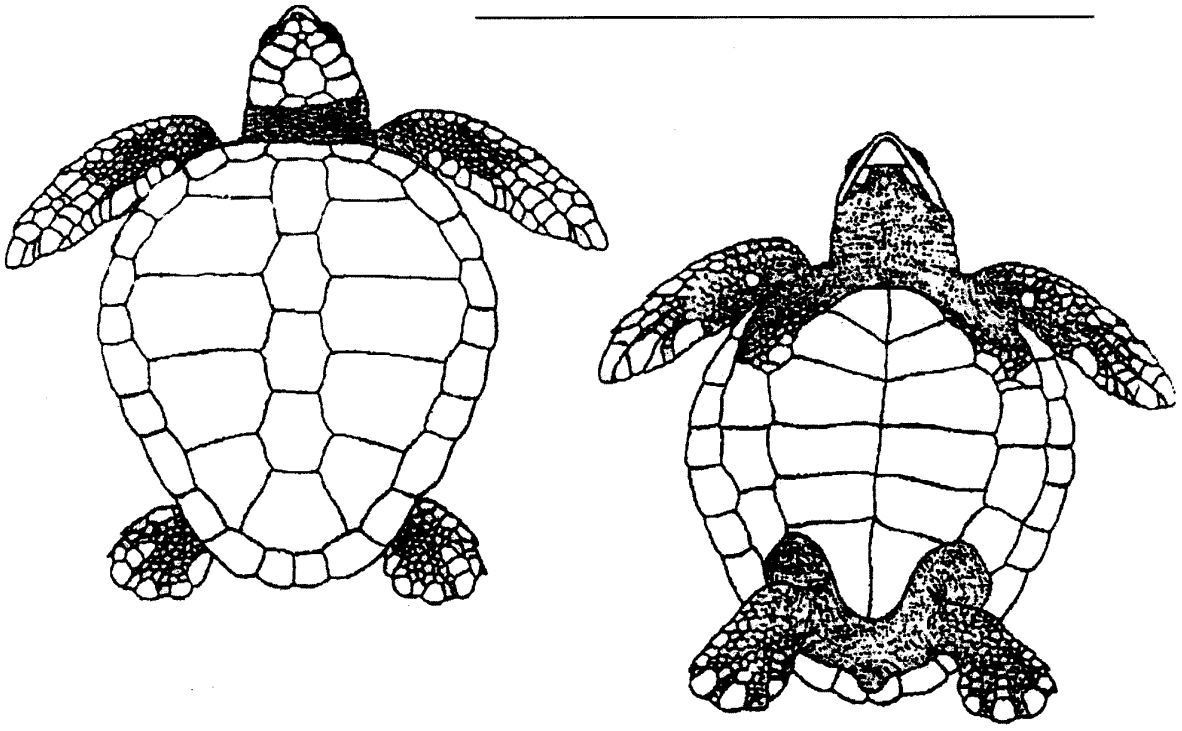
Diagrams by Tom McFarland

Endangered Species Observer Program Sea Turtle Take Form – Loggerhead

Loggerhead (*Caretta caretta)*

Shade areas of turtle that are missing; sketch cracks and lacerations

Comments: _____



Diagrams by Tom McFarland

Endangered Species Observer Program Sea Turtle Take Form – Green turtle

Green turtle (*Chelonia mydas)*

Shade areas of turtle that are missing; sketch cracks and lacerations

Comments: _____

_____

_____

_____

_____

_____

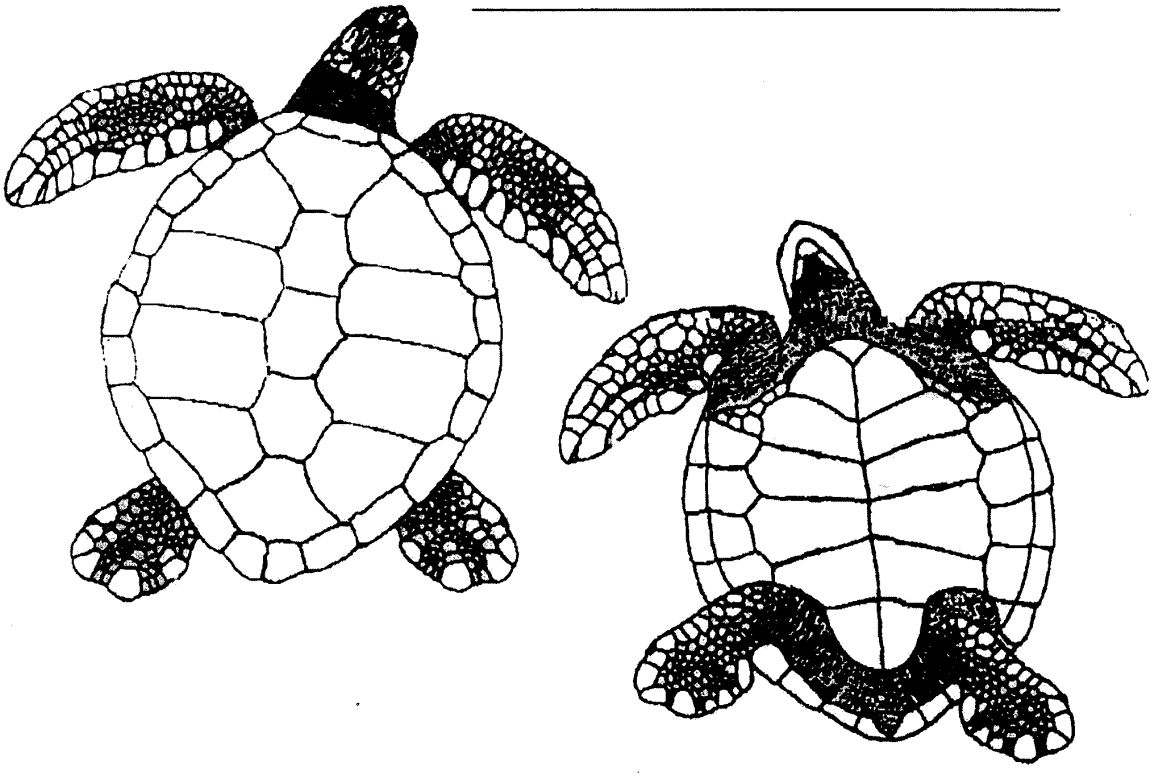
_____

_____

_____

_____

_____



Diagrams by Tom McFarland

Endangered Species Protection for Sea Turtles & Gulf Sturgeon

I. Sea Turtle Trawling and Relocation

Sea Turtle Trawling and Relocation, as specified herein, will be at the option and in the discretion of the Government to aid in preventing the taking of sea turtles during dredging operations with the approved turtle deflector in place. Within 72 hours after receiving written directions from the Contracting Officer, the Contractor shall begin trawling for turtles to relocate them from the dredging project area. Relocation trawling shall be performed so as to not interfere with dredging operations in progress.

e. Approved Sea Turtle Trawling and Relocation Supervisor

A NMFS-Approved Protected Species Observer (supervisor) shall conduct sea turtle trawling. A letter of approval from NMFS shall be provided to the Contracting Officer or his/her authorized representative prior to commencement of trawling. If trawling in Louisiana territorial waters outside of the shrimping season, the approved sea turtle trawling and relocation supervisor must also possess a Scientific Collecting Permit from the Louisiana Department of Wildlife and Fisheries (point of contact is Ms. Karen Foote at 225-765-2384).

f. Sea Turtle Trawling Procedures

Any captured sea turtles either shall be transported to the Institute for Marine Mammal Studies located in Gulfport, Mississippi, or released into waters minimally impacted by presence of oil/dispersants (to be determined by the relocation trawling supervisor in coordination with Edward Creef and Dena Dickerson (601-831-0687). Any captured gulf sturgeons shall be released immediately after capture and handling for measurements away from the dredging site in waters minimally impacted by presence of oil/dispersants (to be determined at the time of capture by the trawling supervisor in coordination with Edward Creef and Dena Dickerson). Methods and equipment shall be standardized including data sheets, nets, trawling direction to tide, length of station, length of tow, and number of tows per station. Data on each tow shall be recorded using the Sea Turtle Trawling Report found at the website (http://el.erdc.usace.army.mil/seaturtles/docs/trawlingforms.pdf). The trawler shall be equipped with 60-foot nets constructed from 8-inch mesh (stretch) fitted with mud rollers and flats as specified in the Turtle Trawl Nets Specifications appended to the end of this Section. Paired net tows shall be made for 24 hours per day, as directed by the Contracting Officer or his/her authorized representative. The tows shall be performed in shifts, to be determined by the Contracting Officer or his/her authorized representative, and the trawler shall be available for operation 24 hours a day. Positions at the beginning and end of each tow shall be determined from GPS Positioning equipment. Refer to EM 1110-1-1003 "Navstar global positioning system surveying", paragraph 5.3 and Table 5-1, for acceptable GPS criteria.

g. Trawling Requirements

Trawling operations shall be conducted in the vicinity of dredge operations, but shall maintain a safe distance from that dredge. **NOTE: ALL TRAWLING ACTIVITIES, VESSELS AND EQUIPMENT SHALL COMPLY WITH THE CONTRACTOR'S ACCIDENT PREVENTION PLAN AND THE REQUIREMENTS OF EM 385-1-1, U.S. ARMY CORPS OF ENGINEERS SAFETY AND HEALTH REQUIREMENTS MANUAL**. Trawling shall be conducted with and against the tidal flow at a speed not to exceed 3.5 knots using repetitive trawls in the channel or other work area not to exceed 42-minutes (total time). Trawls shall be made in the center, green, and red sides of the channel such that the total width of the channel bottom is trawled.

h. Sea Turtle/Gulf Sturgeon Handling and Measurements

At least one crewmember who is a NMFS-Approved Protected Species Observer shall be on board the trawler during the trawl. The observer shall be responsible for handling of captured sea turtles and Gulf sturgeons.

Each captured turtle or gulf sturgeon shall be identified, scanned for PIT tags, measured, tagged, tissue sampled and released, and data recorded on the Sea Turtle Tagging and Relocation Report, which can be found at the following website: (http://el.erdc.usace.army.mil/seaturtles/docs/taggingforms.pdf). Presence of PIT tags shall be scanned for by using a multi-frequency scanner capable of reading multiple frequencies (including 125-, 128-, 134-, and 400-kHz tags) and reading tags deeply embedded in muscle tissue. Any captured sea turtles shall be transported to the Institute for Marine Mammal Studies located in Gulfport, Mississippi. Turtle measurements shall be recorded and shall include, at a minimum, weight, straight-line length, straight-line width, and tail length. Gulf sturgeon measurements shall be recorded and shall include, at a minimum, weight, total length, and fork length. Turtles shall be tagged with NMFS #681 Inconel tags in each of the front flippers according to NMFS protocol. Aseptic conditions shall be maintained for tags and tag attachment. The Contractor shall be responsible for obtaining any and all permits related to trawling from the appropriate state and Federal agencies. All aspects of the trawling shall be coordinated with Edward Creef (504-862-2521) and Dena Dickerson (601-831-0687).

i. Handling Fibropapillomatose Turtles

Anyone handling sea turtles infected with fibropapilloma tumors shall either: 1) clean all equipment that comes in contact with the turtle with mild bleach solution between the processing of each turtle, or 2) maintain a separate set of sampling equipment for handling turtles displaying fibropapilloma tumors or lesions.

j. Water Quality and Physical Measurements

Water temperature measurements shall be taken at the water surface each day using a laboratory thermometer. Weather conditions shall be recorded from visual observations and instruments on the trawler. Weather conditions, air temperature, wind velocity and direction, sea state-wave height, and precipitation shall be recorded on the Sea Turtle Trawling Report. High and low tides shall be recorded.

k. Repair and Replacement of Damaged Trawl Nets

The Contractor, at the time of mobilization, shall provide trawl nets that meet the requirements specified in the Turtle Trawl Net Specifications at the end of this section. Tools, supplies and materials for repairing nets shall be kept aboard the trawler. In the event of damage to trawl nets, one hour will be allowed to either repair or replace them. The Contractor shall have at least one set of replacement nets immediately available at all times, to insure that the dredging work is not adversely delayed due to trawler down-time for replacing damaged nets. It is recommended that a second set of replacement nets be available aboard the trawler.

l. Suspension of Dredging and Relocation Trawling

Should there be a tearing of nets, or breakdown of other equipment that would cause the trawler to leave the area where dredging is underway during any period of time where relocation trawling is required, the dredge may continue to operate for up to 48 hours, as long as no turtles are taken, and subject to the discretion of the Contracting Officer. Should there be dangerously high seas that would cause the trawler to leave the dredging area when relocation trawling is required, the dredge may continue to operate, as long as no turtles are taken and subject to the discretion of the Contracting Officer.

m. Turtle Excluder Devices

Approval for trawling for sea turtles without Turtle Excluder Devices (TEDs) must be obtained from NMFS (contact Eric Hawk at 727-551-5773). Any necessary State or Federal clearances for the capture and relocation of sea turtles must also be obtained. Approvals must be submitted to the Contracting Officer or his/her authorized representative prior to trawling.

n. Reporting

Immediately after completing each day of relocation trawling, if possible, the Contractor shall notify Dena Dickerson by telephone conveying the results of the trawl. The results of each trawl shall be recorded on the Sea Turtle Trawling Report. The Sea Turtle Trawling Report also shall be furnished by the Contractor to Mr. Edward Creef, U.S. Army Corps of Engineers, New Orleans District, within 24 hours after completing the relocation trawl (fax number 504-862-2317; email: edward.d.creef.@usace.army.mil). Following completion of the project, a copy of the Contractor's log regarding sea turtles shall be forwarded to Mr. Edward Creef within 10 working days.

Turtle Trawl Net Specifications

DESIGN:	4 Seam, 4 Legged, 2 Bridal Trawl Net
WEBBING:	4 in bar, 8 in stretch Top – 36 Gauge Twisted Nylon Dipped Side – 36 Gauge Twisted Nylon Dipped Bottom – 84 Gauge Braided Nylon Dipped
NET LENGTH:	60 ft from cork line to cod end
BODY TAPER:	2 to 1
WING END HEIGHT:	6 ft
CENTER HEIGHT:	Dependent on depth of trawl – 14 to 18 ft
COD END:	Length 50 meshes x 4 in equals 16.7 ft Webbing 2 in bar, 4 in stretch, 84 gauge braid nylon Dipped, 80 meshes around, 40 rigged meshes with ¼ x 2 in choker rings, 1 each ½ x 4 in at end Cod End Cover – none Chaffing Gear – none
HEAD ROPE:	60 ft ½ in combination rope (braid nylon with stainless cable center)
FOOT ROPE:	65 ft ½ in combination rope
LEG LINE:	Top – 6 ft, Bottom – 6 ft
FLOATS:	Size – Tuna Floats (football style), Diameter – 7 In; Length – 9 in; number 12 each; Spacing – center of top net 2 in apart
MUD ROLLERS:	Size – 5 in Diameter, 5.5 in length Number – 22 each; spacing – 3 ft attached with 3/8 in Polypropylene rope (replaced with snap on roller when broken)
TICKLER CHAINS:	NONE (Discontinued – but previously used ¼ in x 74 ft galvanized chain)
WEIGHT:	20 ft of ¼ in galvanized chain on each wing, 40 ft per net looped and tied
DOOR SIZE:	7 ft x 40 in (or 8 ft x 40 in); Shoe – 1 in X 6 in: bridles – 3/8 in high test chain
CABLE LENGTH:	(Bridle Length, Total): 7/16 in x 240-300 ft varies with bottom conditions
FLOAT BALL:	NONE
LAZY LINES:	1 in nylon
PICKUP LINES:	3/8 in polypropylene
WHIP LINES:	1 in nylon

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727) 824-5312; FAX (727) 824-5309
http://sero.nmfs.noaa.gov

Measures for Reducing Entrapment Risk to Protected Species

Bottlenose dolphins, sea turtles, and Gulf sturgeon (protected species) are known to inhabit coastal waters of the northern Gulf of Mexico. Bottlenose dolphins are protected under the Marine Mammal Protection Act (MMPA) and sea turtles and Gulf sturgeon are protected under the Endangered Species Act (ESA). Because of the potential for these protected species to become entrapped within coastal waters of construction sites along the northern Gulf coast, projects that enclose shallow open water areas for wetland creation or nourishment will use the following measures to minimize the potential for entrapment:

1. **Pre-construction planning.** During project design, the Federal Action Agency or project proponents must incorporate at least one escape route into the proposed retention structure(s) to allow any protected species to exit the area(s) to be enclosed. Escape routes must lead directly to open water outside the construction site and must have a minimum width of 100 feet. Escape routes should also have a depth as deep as the deepest natural entrance into the enclosure site and must remain open until a thorough survey of the area, conducted immediately prior to complete enclosure, determines no Protected Species are present within the confines of the structure (see item 5 below for details).

2. **Pre-construction compliance meeting.** Prior to construction, the Federal Action Agency, project proponents, the contracting officer representative, and construction personnel should conduct a site visit and meeting to develop a project-specific approach to implementing these preventative measures.

3. **Responsible parties.** The Federal Action Agency will instruct all personnel associated with the project of the potential presence of protected species in the area and the need to prevent entrapment of these animals. All construction personnel will be advised that there are civil and criminal penalties for harming, harassing, or killing protected species. Construction personnel will be held responsible for any protected species harassed or killed as a result of construction activities. All costs associated with monitoring and final clearance surveys are the responsibility of project proponents and must be incorporated in the construction plan.

4. **Monitoring during retention structure construction.** It is the responsibility of construction personnel to monitor the area for protected species during dike or levee construction. If protected species are regularly sighted over a 2 or 3 day period within the enclosure area during retention structure assembly, construction personnel must notify the Federal Action Agency. It is the responsibility of the Federal Action Agency

to then coordinate with the National Marine Fisheries Service (NMFS) Marine Mammal Health and Stranding Response team (1-877-WHALE HELP [1-877-942-5343]) or the appropriate State Coordinator for the Sea Turtle Stranding and Salvage Network (see http://www.sefsc.noaa.gov/species/turtles/stranding_coordinators.htm) to determine what further actions may be required. Construction personnel may not attempt to scare, herd, disturb, or harass the protected species to encourage them to leave the area.

5. **Pre-closure final clearance.** Prior to completing any retention structure by closing the escape route, the Federal Action Agency will insure that the area to be enclosed is observed for protected species. Surveys must be conducted by experienced marine observers during daylight hours beginning the day prior to closure and continuing during closure. This is best accomplished by small vessel or aerial surveys with 2-3 experienced marine observers per vehicle (vessel/helicopter) scanning for protected species. Large areas (e.g. >300 acres) will likely require the use of more than one vessel or aerial survey to insure full coverage of the area. These surveys will occur in a Beaufort sea state (BSS) of 3 feet or less, as protected species are difficult to sight in choppy water. Escape routes may not be closed until the final clearance determines the absence of protected species within the enclosure sight.

6. **Post closure sightings.** If protected species become entrapped in an enclosed area, the Federal Action Agency and NMFS must be immediately notified. If observers note entrapped animals are visually disturbed, stressed, or their health is compromised then the Action Agency may require any pumping activity to cease and the breaching of retention structures so that the animals can either leave on their own or be moved under the direction of NMFS.

    a. In coordination with the local stranding networks and other experts, NMFS will conduct an initial assessment to determine the number of animals, their size, age (in the case of dolphins), body condition, behavior, habitat, environmental parameters, prey availability and overall risk.
    b. If the animal(s) is/are not in imminent danger they will need to be monitored by the Stranding Network for any significant changes in the above variables.
    c. Construction personnel may not attempt to scare, herd, disturb, or harass the protected species to encourage them to leave the area. Coordination by the Federal Action Agency with the NMFS SER Stranding Coordinator may result in authorization for these actions.
    d. NMFS may intervene (catch and release and/or rehabilitate) if the protected species are in a situation that is life threatening and evidence suggests the animal is unlikely to survive in its immediate surroundings.
    e. Surveys will be conducted throughout the area at least twice or more in calm surface conditions (BSS 3 feet or less), with experienced marine observers, to determine whether protected species are no longer present in the area.

Revised: May 22, 2012

While NMFS recommends these best management practices to prevent the future takes of marine mammals by entrapment, use of these measures cannot guarantee a take will not occur. Following these measures does not constitute compliance with the MMPA's Incidental Take requirements and take is not authorized.

SOUTHWEST COASTAL LOUISIANA
REVISED INTEGRATED DRAFT FINAL FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

ANNEX R

2050 Coastal Wildlife Tables

Table 7-2. Region 3 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
Status: NH = Not Historically Present; NL = No Longer Present; Lo = Low Numbers; Mo = Moderate Numbers; Hi = High Numbers
Functions of Particular Interest: Ne = Nesting; St = Stopover Habitat; W = Wintering Area; Mu = Multiple Functions
Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna														Furbearer												Game Mammals												Reptiles			
	Type	% of Unit	Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Migrants				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Atchafalaya Basin																																											
Atchafalaya Subdelta	OW	95	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Lo	I	I
	FM	3	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	I
	BB	1		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH			Mu	Lo	Sy	Sy
West N. Wax Lake	FM	17	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy
	FS	16	Mu	Lo	Sy	Sy	Ne	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	HF	55		NH			Ne	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	AU	11		NH			Ne	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
East N. Wax Lake Wetlands	FS	35	Mu	Lo	Sy	Sy	Ne	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	56		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Wax Lake Wetlands	OW	18	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	I
	FM	38	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	I
	FS	8	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Hi	I	I
	HF	34		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	I	I
Wax Lk. Outlet Subdelta	OW	97	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Lo	I	I
	FM	2	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	I
	BB	1		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH			Mu	Lo	Sy	Sy
Teche/Vermilion Basin																																											
Cote Blanche Wetlands	OW	10	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Hi	I	I
	FM	54	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Hi	I	I
	FS	15	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	I	I
	HF	17		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	I	I
East Cote Blanche Bay	OW	100	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH				NH				NH				NH				NH				NH				NH				NH		
West Cote Blanche Bay	OW	100	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH				NH				NH				NH				NH				NH				NH				NH		
Marsh Island	OW	20	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH			Mu	Mo	Sy	I

Table 7-2. Region 3 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
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Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																																					
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
	BM	70		NH				NH			Mu	Hi	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	SM	10		NH				NH			Mu	Hi	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy
Vermilion Bay Marsh	OW	13		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH				NH			Mu	Lo	Sy	Sy
	FM	5		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	IM	25		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BM	30		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	FS	5		NH			Ne	Lo	Sy	Sy		NH			Mu	Hi	I	Sy		NH			Mu	Lo	Sy	Sy		NH				NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	18		NH				NH				NH				NH				NH			Mu	Lo	Sy	Sy		NH				NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy
Vermilion Bay	OW	99	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH				NH				NH		
Big Woods	FM	8		NH				NH			St	Lo	Sy	Sy	Mu	Mo	I	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Lo	Mo	Sy	Sy
	HF	60		NH				NH				NH				NH				NH			Mu	Lo	Sy	Sy		NH				NH			Mu	Hi	Sy	D		NH		
	AU	25		NH				NH				NH			St	Lo	I	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH		
Rainey Marsh	OW	12	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy
	IM	11		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy
	BM	70		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy

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Mapping Unit	1988 Habitat		Avifauna (cont.)														Furbearers												Game Mammals												Reptiles			
	Type	% of Unit	Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Migrants				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
	BM	70	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	I
	SM	10	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
Vermilion Bay Marsh	OW	13	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Lo	I	I
	FM	5	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	I	I
	IM	25	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	I	I
	BM	30	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	I	I
	FS	5	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	I	I
	HF	18		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	I	I
Vermilion Bay	OW	99	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH				NH				NH				NH				NH				NH				NH				NH		
Big Woods	FM	8	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	60		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	AU	25	Mu	Lo	Sy	Sy	Ne	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Rainey Marsh	OW	12	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH			Mu	Hi	I	I
	IM	11	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Hi	I	I
	BM	70	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Hi	I	I

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
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Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																																					
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Mermentau Basin																																								
Amoco	OW	14		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Hi	I	I		NH			W	Mo	Sy	Sy
	FM	80		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Hi	I	I	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
Big Marsh	OW	11		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			W	Mo	Sy	Sy
	FM	57		NH			St	Lo	U	U	Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	IM	25		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
Big Burn	OW	18		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	AB	6		NH				NH				NH				NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	FM	67		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
Cameron Prairie	OW	6		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	AB	14		NH				NH				NH				NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	FM	67		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	AU	11		NH				NH				NH			St	Lo	I	Sy	Mu	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Grand Chenier Ridge	OW	11		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	FM	23		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	IM	24		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	BM	5		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	8		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH			Mu	Hi	Sy	D		NH		
	AU	30		NH				NH				NH			St	Lo	I	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Grand Lake	OW	99		NH				NH			Mu	Hi	Sy	Sy		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH				NH				NH		

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
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Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																																					
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Mermentau Basin																																								
Amoco	OW	14		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Hi	I	I		NH			W	Mo	Sy	Sy
	FM	80		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Hi	I	I	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
Big Marsh	OW	11		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			W	Mo	Sy	Sy
	FM	57		NH			St	Lo	U	U	Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	IM	25		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
Big Burn	OW	18		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	AB	6		NH				NH				NH				NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	FM	67		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
Cameron Prairie	OW	6		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	AB	14		NH				NH				NH				NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	FM	67		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	AU	11		NH				NH				NH			St	Lo	I	Sy	Mu	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Grand Chenier Ridge	OW	11		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	FM	23		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	IM	24		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	BM	5		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	8		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH			Mu	Hi	Sy	D		NH		
	AU	30		NH				NH				NH			St	Lo	I	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Grand Lake	OW	99		NH				NH			Mu	Hi	Sy	Sy		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH				NH				NH		

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Mapping Unit	1988 Habitat		Avifauna																Furbearer										Game								Reptiles			
	Type	% of Unit	Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Mig.				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Mermentau Basin																																											
Amoco	OW	14	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	I
	FM	80	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	I
Big Marsh	OW	11	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Hi	I	I
	FM	57	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	I
	IM	25	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Hi	I	I
Big Burn	OW	18	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	I
	AB	6	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	I
	FM	67	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	I
Cameron Prairie	OW	6	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	AB	14	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	FM	67	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	I	Sy
	AU	11	Mu	Mo	Sy	Sy	Ne	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Grand Chenier Ridge	OW	11	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Lo	I	Sy
	FM	23	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	I	Sy
	IM	24	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	I	Sy
	BM	5	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	I	Sy
	HF	8		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	AU	30	Mu	Lo	Sy	Sy	Ne	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Grand Lake	OW	99	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH				NH				NH				NH				NH				NH				NH				NH		

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			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Grand/White Lake Land Bridge	OW	35		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			W	Lo	Sy	Sy
	FM	54		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	9		NH				NH				NH				NH				NH				NH				NH				NH			Mu	Hi	Sy	D		NH		
Grand Lake East	OW	14		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			W	Lo	Sy	Sy
	AB	6		NH				NH				NH				NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			Mu	Lo	Sy	Sy
	FM	64		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			Mu	Lo	Sy	Sy
	HF	14		NH				NH				NH				NH				NH				NH				NH				NH			Mu	Hi	Sy	D		NH		
Hog Bayou	OW	34	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			W	Lo	Sy	Sy
	FM	5		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			Mu	Lo	Sy	Sy
	BM	32		NH				NH			Mu	Hi	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			Mu	Lo	Sy	Sy
	SM	25		NH				NH			Mu	Hi	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Lo	D	D	W	Lo	D	D	W	Lo	D	D		NH			Mu	Lo	Sy	Sy
	BB	1		NH				NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy		NH				NH				NH				NH				NH		
Lacassine	OW	20		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	AB	20		NH				NH				NH				NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	FM	55		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	HF	5		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH			Mu	Hi	Sy	D		NH		
Little Prairie	OW	6		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy
	FM	30		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy
	HF	14		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH			W	Mo	Sy	Sy		NH		
	AU	50		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Lo	Sy	Sy

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
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Functions of Particular Interest: Ne = Nesting; St = Stopover Habitat; W = Wintering Area; Mu = Multiple Functions
Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna														Furbeare												Game												Reptiles			
	Type	% of Unit	Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Mig.				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Grand/White Lake Land Bridge	OW	35	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	I
	FM	54	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	D	D		NH			Mu	Lo	D	D	Mu	Mo	I	I
	HF	9		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	D	D		NH			Mu	Lo	D	D	Mu	Lo	Sy	Sy
Grand Lake East	OW	14	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	AB	6	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	FM	64	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	D	D		NH			Mu	Lo	D	D	Mu	Mo	I	Sy
	HF	14		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Hog Bayou	OW	34	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Lo	Sy	Sy
	FM	5	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BM	32	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	SM	25	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BB	1		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
Lacassine	OW	20	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Hi	I	Sy
	AB	20	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Hi	I	Sy
	FM	55	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy
	HF	5		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
Little Prairie	OW	6	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	FM	30	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	I	Sy
	HF	14		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	AU	50	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
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Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																																					
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Little Pecan	OW	15		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	FM	75		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	D	D	W	Mo	D	D	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	HF	3		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH				NH				NH		
Locust Island	OW	9		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy
	FM	9		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy
	IM	31		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy
	BM	13		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy
	AU	36		NH				NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Lower Mud Lake	OW	11	W	Lo	I	I		NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D		NH			W	Lo	Sy	Sy
	SM	77		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Lo	D	D	W	Lo	D	D	W	Lo	D	D		NH			Mu	Lo	Sy	Sy
	HF	4		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
	BB	2		NH				NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy		NH				NH				NH				NH				NH		
Middle Marsh	OW	7		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	FM	10		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	IM	69		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Hi	Sy	Sy	W	Hi	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	AU	10		NH				NH				NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
North White Lake	FM	92		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy
	HF	6		NH				NH				NH				NH				NH			Mu	Lo	Sy	Sy		NH				NH			Mu	Hi	Sy	D		NH		

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Mapping Unit	1988 Habitat		Avifauna														Furbear												Game												Reptiles			
			Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Mig.				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
	Type	% of Unit	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Little Pecan	OW	15	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH			Mu	Hi	I	I
	FM	75	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Hi	I	I
	HF	3		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Locust Island	OW	9	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Mo	I	Sy
	FM	9	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	I	Sy
	IM	31	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	BM	13	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	AU	36	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Lower Mud Lake	OW	11	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Lo	Sy	Sy
	SM	77	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	4		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BB	2		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
Middle Marsh	OW	7	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Mo	I	Sy
	FM	10	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	I	Sy
	IM	69	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	AU	10	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
North White Lake	FM	92	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	HF	6		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy

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Mapping Unit	1988 Habitat		Avifauna																																					
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
North Grand Lake	OW	20		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy
	FM	68		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	HF	7		NH				NH				NH				NH				NH			Mu	Lo	Sy	Sy		NH				NH			Mu	Hi	Sy	D		NH		
Oak Grove	IM	73		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	BM	13		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	AU	8		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Rockefeller	OW	23	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy
	FM	15		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	D	D	W	Mo	D	D	W	Mo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D
	IM	14		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	D	D	W	Mo	D	D	W	Mo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D
	BM	30		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	D	D	W	Mo	D	D	W	Mo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D
	SM	15		NH				NH			Mu	Hi	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Lo	D	D	W	Lo	D	D	W	Mo	Sy	Sy		NH			Mu	Lo	D	D
South Pecan Island	OW	26	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy
	IM	5		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	D	D	W	Mo	D	D	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D
	BM	61		NH				NH			Mu	Hi	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	D	D	W	Mo	D	D	W	Lo	Sy	Sy	Mu	Lo	Sy	D	Mu	Mo	D	D
South White Lake	OW	7		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Mo	D	D	W	Mo	D	D	W	Lo	D	D					W	Mo	Sy	Sy
	FM	70		NH			Ne	Lo	I	I	Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	D	D	W	Mo	D	D	W	Lo	D	D	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	HF	11		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
	AU	10		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	Mu	Lo	Sy	Sy
White Lake	OW	99		NH				NH			Mu	Hi	Sy	Sy		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH				NH				NH		

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Mapping Unit	1988 Habitat		Avifauna														Furbeare												Game												Reptiles			
			Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Mig.				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
	Type	% of Unit	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
North Grand Lake	OW	20	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	FM	68	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy	Mu	Mo	I	Sy
	HF	7		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Oak Grove	IM	73	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	BM	13	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	AU	8	Mu	Lo	Sy	Sy	Ne	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Rockefeller	OW	23		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH			Mu	Hi	I	Sy
	FM	15	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Mo	Sy	D		NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy
	IM	14	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Mo	Sy	D		NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy
	BM	30	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Mo	Sy	D		NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy
	SM	15	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	D		NH			Mu	Mo	Sy	D	Mu	Lo	Sy	Sy
South Pecan Island	OW	26		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH			Mu	Mo	I	Sy
	IM	5	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy
	BM	61	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy
South White Lake	OW	7	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	FM	70	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	HF	11	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	AU	10	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
White Lake	OW	99	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH				NH				NH				NH				NH				NH				NH				NH		

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
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Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																																					
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Calcasieu/Sabine Basin																																								
Big Lake	OW	24		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	FM	14		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	IM	9		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	BM	18		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	HF	10		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH				NH				NH		
	AU	25		NH				NH			St	Lo	Sy	Sy	St	Mo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH		
Black Bayou	OW	34	W	Lo	I	I		NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			W	Lo	Sy	D
	IM	23		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	BM	34		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	HF	5		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
Black Lake	OW	68		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	W	Lo	Sy	D
	IM	5		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	Mu	Lo	Sy	D
	BM	11		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	W	Lo	I	D	Mu	Lo	Sy	D
	AU	10		NH				NH			St	Lo	Sy	Sy	St	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH				NH				NH		
Brown Lake	OW	52		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	FM	7		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	IM	5		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	BM	34		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
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Functions of Particular Interest: Ne = Nesting; St = Stopover Habitat; W = Wintering Area; Mu = Multiple Functions
Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																Furbear												Game												Reptiles			
			Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Mig.				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
	Type	% of Unit	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Calcasieu/Sabine Basin																																												
Big Lake	OW	24	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Mo	I	Sy
	FM	14	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	IM	9	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	BM	18	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	HF	10		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	AU	25	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Black Bayou	OW	34	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Lo	Sy	Sy
	IM	23	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy
	BM	34	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy
	HF	5		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
Black Lake	OW	68	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Lo	Sy	Sy
	IM	5	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	BM	11	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	AU	10	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	D		NH			Mu	Mo	Sy	D	Mu	Lo	Sy	Sy
Brown Lake	OW	52	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Lo	Sy	Sy
	FM	7	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy
	IM	5	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy
	BM	34	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy

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Mapping Unit	1988 Habitat		Avifauna																																					
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Cameron	OW	6		NH				NH			Mu	Mo	Sy	Sy		NH				NH				NH				NH				NH				NH				NH		
	FM	19		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy		NH				NH				NH			Mu	Lo	Sy	Sy		NH		
	IM	22		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	BM	14		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	SM	6		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Lo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	1		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
	BB	1		NH				NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy		NH				NH				NH				NH				NH		
Calcasieu Lake	OW	94	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH				NH				NH		
Cameron-Creole Watershed	OW	38		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	Sy	W	Hi	I	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy
	IM	26		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BM	35		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
Choupique Island	OW	33		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy
	FM	29		NH				NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BM	31		NH				NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	AU	5		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH				NH				NH		
Clear Marais	OW	21		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	I		NH			W	Mo	Sy	Sy
	AB	10		NH				NH				NH				NH				NH			W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	I		NH			Mu	Mo	Sy	Sy
	FM	58		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	I	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	AU	6		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	I	Sy	W	Mo	I	Sy	W	Mo	I	I	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
Gum Cove	FM	21		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy
	AU	77		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	W	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	Sy	Sy

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	Type	% of Unit	Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Mig.				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Cameron	OW	6	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	FM	19	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	IM	22	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	BM	14	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
	SM	6	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	HF	1	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
	BB	1		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
Calcasieu Lake	OW	94	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH				NH				NH				NH				NH				NH				NH				NH		
Cameron-Creole Watershed	OW	38	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	I	I	Mu	Mo	I	I	Mu	Mo	I	I		NH				NH				NH			Mu	Mo	I	I
	IM	26	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	I	I	Mu	Mo	I	I	Mu	Mo	I	I	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	I
	BM	35	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	I	I	Mu	Mo	I	I	Mu	Mo	I	I	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	I
Choupique Island	OW	33	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Lo	Sy	Sy
	FM	29	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BM	31	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	AU	5		NH			Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Lo	Sy	Sy	Mu	Lo	Sy	Sy
Clear Marais	OW	21	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	I
	AB	10	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	I
	FM	58	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	I
	AU	6	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Gum Cove	FM	21	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy
	AU	77	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
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Mapping Unit	1988 Habitat		Avifauna																																							
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Hackberry Ridge	OW	12		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	BM	21		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	I	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	HF	9		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH			Mu	Mo	Sy	D		NH		
	AU	53		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy
Hog Island Gully	OW	37		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	BM	22		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	SM	36		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Lo	Sy	D	W	Lo	Sy	D	W	Lo	Sy	D		NH			Mu	Lo	Sy	D
East Johnson's Bayou	OW	7		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			W	Lo	Sy	Sy
	FM	7		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	IM	80		NH				NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
West Johnson's Bayou	OW	13	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Mo	I	D	W	Mo	I	D	W	Mo	I	D		NH			W	Lo	Sy	Sy
	BM	83		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	D	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
Johnson's Bayou Ridge	OW	5	W	Lo	I	I		NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	I	D	W	Mo	I	D	W	Mo	I	D		NH			W	Lo	Sy	Sy
	BM	31		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Hi	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	SM	44		NH				NH			Mu	Mo	Sy	D	Mu	Hi	I	Sy	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Hi	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	HF	3		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH				NH				NH		
	BB	1		NH				NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy		NH				NH				NH				NH				NH		
	AU	16		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	I	D	W	Mo	I	D	W	Hi	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
Martin Beach-Ship Can. Shore	OW	9	W	Mo	I	I		NH			Mu	Mo	Sy	Sy		NH				NH			W	Mo	I	D	W	Mo	I	D	W	Lo	I	D		NH			W	Lo	Sy	Sy
	IM	33		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	BM	26		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	SM	7		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	I	D	W	Mo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	BB	1		NH				NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy		NH				NH				NH				NH				NH		
	AU	24		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Lo	I	D	W	Lo	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D

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Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna														Furbearer												Game												Reptiles			
			Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Mig.				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
	Type	% of Unit	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Hackberry Ridge	OW	12	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Lo	Sy	Sy
	BM	21	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	HF	9	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH				NH				NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH					
	AU	53	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH		
Hog Island Gully	OW	37	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Lo	Sy	Sy
	BM	22	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	SM	36	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
East Johnson's Bayou	OW	7	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH			Mu	Hi	I	Sy
	FM	7	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy
	IM	80	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy
West Johnson's Bayou	OW	13	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH			Mu	Hi	I	Sy
	BM	83	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy
Johnson's Bayou Ridge	OW	5	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH			Mu	Lo	Sy	Sy
	BM	31	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	SM	44	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	HF	3		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BB	1		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
	AU	16	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
Martin Beach-Ship Can. Shore	OW	9	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH			Mu	Lo	Sy	Sy
	IM	33	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	BM	26	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	SM	7	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	BB	1		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
	AU	24	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	D		NH			Mu	Mo	Sy	D	Mu	Lo	Sy	Sy

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			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Mud Lake	OW	34	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Mo	I	Sy	W	Mo	I	Sy	W	Lo	I	Sy		NH			W	Lo	Sy	Sy
	BM	62		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	I	Sy	W	Mo	I	Sy	W	Lo	I	Sy	Mu	Lo	Sy	D	W	Lo	Sy	Sy
Perry Ridge	OW	30		NH				NH			Mu	Mo	Sy	D		NH				NH			W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	Sy		NH			W	Lo	Sy	Sy
	FM	30		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	Sy		NH			Mu	Lo	Sy	Sy
	IM	28		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	Sy		NH			Mu	Lo	Sy	Sy
	HF	10		NH			Mu	Lo	Sy	Sy		NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH				NH				NH		
Sabine Pool No. 3	OW	32		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	Sy	W	Hi	I	Sy	W	Hi	I	Sy		NH			W	Lo	Sy	Sy
	AB	7		NH				NH				NH				NH				NH			W	Hi	I	Sy	W	Hi	I	Sy	W	Hi	I	Sy		NH			Mu	Mo	Sy	Sy
	FM	61		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Hi	I	Sy		NH			Mu	Mo	Sy	Sy
Sabine Lake Ridges	OW	5	W	Lo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Hi	I	Sy		NH			W	Mo	Sy	Sy
	FM	5		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Hi	I	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	IM	24		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	D	W	Mo	Sy	D	W	Hi	I	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D
	BM	35		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Mo	Sy	D	W	Mo	Sy	D	W	Hi	I	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D
	SM	11		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	D	W	Lo	Sy	D	W	Lo	Sy	D	W	Mo	I	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D
	HF	1		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
	BB	2		NH				NH			Mu	Hi	Sy	Sy	St	Lo	Sy	Sy	Mu	Hi	Sy	Sy		NH				NH				NH				NH				NH		
	AU	17		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Hi	I	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
Second Bayou	OW	13		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			W	Lo	Sy	Sy
	IM	72		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	BM	14		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D

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			Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Mig.				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
	Type	% of Unit	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Mud Lake	OW	34	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	I	Sy
	BM	62	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	I	Sy
Perry Ridge	OW	30	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Hi	I	Sy
	FM	30	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy
	IM	28	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Hi	I	Sy
	HF	10		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
Sabine Pool No. 3	OW	32		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH			Mu	Hi	Sy	Sy
	AB	7	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Hi	Sy	Sy
	FM	61	Mu	Hi	Sy	Sy		NH			Mu	Hi	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy
Sabine Lake Ridges	OW	5	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH				NH			Mu	Mo	Sy	Sy
	FM	5	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
	IM	24	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	BM	35	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	SM	11	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	HF	1		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
	BB	2		NH				NH				NH				NH				NH				NH				NH				NH				NH				NH				NH		
	AU	17	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy
Second Bayou	OW	13	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH				NH			Mu	Hi	I	I
	IM	72	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Hi	I	I
	BM	14	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Hi	I	I

Table 7-2. Region 4 wildlife functions, status, trends, and projections.

Habitat Types: OW = Open Water; AB = Aquatic Bed; FM = Fresh Marsh; IM = Intermediate Marsh; BM = Brackish Marsh; SM = Saline Marsh; FS = Fresh Swamp; HF = Hardwood Forest; BB = Barrier Beach; AU = Agriculture/Upland. Habitat types comprising less than 5% of unit are shown only if habitat is particularly rare or important to wildlife.
Status: NH = Not Historically Present; NL = No Longer Present; Lo = Low Numbers; Mo = Moderate Numbers; Hi = High Numbers
Functions of Particular Interest: Ne = Nesting; St = Stopover Habitat; W = Wintering Area; Mu = Multiple Functions
Trends (since 1985) / **Projections** (through 2050)**:** Sy = Steady; D = Decrease; I = Increase; U = Unknown

Mapping Unit	1988 Habitat		Avifauna																																					
	Type	% of Unit	Brown Pelican				Bald Eagle				Seabirds				Wading Birds				Shorebirds				Dabbling Ducks				Diving Ducks				Geese				Raptors				Rails, Coots, and Gallinules			
			Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Southeast Sabine	OW	9		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			W	Lo	Sy	Sy
	IM	59		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
	BM	31		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D	Mu	Lo	Sy	D	Mu	Lo	Sy	D
SW Gum Cove	OW	17		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			W	Lo	Sy	D
	FM	41		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	IM	24		NH				NH			Mu	Lo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	BM	8		NH				NH			Mu	Mo	Sy	Sy	Mu	Hi	Sy	Sy	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	HF	6		NH				NH				NH				NH				NH			Ne	Lo	Sy	Sy		NH				NH				NH				NH		
	AU	5		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy
Sweet/Willow Lakes	OW	43		NH				NH			Mu	Lo	Sy	Sy		NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			W	Mo	Sy	Sy
	AB	6		NH				NH				NH				NH				NH			W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
	FM	46		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Lo	Sy	Sy		NH			Mu	Mo	Sy	Sy
West Black Lake	OW	61		NH				NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	FM	20		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	IM	9		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	AU	6		NH				NH				NH			St	Lo	Sy	Sy	Mu	Mo	Sy	Sy	W	Hi	I	Sy	W	Hi	I	Sy	W	Mo	I	Sy		NH			Mu	Lo	Sy	Sy
West Cove	OW	24	W	Mo	I	I		NH			Mu	Hi	Sy	Sy		NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	AB	7		NH				NH				NH				NH				NH			W	Hi	I	D	W	Hi	I	D	W	Mo	I	D		NH			Mu	Lo	Sy	D
	FM	65		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	W	Hi	Sy	D	W	Hi	Sy	D	W	Mo	Sy	D		NH			Mu	Lo	Sy	D
Willow Bayou	OW	40	W	Lo	I	I		NH			Mu	Mo	Sy	Sy		NH				NH			W	Hi	D	D	W	Hi	D	D	W	Mo	Sy	D		NH			W	Lo	Sy	D
	IM	8		NH				NH			Mu	Lo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	W	Hi	D	D	W	Hi	D	D	W	Mo	Sy	D		NH			Mu	Lo	Sy	D
	BM	52		NH				NH			Mu	Mo	Sy	D	Mu	Hi	Sy	D	Mu	Hi	Sy	Sy	W	Hi	D	D	W	Hi	D	D	W	Mo	Sy	D		NH			Mu	Lo	Sy	D

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Mapping Unit	1988 Habitat		Avifauna																Furbear														Game												Reptiles			
			Other Marsh/ OW Residents				Other Wood-land Resid.				Other Marsh/ OW Migrants				Other Wood-land Mig.				Nutria				Muskrat				Mink, Otter, and Raccoon				Rabbits				Squirrels				Deer				American Alligator			
	Type	% of Unit	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.	Func.	Status	Trend	Proj.
Southeast Sabine	OW	9	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy		NH				NH			Mu	Hi	I	Sy
	IM	59	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy
	BM	31	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Mo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy
SW Gum Cove	OW	17	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Mo	Sy	Sy				
	FM	41	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	IM	24	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	BM	8	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	Sy	Sy
	HF	6		NH			Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	Sy
	AU	5	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy	W	Mo	Sy	Sy		NH			W	Mo	Sy	Sy	Mu	Lo	Sy	Sy
Sweet/Willow Lakes	OW	43	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Lo	Sy	Sy				
	AB	6	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Mo	Sy	Sy				
	FM	46	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy
West Black Lake	OW	61	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Lo	Sy	Sy				
	FM	20	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	I
	IM	9	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Lo	Sy	I
	AU	6	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy	Mu	Lo	Sy	Sy
West Cove	OW	24	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Hi	I	Sy				
	AB	7	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Hi	I	Sy				
	FM	65	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Hi	I	Sy
Willow Bayou	OW	40	Mu	Mo	Sy	Sy		NH			Mu	Mo	Sy	Sy		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy		NH				NH			Mu	Mo	I	Sy				
	IM	8	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy
	BM	52	Mu	Hi	Sy	D		NH			Mu	Hi	Sy	D		NH			Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	Sy	Mu	Lo	Sy	D		NH			Mu	Lo	Sy	D	Mu	Mo	I	Sy

SOUTHWEST COASTAL LOUISIANA
REVISED INTEGRATED DRAFT FEASIBILITY REPORT
AND
ENVIRONMENTAL IMPACT STATEMENT

ANNEX S

Floods and Storms of Record

1. FLOODS AND STORMS OF RECORD

FLOODS AND STORMS OF RECORD

There have been several floods caused by runoff from heavy rainfall. Some of the major events that occurred over the last thirty years, including Hurricanes Lili, Rita, and Ike are discussed below.

Hurricane Audrey (June 25 - 29, 1957) ranks as the 7th deadliest hurricane to strike the United States and was the deadliest natural disaster in the history of southwest Louisiana in modern record-keeping with at least 500 deaths (source: http://www.srh.noaa.gov/lch/?n=audrey; accessed January 7, 2016).

Hurricane Lili (September 23 - October 3, 2002) was originally a Category 4 hurricane and first made landfall near Marsh Island in Iberia Parish with maximum sustained winds of 92 mph. Highest recorded rainfall amount was about 9 inches in some parts of Louisiana. The highest storm surge was over 11 feet in St. Mary Parish (source: https://coast.noaa.gov/hes/docs/postStorm/Lili_%20final.pdf; accessed December 15, 2015).

Hurricane Rita (September 24 - 26, 2005) Hurricane Rita, reaching its peak intensity southeast of the mouth of the Mississippi River as a Category 5, first made landfall just west of Johnson's Bayou and east of Sabine Pass at the Texas-Louisiana border as a Category 3 hurricane Sensors recorded storm-surge water levels over 14 ft above NAVD 88 at Constance Beach (LC11), Creole (LA12), and Grand Chenier (LA11), La., about 20 miles, 48 miles, and 54 miles, respectively, east of Sabine Pass, Texas. In general, storm-surge water levels increased eastward from the Sabine River into southwest Louisiana. The magnitude of the storm surge was greatest near the coast and decreased inland through the approximate latitude of I-10, about 35 miles inland from the coast (source: http://pubs.usgs.gov/circ/1306/pdf/c1306_ch7_j.pdf; accessed December 15, 2015).

Hurricane Gustav (August 25 - September 4, 2008) Gustav made landfall near Cocodrie, Louisiana on September 1, 2008 as a strong category 2 (based on 110 mph sustained winds) and continued to move northwest, spreading hurricane force wind gusts across portions of Southeast and South Central Louisiana (http://www.srh.noaa.gov/lix/?n=gustavsummary; accessed January 26, 2016). Due to the storm making landfall east of the study area, storm surge values were only 4-5 feet across St. Mary, Iberia, and Vermilion parishes (http://www.srh.noaa.gov/images/lch/tropical/HPW1-SUN.pdf; accessed January 26, 2016).

Hurricane Ike (September 1-14, 2008) first made landfall near Galveston, Texas on September 13, 2008 as a Category 2 hurricane with maximum sustained winds of 110 mph (http://www.srh.noaa.gov/hgx/?n=projects_ike08; accessed December 15, 2015). Ike was a large hurricane with tropical-storm-force and hurricane-force winds associated at the time of its landfall extending approximately 275 miles and 120 miles from the storm center, respectively. In Louisiana, estimated wind speeds ranged from 80 mph near the Texas-Louisiana border to 50 mph in Vermilion Parish. Storm surge caused flooding in Cameron, Vermilion, and many parishes to the east, with over 9 foot stillwater levels estimated for Lake Charles (http://www.fema.gov/media-library-data/20130726-1648-20490-1790/757_ch1_final.pdf; accessed December 15, 2015).