MADISON BAY MARSH CREATION AND TERRACING PROJECT
ENVIRONMENTAL ASSESSMENT
Fed No. TE-51
Terrebonne Parish, Louisiana

U.S. Department of Commerce

National Oceanic and Atmospheric Administration

National Marine Fisheries Service

DRAFT

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ACRONYMS

BTNEP	Barataria-Terrebonne National Estuary Program
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CPRA	Louisiana Coastal Protection and Restoration Authority
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
CZMA	Coastal Zone Management Act
DWH	Deepwater Horizon
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FIRM	Flood Insurance Rate Maps
GMFMC	Gulf of Mexico Fisheries Management Council
HTRW	Hazardous, Toxic, and Radioactive Waste
LCWCRTF	Louisiana Coastal Wetlands Conservation and Restoration Task Force
LDWF	Louisiana Department of Wildlife and Fisheries
LDEQ	Louisiana Department of Environmental Quality
MBTA	Migratory Bird Treaty Act
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration, U.S. Department of Commerce
NRHP	National Register of Historic Places
SAV	Submerged aquatic vegetation
SHPO	State Historic Preservation Office
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service, U.S. Department of Interior
WCRA	Wetlands Conservation and Restoration Authority
WVA	Wetland Value Assessment

UNITS OF MEASURE

ft	feet

EXECUTIVE SUMMARY

Project: Madison Bay Marsh Creation and Terracing (TE-51)

Sponsor: National Marine Fisheries Service and Louisiana Coastal Protection and Restoration Authority

Contact: Cecelia Linder; 1315 East-West Hwy, Silver Spring MD 20910; ph 301-427-8675

Project Size: Over 1,000 acres of shallow open water and marsh, where the net benefit of several hundred acres of new and enhanced marsh is expected.

Location: Along the Terrebonne Basin in Terrebonne Parish, Louisiana near Montegut.

Need: Land loss from wave erosion, subsidence, salt water intrusion, lack of sediment input, and oil and gas activities have resulted in conversion of marsh to open water, a less valuable fish and wildlife habitat.

Purpose: Support the objectives of the Coastal Wetlands Planning, Protection, and Restoration Act by creating marsh, and nourishing existing marsh.

Proposal: Create and nourish 470 acres of marsh using nearby bay sediments. Construct approximately 25,000 ft (42 acres) of terraces and marsh to reduce wave erosion of created and existing marsh.

Public Participation:
State resource agencies, federal resource agencies, and local government coordinated throughout project development. The draft Environmental Assessment will be available for public review at the Terrebonne Parish Public Library in Montegut, Louisiana, and online (http://www.habitat.noaa.gov/pdf/madison_te_51_draft_environmental_assessment.pdf). We will publish a notice of the draft EA in the Advocate (State newspaper) and the Houma Daily Courier (local newspaper), and copies of the notices will be added to Appendix C. Comments received to date have been included in this EA.

Summary of statement and conclusions:
Long-term benefits to Louisiana coastal resources without substantial long-term adverse environmental impacts are expected of the preferred alternative. Construction-related adverse impacts are considered minor and insubstantial because they are temporary or reversible. Benefits are moderate and sustained. This conclusion is based on: a review of relevant literature; site-specific data; project-specific engineering reports related to biological, physical and cultural resources; and experience gained through more than a decade of coastal restoration in Louisiana. An increase to fisheries habitat is expected to have lasting social and economic benefits for recreational and commercial fishing. Also, the action would increase protection of adjacent marsh in the area to be restored.

Potential adverse impacts: None

Issues to be resolved: None

1 INTRODUCTION

The proposed project (**Madison Bay Marsh Creation and Terracing Project, TE-51**) is authorized under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) of 1990 (16 United States Code [U.S.C.] §777c, 3951-3956), which stipulates that five federal agencies and the State of Louisiana jointly develop and implement a plan to reduce the loss of coastal wetlands in Louisiana (16 U.S.C. §3952 (b) (2)). The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (Fisheries Service), Department of Commerce is the federal sponsor responsible for project oversight, including National Environmental Policy Act (NEPA) compliance. The Louisiana Coastal Protection and Restoration Authority (CPRA) is the non-federal local project sponsor. Other federal agencies that make up the CWPPRA Task Force selected this project through a publicly vetted process for engineering and design (Louisiana Coastal Wetlands Conservation and Restoration Task Force [LCWCRTF] 2006).

For NOAA and CPRA to request funds and authorization to construction this project, the CWPPRA standard operating procedures require an Environmental Assessment (EA). The EA provides information for the decision of whether or not to fund and authorize this project, including the proposed action and alternatives, and to determine whether the proposed re-establishment of marsh features have the potential for significant impacts. This EA discloses information on and analyzes the direct, indirect, and cumulative impacts on the human environment likely to result from the Madison Bay Marsh Creation and Terracing Project proposed action and the alternatives. It was prepared in compliance with the NEPA of 1969 and Council on Environmental Quality (CEQ) regulations for implementation of NEPA (Title 40 *Code of Federal Regulations* [CFR] Parts 1500 through 1508 [CEQ 1992]). Significant sources used to consider environmental impacts are:

- Environmental Impact Statement (EIS) for the CWPPRA program (LCWCRTF 1993).
- Louisiana Coastal Area Ecosystem Restoration Study (LCA) EIS (U.S. Army Corps of Engineers (USACE) 2004).
- Wetland Value Assessment (WVA, NOAA Fisheries Service 2006 and its revision NOAA Fisheries Service 2013)
- Engineering design analyses (Byland, Kar, and Foret 2013)
- Coast 2050 Plan (LCWCRTF and Wetlands Conservation and Restoration Authority (WCRA) 1998)
- Barataria-Terrebonne National Estuary Program (BTNEP) Ecological Management Action Plans (BTNEP 2013)
- and other restoration efforts in coastal Louisiana (LCWCRTF 2006 and OCPR 2012)

The CWPPRA EIS and LCA EIS provide general information on the need for action, the affected environment, and the environmental consequences.

The CWPPRA WVA evaluates wetland impacts through a quantitative, habitat-based assessment model developed to estimate anticipated environmental benefits. The WVA compares conditions over a 20-year period to determine the net difference in “future without project” and “future with project” scenarios. Initial and future conditions are set based on historical land loss, aerial imagery, and on-site visits to the proposed project area. Expected benefits are based on a combination of experience with previous projects, construction plans, models, and biological and engineering experience of the assessment team.

The engineering design analyses evaluate the cost efficiency and feasibility of components to achieve project goals. The design process includes surveying the proposed project area, testing soils for type and strength, determining options for access and staging of work, and proposed feature longevity. The

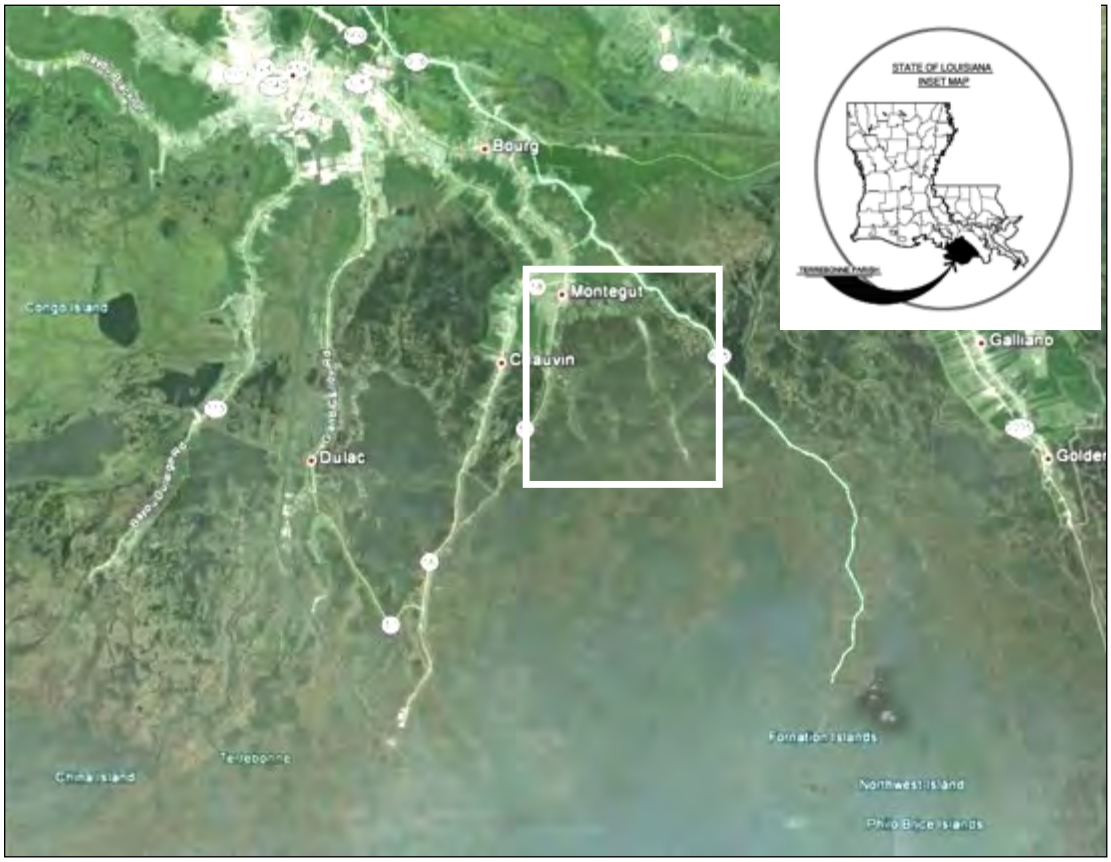
CWPPRA program operating principles stipulate that, during engineering and design, reports are required at 30% and 95% completion. The reports are circulated, and meetings are held at which the CWPPRA participating agencies, landowners, and other interested parties are presented with the design process to date, and provided opportunity to comment at that time. A 30% design meeting was held in Baton Rouge, LA July 23, 2013, and comments are being incorporated. A 95% design meeting was held on October 31, 2013.

1.1 Project Location

The proposed project is located in Terrebonne Parish, Louisiana near Montegut approximately 16 miles southeast of the Houma, Louisiana (Figure 1). The proposed project area encompasses over a thousand acres of saline marsh and open water (Sasser and others 2008). The borrow area and pipeline corridor proposed for this project are located along and within the project boundary (Figure 2).

The proposed project area is in Terrebonne Basin of the Terrebonne Marshes mapping unit in Region 3 of the Coast 2050 Restoration Plan (LCWCRTF and WCRA 1998, 1999).

FIGURE 1. GENERAL PROJECT VICINITY MAP



Source: Project files

1.2 CWPPRA Process

The CWPPRA project selection process takes several months to complete, involves extensive public involvement and review by federal and state agencies, and narrows the field of potential projects down to approximately four a year that are approved to enter the formal engineering and design process. As a result of this process, the field of available alternatives under consideration for a project generally

includes those alternatives that would meet project goals developed during the engineering and design process and that take place within the general proposed project area.

During the engineering and design process, a CWPPRA project is subjected to layers of public, academic, and interagency review to ensure that effective projects move forward for design and ultimate construction. The project selection process begins around February of each year when Regional Planning Teams across the coast convene to solicit project nominations from the public, State, and federal agencies, as well as members of industry and academia. The meetings are publicized via public notices, and all members of the public are invited to attend. Every nominated project contains conceptual project features, approximate construction costs, and anticipated benefits to wetland resources. The nominated projects are screened and pared down to 20 nominees at a public voting meeting. Each federal agency represented in the CWPPRA program, the State, and each coastal parish participates in voting.

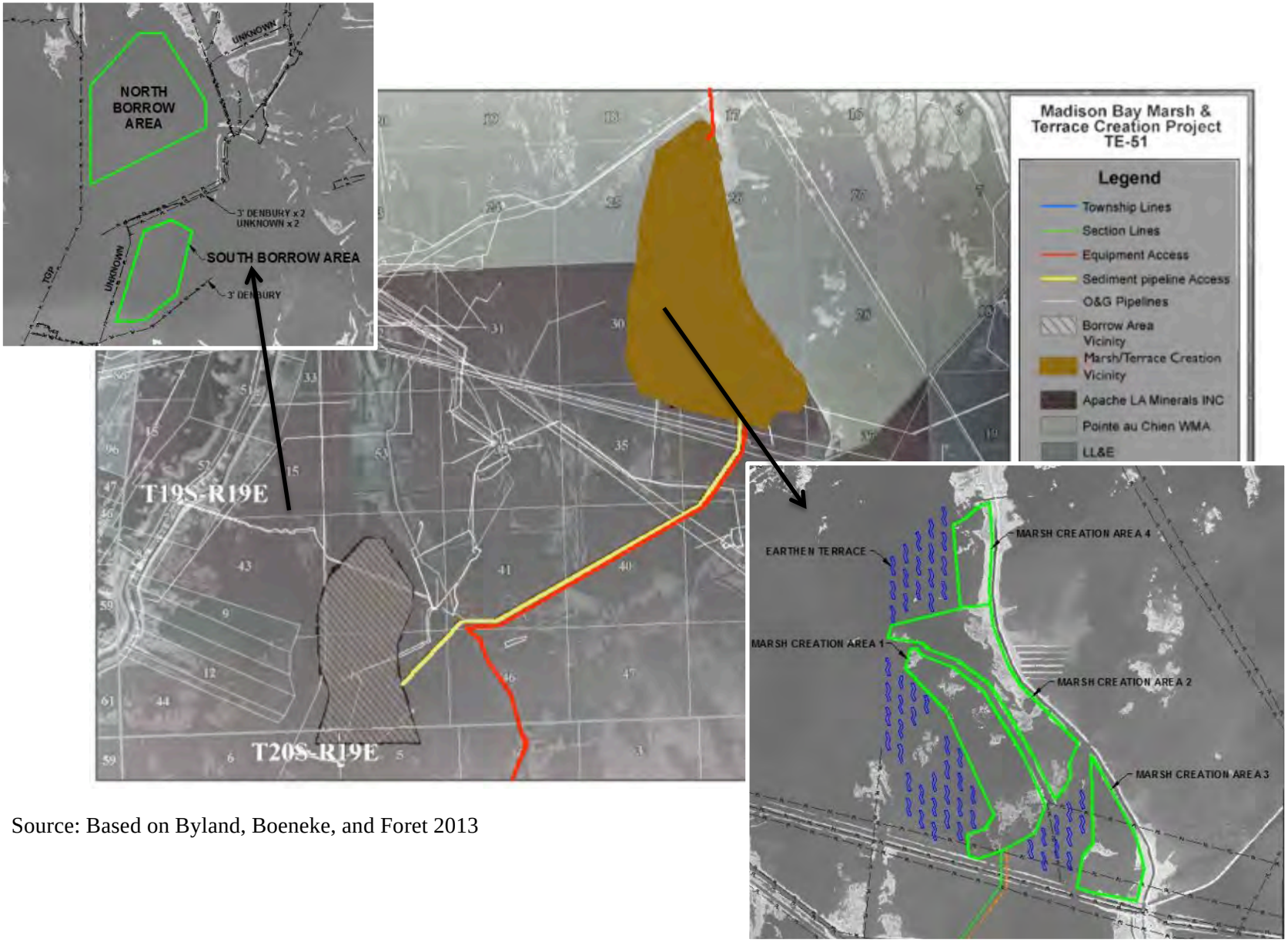
Interagency and academic working groups then evaluate the conceptual project features for cost and project-associated wetland benefits for feasibility and appropriateness to addressing the local land loss. The 20 nominee projects are then voted on by the program's federal agencies and the State to obtain a list of the 10 top-ranking projects to continue through the process. These candidate projects undergo several months of further design and interagency evaluation to determine whether the proposed project features are feasible, the anticipated benefits are likely, and the project costs are within the funding constraints of the program. Certain project features are typically discounted during this preliminary design phase based on concerns about inferior performance, adverse impacts, technical infeasibility, or unreasonable costs. In the first months of each calendar year, the candidate projects are publicly presented and voted on by the program agencies to be funded for Phase 1 analysis, which includes the activities necessary to complete engineering and design, permitting, land rights, and environmental compliance before the project moves to construction.

1.3 Environmental Setting

The proposed project is part of the Mississippi River Delta system that consists of a main river channel with radiating distributaries. In the project vicinity, these natural waterways are called bayous. The bayous historically provide freshwater, sediments, and nutrients that flow into the surrounding marshes from river and rainwaters that drained to the bays and lakes, such as Madison Bay. Generally, erosion and deterioration of the marshes in the greater Terrebonne Basin are the result of increased eustatic sea-level rise, diminished sediment supply, frequent storm events, construction of canals and navigation channels, and high rates of subsidence (Boesch and others 1994). The low marshes in the project area are frequently inundated with several feet of gulf water during hurricanes and tropical storms.

The area is predominantly marsh habitat, which in the 1930s included intermediate, less saline, marsh. Since then the intermediate marsh converted to brackish marsh. While some brackish marsh remains, the area today is nearly all saline marsh and open water (Figure 3). The Terrebonne Marshes Mapping Unit lost 24,270 acres of wetlands between 1932 and 1990 (LCWCRTF and WCRA 1999). It is expected that 19,600 acres of the 1990 marsh will convert to open water by 2050 (LCWCRTF and WCRA 1999), and approximately 30% of Terrebonne Parish will be below sea level by 2050 (Figure 4 and Terrebonne Parish 2009).

FIGURE 2. SPECIFIC AREA OF MARSH AND TERRACE CREATION.



Source: Based on Byland, Boeneke, and Foret 2013

Subsidence (2.1 to 3.5 ft/century), wind and wave erosion, and altered hydrology are historic causes of land loss (LCWCRTF and WCRA 1999) that continue to convert land to open water in these units. The reason for the significant land loss at the Madison Bay area, specifically, was determined to be 2/3 subsidence and 1/3 erosion as determined by a subsurface study (Morton and others 2002).

The proposed project area is within the coastal area impacted by the Deepwater Horizon (DWH) oil spill of 2010 - the largest marine oil discharge ever to occur and possibly one the largest environmental disasters to occur in the United States (Mendelssohn and others 2012). The nearest oiled shoreline is 6.8 miles south of the proposed project area boundary (Appendix B). None of the proposed project area was directly oiled by the DWH spill.

FIGURE 3. AREA LAND LOSS FROM 1971 TO 2010

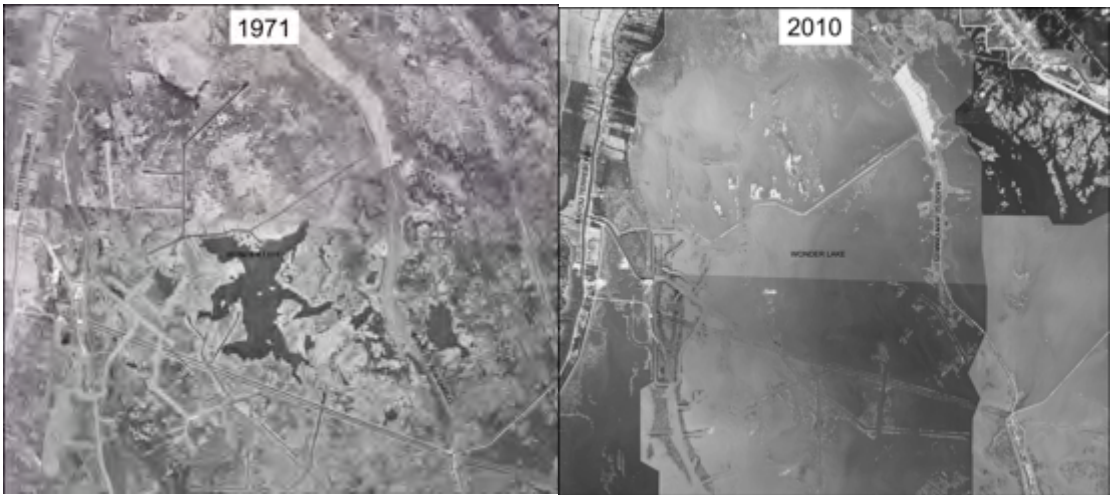
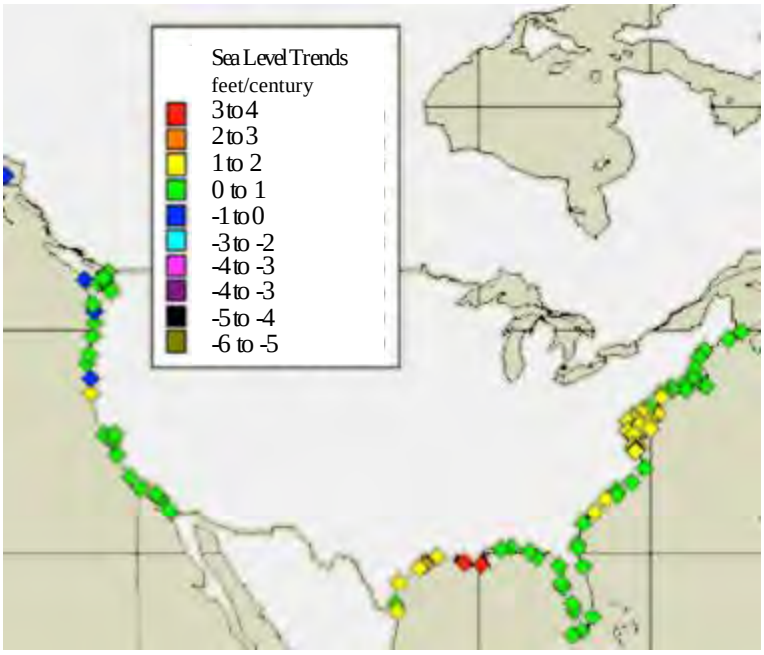


FIGURE 4. AREA RELATIVE SEALEVEL RISE



1.4 Purpose and Need

1.4.1 Purpose

The purpose of this proposed project is to support the coastal restoration objectives of CWPPRA by re-establishing marsh in the project area using local sediment. After construction, native saline marsh would be planted to help stabilize the rebuilt marsh habitat. Specific objectives listed in the 30% design report are:

- Construct and maintain an intertidal marsh elevation for the longest period of time within the 20-year project life.
- Protect the Montegut Flood Protection Levee and St. Jean Charles Ridge from wave energy by reducing the fetch over Wonder Lake/Madison Bay.
- Protect the newly constructed marsh from wave energy by reducing the fetch of Wonder Lake/Madison Bay.

1.4.2 Need for Action

The need for the proposed action is directly related to the rapidly degrading environmental conditions at the proposed project site and the necessity to re-establish the structural integrity and value of the marsh as habitat. Priority issues identified by the public that affect the Terrebonne Basin include habitat loss, eutrophication, and living resources (Rabalais and others 1995). A healthy coastal marsh: provides rearing habitat for shellfish and finfish; furnishes habitat for waterfowl, wading birds, small mammals, and numerous amphibians and reptiles; protects interior lands from storm surges; helps maintain water quality; and provides other services. Louisiana's coastal wetlands are essential to sustain renewable fishery resources integral to the local, state, and national economies. Of the 1.7 billion pounds of fisheries landings reported for the Gulf Coast in 2011, more than 73% were caught in Louisiana (NOAA 2012). Marshes provide nursery, foraging, and spawning habitat for numerous marine and estuarine species of commercial and recreational importance. Maintaining marshes also helps protect the habitat, infrastructure, and community inland by reducing storm surge.

2 PROPOSED ACTION AND ALTERNATIVES

2.1 Alternatives Considered but Eliminated

Through the CWPPRA process, it was determined that re-establishment of the marsh was the appropriate approach to restoration. Alternatives available to achieve this goal focus on protecting existing marsh, adding sediment for elevation and nutrient enrichment of existing marsh, and establishing new marsh using borrow sediments of the surrounding bay area. When a proposed project is approved to proceed to formal engineering and design (Phase 1) by the CWPPRA Task Force, evaluation of project performance often includes the use of modeling to determine what project features are likely to be the most cost effective. Project features are refined based on results of field investigations and quantitative modeling, where applicable. Comprehensive engineering and design efforts focus on project alternatives that are considered technically feasible and cost effective while still meeting the project purpose and need. Project features are typically vetted to landowners and the public before the project moves into Phase 1, so that untenable features are eliminated from the evaluation process prior to investment of significant resources in data collection and detailed design.

Using borrow material from a nearby waterway was considered and rejected. The bayous within pumping distance have a limited availability of sediments relative to the goals and sediment needs of the project, and those available are dedicated to other projects, such as the *Morganza to the Gulf* earthen levee adjacent to the bayou intended to protect people and property.

Other methods of restoration were considered, such as a freshwater diversion, or ridge/levee construction. A freshwater diversion, the Mississippi River Reintroduction into Bayou Lafourche, is being designed by

the State of Louisiana north of the project area. Freshwater diversions are known to be a costly and slowly implemented endeavor. Considering the extended time required, the extra cost to mine sediments, and additional time to establish a freshwater diversion project, the areas needs would not be met efficiently. Alternatives that would address the wind/wave erosion include re-establishing the lake boundary or creating a ridge/levee. The lake boundary is far too eroded for a re-establishment to be structurally feasible. Building a ridge/levee was rejected, as there was no such natural feature in the area. Neither option would address subsidence.

2.2 Alternatives Considered in Detail

Scientific studies and monitoring have been conducted on marsh creation/ terracing projects and evidence exists that open-water areas can be filled to create marsh with this method. The successes of marsh creation/ terracing projects are apparent, as the method has been adopted by numerous restoration actions being constructed by the state, CWPPRA, Ducks Unlimited/NAWCA, Coastal Impact Assistance Program, NOAA Community-based Restoration Program, and as compensatory mitigation. Therefore, marsh creation and terracing options were pursued to meet the goals of the project.

Build alternatives were designed based on results of geotechnical reports, and topographic, bathymetric, and magnetometer surveys. All build alternatives consider using bay borrow sources and have similar elevations of marsh and terrace, but differ in location (Table 1). Locations differ by benthic and fisheries resources, sediment type, and existing infrastructure (pipelines).

TABLE 1. FEATURE DIFFERENCES OF ALTERNATIVES CONSIDERED

	No Action Alternative	Build Alternative 1	Build Alternative 2 (Preferred)
Marsh created and nourished	None	675 acres marsh, 13 acres terrace, 49 acres initially impacted*	470 acres marsh (4 areas), 42 acres terrace, 32 acres initially impacted**
20-year post-construction acres	-115 in build alternative 1 area* -41 in build alternative 2 area**	+245 acres would be gained/remained*	+199 acres would be gained**
Borrow	None	Two areas cut at -15 ft**	Two areas cut at -15ft**
Location	Madison Bay	Madison Bay	Wonder Lake
Dike	None	42,240 linear feet***	47,838 linear feet**

*Byland, Kar, and Foret 2013; NOAA Fisheries Service 2006 **Byland, Boeneke, and Foret 2013; NOAA Fisheries Service 2013 ***estimated from images in Byland, Kar, and Foret 2013

2.2.1 The No-Action Alternative

NEPA refers to the no-action alternative as the continuation of baseline conditions without implementation of the proposed action. Evaluation of the no-action alternative is required by CEQ regulations.

2.2.2 Build Alternative 1

This alternative was to have marsh creation and terraces north of Madison Bay (Figures 1). Borrow material from the center of Madison Bay would be used as described below.

Terrace The terrace construction would be built to approximately 25,000 linear ft in length, with a crown width averaging 10 ft, and side slopes of 1:5. Initial target elevation is +1.5 ft NAVD88 with a second lift resulting in a +3.5 ft height providing approximately 42 acres. This height is estimated to be required to retain an intertidal height typical of healthy marshes for 20 years, +2.5 ft. Placement would be in water depths averaging 3.0 ft or less (Figure 5). This alternative considers aligning terraces counter to the wind direction to provide wave reduction to existing marshes. Marsh buggy excavators would be used to build terraces.

Marsh The marsh creation and nourishment assumes a 2 ft average water depth or less. Borrow sediments would be hydraulically dredged and transported via pipeline to the fill/nourishment locations. Initial target elevation is +1.5 ft NAVD88 with a second lift resulting in a +3.5 ft height. Engineers estimate this height would be required for the created marsh to remain intertidal for 20 years. The intertidal elevations are typical of healthy marshes. Containment dikes (Figure 6) would be necessary along the perimeter to contain sediments and allow settlement, except where existing marsh or levee would contain sediments. Roughly 42,240 linear ft of containment dike would be necessary for this alternative. The dikes would be gapped, if needed, to provide tidal exchange and drainage after construction and consolidation of the marsh. Marsh buggy excavators would be used to build containment dikes. A hydraulic dredge at the borrow area and a conveyance pipeline from the dredge to the marsh fill area would be used for marsh creation.

Plantings After initial settlement of marsh creation sediments, half the created marsh would be planted with 4-inch live saltmeadow cordgrass and plugs of smooth cordgrass (*Spartina alterniflora* cv. Vermilion). Terraces would be planted with 4 rows of smooth cordgrass plugs on 7-ft spacing and two rows of saltmeadow cordgrass on the crown. Areas not planted are expected to vegetate naturally.

Borrow Approximately 5 miles from the marsh creation area, is a 715-acre potential borrow area. Pipelines and magnetic anomalies were found in preliminary surveys. To avoid these for both environmental and human safety, the borrow area was divided into north and south borrow areas. A 300 ft offset from the pipelines and -15 ft depth-of-cut incorporated. The estimated available sediment for marsh fill borrow within these areas is 6,762,733 cubic yards. For equipment to access the shallow area for project construction, some sediment may be removed from interior bay areas. Materials excavated would be used beneficially for terraces or containment dike construction. Additional materials would be needed to construct the perimeter containment dikes. Any materials removed from the marsh creation area would subsequently be filled with the marsh fill borrow materials.

FIGURE 5. TERRACE TYPICAL SECTION

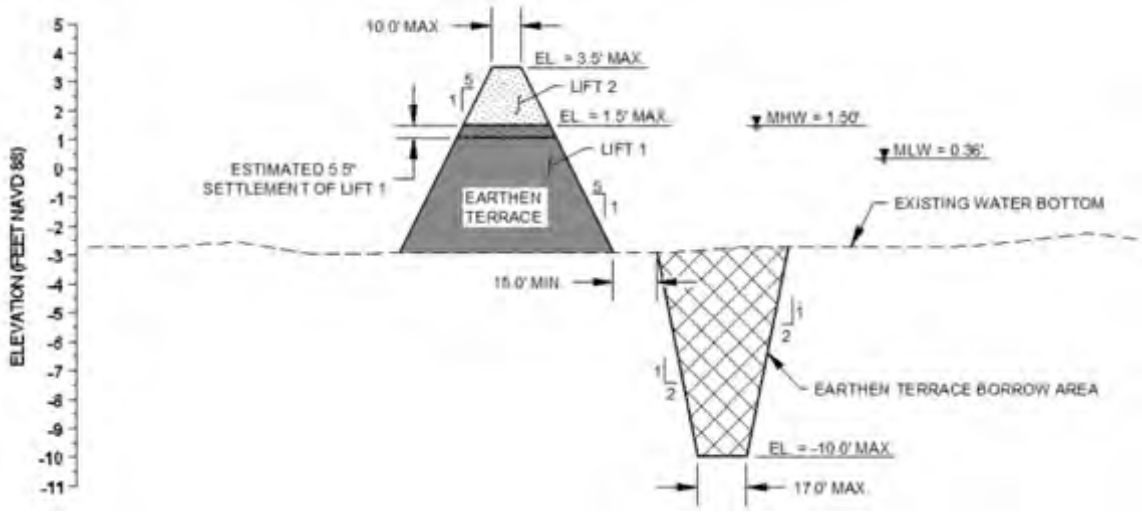
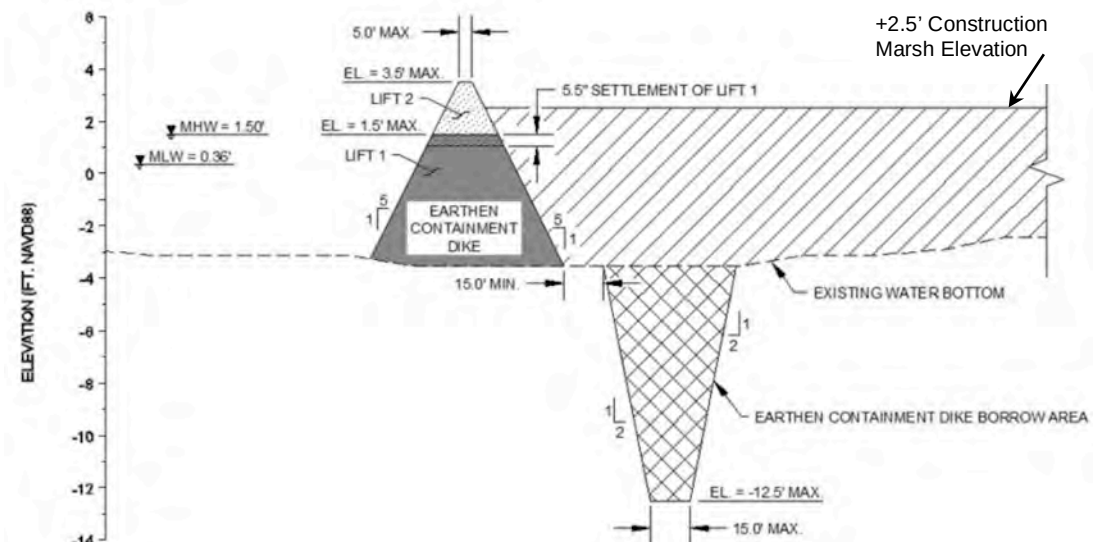


FIGURE 6. EARTHEN CONTAINMENT DIKE AND MARSH CREATION DESIGN



2.2.3 Preferred-Build Alternative 2

Terrace and Marsh Creation Areas to the east of the build alternative 1 were soil tested to identify alternative locations. The build alternative 2 contained "soils better suited for marsh construction [than build alternative 1] due to the smaller peat layer in the subsurface and generally higher soil strengths, especially in the top twenty feet of the profile (GeoEngineers 2011)."

The layout of the marsh creation and terraces avoids deepest areas for marsh fill, optimizes protection of a perimeter ridge, and facilitates hydrologic exchange across the ridge. An estimated 47,838 linear feet of containment dike would be constructed in a phased (two lifts) process for four defined marsh areas (Figure 2). Gaps would be created after marsh creation and settlement to allow water exchange if gaps do not occur naturally.

Plantings After initial settlement of marsh creation sediments, the created marsh and terraces would be planted with approximately 33,333 plugs of smooth cordgrass (*Spartina alterniflora* cv. Vermilion) and 16,668 live grasses (*Paspalum sp.*). Areas not planted are expected to vegetate naturally.

Borrow The borrow area is the same as build alternative 1.

3 AFFECTED ENVIRONMENT AND CONSEQUENCES

Effects of alternatives were designated as having *no impact*, *no significant impact (minor* or *moderate*), or *significant impact*. Consideration was given to both length of time and severity of the impact. *Minor impacts* are those that may be measurable but not result in adverse effects to humans or their resources; these are short-term and reversible. *Moderate* impacts may have longer-term adverse effects that have a measurable change to the identified environment, and thus warrant consideration of revision of the project component causing the adverse impact. *Significant* impacts are harmful to humans or their environment and long lasting that warrant preparation of a full EIS. The qualitative assessment is based on reference material and professional judgment. A quantitative assessment is included when sufficient data are available to do so. Table 2 presents a summary of environmental impacts associated with the no-action and build alternatives. Table 3 presents avoidance and minimization measures of the preferred alternative.

Given the magnitude and duration of the 2010 Deepwater Horizon oil spill to gulf waters, the disturbance and recovery of resources from the event were considered in analysis. The proposed project area was not directly impacted/oiled in the event (Appendix A) and indirect impacts may exist that are not yet identified. Information about the impacts to resources in surrounding areas is provided, if it was available and applicable.

TABLE 2. SUMMARY OF ENVIRONMENTAL IMPACTS OF ALTERNATIVES

Resource	No Action	Build Alternative 1	Build Alternative 2 (Preferred)
Geology, Soils & Topography	Long-term, direct and indirect, moderate adverse from loss of surface soils.	Long-term, indirect, moderate beneficial from elevation Short-term, direct, minor from burial, and moderate from suspension	Same as alternative 1
Climate & Air Quality	None	Long-term, indirect, moderate beneficial from carbon storage Short-term, direct, minor adverse from emissions	Same as alternative 1
Water Resources	Long-term, indirect, moderate adverse from turbidity and reduced nutrient uptake	Long-term, moderate, indirect beneficial from reduced turbidity and increased nutrient uptake	Same as alternative 1
Vegetation Resources	Long-term, direct and indirect, moderate adverse from loss of surface soils.	Long-term, moderate, direct and indirect beneficial from created, nourished, and protected marshes Short-term, minor, direct adverse from construction disturbance	Same as alternative 1
Aquatic & Benthic Habitats	Long-term, moderate, indirect adverse as current conditions continue	Long-term, moderate, indirect beneficial from increased clarity and detritus Short-term, minor, direct adverse from construction disturbance Long-term, moderate, direct adverse from construction disturbance	Same as alternative 1
Essential Fish Habitat	Long-term, moderate, indirect adverse as variety and quality decline	Long-term, moderate, direct and indirect beneficial from increased marsh Short-term, unavoidable, direct and indirect adverse during construction	Less adverse impact than with alternative 1 or no action

Resource	No Action	Build Alternative 1	Build Alternative 2 (Preferred)
Marine Fisheries	Long-term, moderate, indirect adverse as variety and quality decline	Long-term, moderate, direct and indirect beneficial as habitat quality is increased Short-term, minor, direct and indirect adverse from construction disturbance	Same as alternative 1
Marine Mammals	Long-term, moderate, indirect adverse from prey habitat declines	Long-term, moderate, indirect beneficial as prey species habitat increases Short-term, minor, indirect adverse during construction	Same as alternative 1
Migratory Birds	Long-term, moderate, indirect adverse from habitat and prey habitat declines	Long-term, moderate, direct and indirect beneficial from increased longevity and variety of foraging habitat Short-term, minor, indirect adverse from disrupted foraging	Same as alternative 1
Wildlife	Long-term, moderate, indirect adverse from habitat decline	Long-term, moderate, direct beneficial from habitat creation Short-term, minor, localized, direct adverse from displacement during construction	Same as alternative 1
Threatened & Endangered Species	Long-term, moderate, indirect adverse from prey habitat decline	Long-term, moderate, indirect beneficial from prey habitat creation	Same as alternative 1
Historic, Prehistoric & Native American	None	None	None
Socio-economics	Long-term, minor, indirect adverse from land loss	Long-term, moderate, indirect beneficial from fisheries habitat longevity Shore-term, minor, indirect as construction utilize local businesses Short-term, minor, indirect adverse from disruption of fishing during construction	Same as alternative 1
Land Use & Infrastructure	Long-term, minor, indirect from subsidence and erosion increasing risks to infrastructure	Long-term, moderate, indirect beneficial from fisheries habitat longevity Short-term, minor, indirect adverse from disruption of fishing	Longer-term benefits than alternative 1 or no action
Hazardous, Toxic, & Radioactive Waste	None	None	None
Noise	None	Short-term, minor, direct adverse from construction equipment	Same as alternative 1

TABLE 3. AVOIDANCE/MINIMIZATION MEASURES SUMMARY OF THE PREFERRED ALTERNATIVE

Resource	Potential Avoidance and Minimization Measures
Geology, Soil & Topography	None
Climate & Air Quality	Comply with emissions standards
Water	Retention to maximize settling of turbidity-causing flocculants
Vegetation	• Stay within designated staging and transport areas • Identify any rare plant species at risk and coordinate with Louisiana Department of Wildlife and Fisheries (LDWF)
Aquatic & Benthic Habitats	Retention dikes, sediment curtains, and best practices to reduce impacts to habitat quality
Essential Fish Habitat & Fisheries	None
Marine Mammals	Cease work until manatee is over 500 ft away from workboats
Migratory Birds	If nesting migratory bird colonies were observed, • Restrict activities within 1,000 ft of colonies to the fall/winter non-nesting period • Develop an abatement plan with U.S. Fish and Wildlife Service (USFWS).
Wildlife	None
Threatened & Endangered Species	None
Historic, Prehistoric & Native American	None
Socioeconomics	None
Land Use & Infrastructure	None
Hazardous, Toxic & Radioactive Waste	Stay within design designated areas to avoid identified hazards
Noise	None

3.1 Physical Environment

3.1.1 Geology, Soils, and Topography

The soils underlying the proposed project area consist of tidally influenced Clovelly Muck and Lafitte Muck (Soil Survey Staff 2013). Clovelly soils are "very poorly drained" organic soils that are very slowly permeable or impermeable, slightly saline, with a fluid, clay substratum (U.S. Department of Agriculture 2000)." Lafitte soils are "very poorly drained" organic soils that are slightly saline (U.S. Department of Agriculture 2000)." A soil boring taken in 2011 consisted of "a thin layer (about 2 feet) of peat, followed by very soft to soft organic clay with intermittent layers of inorganic clay" to a depth of 40 feet (GeoEngineers 2011). Ardaman and Associates, Inc. performed nine subsurface soil borings of the marsh creation and terrace area in the fall of 2012. Water depths averaged 2.15 ft at these soil-boring locations (Byland, Kar, and Foret 2013).

The approximately 715 acre borrow area, located approximately 4.5 miles from the middle of the marsh fill area (Figure 2), consists of soft clay with traces of organic soil (Byland, Kar, and Foret 2013). The borrow area consisted of interspersed emergent marsh in the 1950's and 70's that converted to shallow open water and coalesced with Madison Bay 25 years ago. Profession Service Industries performed three subsurface samples to a depth of 25 ft within the borrow area. The soil borings and analyses were completed in 2009 and 2010. Water depths were between 1.3 and 3 ft at the boring locations (Byland, Kar, and Foret 2013).

Impacts of No Action Under the no-action alternative, material from the borrow areas would remain shallow open water. Geotechnical surveys, historical land/water analyses, and land/loss expectations for the basin suggest the area will continue to subside, deepen, and coalesce with surrounding water areas over time (USGS on lacoast.gov/CRMS2; GeoEngineers 2011). There are no foreseeable actions that could reverse the trend of subsidence and decreasing integrity. With no action, existing marsh would continue to erode in storm conditions resulting in an estimated loss of 115 acres in the build alternative 1 area, and 41 acres in the build alternative 2 area (Table 1). Without terracing and marsh creation, wave erosion from wind and tide flushes the area, moving sediments around, and undercutting existing vegetation. This is expected to continue until the marsh vegetation has all died and the area is all shallow open water. The loss of marsh coupled with the area's high rate of subsidence would leave little protection for the levee. Adjacent marshes converted to shallow open water and are exposed mud flats at low tide. Geomorphology in the project area is characteristic of a highly eroding, sediment-deficient system with marsh areas increasing in salinity and converting to open water.

Impacts of Build Alternative 1 Long-term, moderate, indirect benefits to this resource would result as vegetation colonizes the recreated emergent areas. The created habitat would reduce wave energy along the marsh and allow establishment of vegetation on the terrace and protected marshes, clarify the remaining water, and reduce the wind-induced marsh loss. The proposed elevation increase would reduce vegetation stress caused by subsidence, and placed sediments would increase nutrient availability to plants. An increase in plant productivity and subsequent increases in organic material in the plant soils would be expected.

Short-term, minor, direct adverse effects would result from the burial of current marsh habitat, because marsh exists in the area. This impact is expected to be temporary, as long-term direct benefits of recreating more of this habitat is the project goal.

Retention dikes would temporarily reduce natural water exchange with the marsh. After placed sediment consolidates, gaps may be placed in strategic places along the dike to return tidal influence to the marsh if natural consolidation and erosion of the dikes does not occur. The dredged material used for the terraces and dikes would consist of naturally occurring material to the area. Native vegetative plantings would be used to stabilize soil, reduce resuspension of recently deposited sediment, and encourage sedimentation and colonization.

Short-term, moderate, direct adverse effects would result in the direct suspension of sediments and disturbance to natural sediment within the borrow area. To minimize ecological impacts, depths of cut are limited. An excavation of -15 ft NAVD88 has been planned (Byland, Boeneke, and Foret 2013). Water depth would increase in the bay to a depth up to 15 ft in some places, but that would be temporary and depths of 12 ft exist in areas of the bay currently, so there would be minimal impact. Over the long term, dredged materials removed from the borrow area would be expected to rearrange by natural processes, and pre-dredging bathymetric contours would return to the dredged areas as they have before (Lear and others 2011).

Impacts of Preferred-Build Alternative 2 The beneficial impacts are similar to the build alternative 1. Short-term, moderate, direct adverse effects within the borrow area would be the same. Short-term, minor, direct adverse effects would differ slightly from build alternative 1, with the result being equivalent to that of the build alternative 1. For instance, 17 acres less marsh would be initially impacted, but approximately 10% more containment dike would be needed than for build alternative 1.

3.1.2 Climate and Air Quality

The subtropical climate of coastal Louisiana is characterized by long, hot summers and short, mild winters with high humidity year round. Over the past 40 years, air temperature ranged from 14 to 102 °F;

average winter and summer temperatures are 55.3 and 82.4 °F, respectively. In a typical year, more than 60 inches of rain falls, mostly in the spring and summer. In the fall and winter, winds tend to be from the north-northeast; in spring and summer, winds are generally from the south-southeast.

Hurricanes and tropical storms typically occur over the study area between June and November. On average, since 1871, a tropical storm or hurricane is expected somewhere within the state of Louisiana every 0.7 years; hurricanes make landfall about every 2.8 years (Roth 1998). Historic data from the National Hurricane Center dataset on tropical cyclones (including tropical depressions, tropical storms, and hurricanes) along the Louisiana coast from 1899 to 2007 indicates a total of 63 storms, of which 49 were Category 3 or less. Coastal wetlands provide storm surge protection that was estimated at a value of $4,320/acre annually in 2004 dollars (Costanza and others 2008, as cited in Engle 2011).

Louisiana air quality is good, having "attainment" status according to the National Ambient Air Quality Standards in areas of the proposed project area (Appendix C). Ozone, carbon monoxide, lead, nitrogen dioxide, and particulate pollution are monitored with sulfur dioxide designations expected this year (Louisiana Department of Environmental Quality (LDEQ) 2013a). In Terrebonne Parish, offshore breezes mix and freshen the air and frequent precipitation prevents accumulation of particulates. The American Lung Association (2012) reports air quality with a passing grade for particulates; other sources are not reported by the Environmental Protection Agency for the Parish. Sources of air emissions in the proposed project area are mainly associated with the oil and gas industry, commercial vessel traffic, and recreational fishing. Emission amounts vary depending on the amount of activity.

Impacts of No Action The no-action alternative would not result in any significant change to existing air quality in the area. Negligible adverse impacts to climate change would result from the loss of an estimated 115 acres of wetlands in the next 20 years. The function of wetlands as a potential carbon sink and storm surge protection would be reduced.

Impacts of Build Alternatives Neither the no-action alternative nor any of the build alternatives would substantially affect the climate or weather. However, there is some suggestion that increases in marsh acreage can contribute to the overall carbon sink and mitigate the effects of atmospheric carbon on global warming, which may indirectly reduce the intensity of hurricanes in the Gulf of Mexico. Potential long-term, indirect, moderate benefits would result from increases in quality and productivity of estuarine marsh that are a significant carbon sink and protection from storm surge function (Engel 2011).

Short-term, minor, direct adverse impacts to air quality from construction would be associated with emissions from diesel engines that would power the dredging machinery and material placement operations. Differences between the emissions of the build alternatives are unquantifiable; while build alternative 2 has more dike and terrace construction, build alternative 1 has more dredging acres and poorer soils which require more machinery handling time. Emissions would occur over a period of a few months, with most emissions occurring at the dredge and creation sites. The emissions would consist predominantly of nitrogen oxides, with smaller amounts of carbon monoxide, sulfur dioxide, particulate matter, and volatile organic compounds.

Prevailing winds would dissipate airborne pollutants and limit them to the proposed project's construction phase. In addition, newly placed, unconsolidated dredged material is subject to drying and blowing during high wind events, adding particulates to the air. Revegetation would hold sediments in place after a time. The impact to human health would be negligible because the proposed project area is remote from any residential area. In the long-term, air quality in the area is expected to be unchanged.

3.1.3 Water Resources

The U.S. Environmental Protection Agency (EPA) has authority through Section 1424(e) of the Safe Drinking Water Act of 1974 to review federally financed projects to determine their potential for contaminating sole source aquifers. There is not a sole source aquifer or underground water source/aquifer for the proposed project area (Appendix C).

Low dissolved oxygen and high turbidity is common of the project area (Figure 7). The Terrebonne Basin generally has low water quality because of organic (nutrient) loading (Rabalais 1995). This nutrient loading can lead to decreased oxygen in the water but is most likely in stagnant or deep waters that surround, but are not within, the proposed project area. Because water quality data was lacking, Rabalais and others (1995) reviewed wetland soils for evidence of historic water quality in the Terrebonne Basin. They found evidence of eutrophication (high chlorophyll a) since the 1970s, nonpoint runoff as a significant source of nutrients, and agricultural fertilizers as more influential to water nutrients than population changes.

FIGURE 7. LOUISIANA WATER QUALITY PRIORITIES

The area is located in the LDEQ water quality subsegment 120704. The project area is "fully supporting the designated use" of swimming, and boating (LDEQ 2013b). The core indicators used to support the determination for each use are based on the following standards:

- Primary contact (swimming): fecal coliform, temperature, and metals and toxic substances
- Secondary contact (boating): fecal coliform, and metals and toxic substances

Waters of this subsegment are "not fully supporting the designated use" of fishing and oyster propagation. Core indicators used to support this determination are based on the following standards:

- Fish and wildlife propagation (fishing): ambient and continuous dissolved oxygen, temperature, pH, chloride, sulfate, total dissolved solids, turbidity, and metals and toxic substances.
- Oyster propagation: fecal coliform

The suspected causes of impairment are "accidental release/spill" for which "corrective actions are in place," fecal coliform from "sewage discharges in unsewered areas," and "marine/boating sanitary on-vessel discharges." Total Maximum Daily Load priority is high.

The fish-and-wildlife-propagation use category is relevant to other sections in this EA. It is defined as "the use of water for preservation and reproduction of aquatic biota such as indigenous species of fish and invertebrates, as well as reptiles, amphibians, and other wildlife associated with the aquatic environment. This use also includes the maintenance of water quality at a level that prevents contamination of aquatic biota consumed by humans (LDEQ 2013b)."

Precipitation and tide are the primary factors that affect surface water in the proposed marsh creation area. Low dissolved oxygen waters occur offshore of coastal Louisiana periodically due to Mississippi River discharge (Osterman and others 2008) and may occur after storm events in inland water bodies as a result of the decomposition of deposit debris in the water bodies.

Impacts of No Action The no-action alternative would not directly affect local water quality. Long-term, moderate, indirect adverse impacts would result from increased turbidity of the water from land erosion, and a decrease in the nutrient uptake of area marshes.

Impacts of Build Alternatives Short-term, minor, direct adverse impacts associated with the dredging required for implementation of the preferred alternative include: (1) increased turbidity and decreased dissolved oxygen in the water column at the dredge sites (dredge plume) and fill sites; (2) potential decreased dissolved oxygen in the water column at the construction location due to increased water depth (>16.4 ft); (3) possible exhumation of buried debris; and (4) discharges from the dredge vessel. During dredging, silt or clay may become suspended in the water column near the dredge site. The suspended sediment would settle in a matter of hours to days (depending on current). If the disturbed sediments were anoxic, the dissolved oxygen levels in the water column would decrease. Turbidity and suspended particulate levels in the water column above the preferred borrow area are normally high as a result of estuarine processes. Adverse impacts would be minimized by the addition of retention dikes and turbidity barriers (such as, Particulate Control System™ silt curtains). If they do not naturally degrade after construction and settlement, dikes would be degraded to allow a tidal exchange typical of healthy marshes.

Long-term, moderate, indirect benefits to water quality would result from the ability of created marsh, including terraces, to remove nitrates and phosphate and reduce turbidity in the water. Beneficial impacts to water quality are likely to result from the ability of terraces to trap sediments and decrease shoreline-erosion (Steyer 1993) thereby reducing turbidity, and increase submerged aquatics (Rozas and Minello 2001, Cannaday 2006, USFWS project files) that trap sediments and consume nitrates and phosphates.

3.2 Biological Environment

Approximately 735 species of birds, finfish, shellfish, reptiles, amphibians, and mammals spend all or part of their life cycle in the estuaries (USACE 2004). We describe broad categories in this chapter.

3.2.1 Vegetation Resources

Coastal Louisiana contains an estimated 40 percent of the vegetated estuarine wetlands in the contiguous United States (USACE 2004). Based on U.S. Geological Survey habitat mapping, the current marsh area for the build alternative 1 area is 258 acres (NOAA Fisheries Service 2006) and the build alternative 2 area is approximately 107 acres. The majority of the vegetation is smooth cordgrass. Other species present are saltmeadow 'marsh hay' cordgrass (*Spartina patens*), and big cordgrass (*Spartina cynosuroides*) (Sasser and others 2008). Common names are from the U.S. Department of Agriculture PLANTS Database. Trace (<1%) submerged aquatic vegetation (SAV) is currently in the project area and occurs only along the marsh edge.

Moderately and lightly oiled marshes of Louisiana were in recovery one year after the DWH event (Mendelssohn and others 2012). Vegetation in the proposed project area was not directly oiled in the DWH event (Appendix B). Any indirect impacts to vegetation attributed to the DWH spill are unknown and considered to be non-existent for this vegetation-resource analysis because of this reported recovery of directly oiled areas.

Rare plants that may occur in Terrebonne parish are mostly of dune/beach habitats, and would not occur in the project area. The Louisiana Department of Wildlife and Fisheries (LDWF) Natural Heritage Program lists arrow-grass (*Triglochin striata*) as a rare plant of Louisiana which was recorded as having three known occurrences in the 1970s, two of which were in Pointe Au Chenes Wildlife Management Area (approximately 5 miles to the east). The plant is a fleshy-leaved grass-like herb about 1 foot tall that occurs in saline and brackish marsh habitat. The U.S. Department of Agriculture PLANTS database lists the species as a native in Louisiana and southeastern US wetlands, protected in the state of Maryland, but not a federally listed species.

Impacts of No Action With no action, continued erosion and subsidence are expected to occur, resulting in long-term, moderate, direct and indirect losses to vegetative resources. Within twenty years, 115 acres are expected to be lost in the build alternative 1 area, and 41 acres in the build alternative 2 area (Table 1). The inability to retain elevation would continue to lead to flooding stress on the plants, decreasing plant productivity, and continue the conversion of remaining vegetation to shallow open water. This would include any rare plant species, should any still exist at this location.

Impacts of Build Alternative 1 The build alternative 1 would exert long-term, moderate, direct and indirect beneficial impacts on vegetative communities of the area (NOAA Fisheries Service 2006). It is expected that over 400 acres of the resource would be created and over 200 acres nourished leading to greater productivity. Similar terrace projects have created marsh and increased plant cover (Turner and Streever 2002). Terraced marsh would increase the resource approximately 13 acres, and the 6 acres that would be lost with no action in the terrace area would be protected. Adding elevation to marshes would offset some subsidence, increase vegetative productivity, and decrease marsh conversion to open water. Increasing the elevation in the area would be beneficial to vegetative communities, reducing flooding stress on the plants and allowing time for vegetation to colonize and contribute to the elevation. Accumulation of organic material is a primary factor influencing the vertical accretion of marshes.

Increases of SAV in terraced shallow water have been reported to be 3.5 times more abundant than SAV in unterraced shallow open water (Cannaday 2006). Increased SAV to approximately 40% cover is expected with this alternative (NOAA Fisheries Service 2006). Creation of the terraces would allow vegetation to colonize and stabilize the terrace sediments, while protecting marsh vegetation from waves that erode their soils. Long-term, moderate, direct benefits to these habitats are expected through increased marsh habitat, clarification of water, increased marsh edge, and increased submerged aquatics and habitats important to fish and wildlife species.

Implementing the alternative would unavoidably have short-term, minor, direct adverse impacts to existing marsh, and shallow open-water areas and their associated vegetative communities. It is estimated that 49 acres would temporarily be suppressed while roots establish in the added sediments. The runoff from the project site would nourish vegetation through added minerals and elevation resulting in beneficial impacts in the long term. Vegetation at the staging areas and the fringe of the marsh creation areas would be disturbed or smothered, but are expected to recover shortly after construction. If the project were authorized for construction, LDWF would be contacted to coordinate identifying and reducing impacts to any existing species. NOAA Fisheries Service would ask that an LDWF biologist visit areas of the proposed project location that are both likely to be disturbed and of the habitat type listed for the rare arrow-grass plant, primarily the wetlands along the projects eastern bank where sediment would be deposited, and staging areas.

Impacts of Build Alternative 2 Long-term, moderate, direct beneficial impacts on vegetative communities would have the same consequence as build alternative 1, although they have individual differences. For example, this alternative would differ from build alternative 1 by creating fewer marsh acres (NOAA Fisheries Service 2013). It is expected that over 470 acres of the resource would be created and nourished leading to greater productivity in the area (Table 1). The likelihood of achieving the increased vegetation is greater with this alternative because of the better soils. Soils of this area are more capable of creating and retaining elevation. Terraced marsh would increase approximately 42 acres, which is an estimated 7 acres less than with the build alternative 1 terraces (Table 1). In twenty years, both build alternatives are likely to have similar increases in vegetation. The 20-year projections presented in Table 1 do not account for the weaker soils in build alternative 1. Benefits of offsetting subsidence, and increasing vegetative productivity are similar to the build alternative 1.

Short-term, minor, direct adverse impacts to existing marsh are less than with build alternative 1, because there is less initially impacted marsh (Table 1). The impacted marsh would recover as soils stabilize and vegetation recolonizes. The soil addition that causes the impact is expected to create more productive vegetation that would increase soil accretion. The accretion would help plants maintain elevations and withstand the wetland flooding and salinity stresses.

3.2.2 Aquatic and Benthic Habitats

Benthic habitats near the proposed marsh creation area are in shallow (<3 ft) open water. In the borrow area, benthic habitats are under open estuarine water column. These habitats support bacteria, fungi, microalgae, meiofauna, and microfauna, such as mollusks, polychaetes, decapods, and nematodes (Day and others 1989, NOAA Fisheries Service 2006). The benthic community supports higher levels of the food chain, such as shrimp and demersal fish (Conner and Day 1987). Substrate quality strongly influences the distribution of benthic fauna. Other variables affecting the distribution of benthic organisms include water depth, salinity, illumination, food availability, currents, and tides. The area has salinities conducive to oyster production and oyster leases are located throughout the area (Figure 8), but water quality is not conductive as described in the water resources section (BTNEP 2010, LDEQ 2013b). Also, declines in Louisiana oyster production have been reported on public seed grounds since 2002 (personal communication, LDWF Inland Fisheries Division).

Disturbance and recovery of benthic organisms from the 2010 BP Deepwater Horizon oil spill were considered in analysis. The project area was not directly impacted or oiled in the event, but indirectly impacted given the magnitude and duration of the pollution event to gulf waters. Areas to the south of the proposed project area and closer to oil-exposed marsh and tidal waters were studied (McCall and Pennings 2012). Snails were unaffected, and crab and arthropods had nearly recovered a year after the event. Oyster east of the Mississippi River (east of the proposed project area) were assessed for oil impacts specifically to identify lingering effects of the pollutant. As a water-filtering organism, it is a good indicator of biological health. In a comparison of the condition of oil-exposed and non-exposed

sites, differences were consistent with those occurring along a salinity gradient rather than with contamination (Soniat and others 2011).

Impacts of No Action Declines in oyster production are expected to continue with no action resulting in long-term, moderate, indirect adverse impacts. The reason for current and future expected decline is unknown, but declines are reported on public seed grounds (personal communication, LDWF Inland Fisheries Division). The recreational and commercial value of the aquatic and benthic resources are expected to decline in ecological function, as indicated by low oyster production, loss of vegetative resources, and poor water quality.

Impacts of Build Alternative 1 Long-term, moderate, direct adverse impacts would result from sediment deposition. However long-term, moderate, indirect benefits would be expected in the water quality of surrounding areas that would result from reduced turbidity and dissolved oxygen issues.

Short-term, minor, direct adverse impacts to local aquatic and benthic resources would occur by the direct removal of sediment along with the organisms living in the sediment during dredging. A revision in design was requested and adopted to minimize oyster impacts; increasing the depth-of-cut from -10 ft to -15 ft reduced the dredge impact area. Other direct, adverse impacts could include entrapment and likely death of slow-moving organisms and polychaetes during dredging, and smothering of benthic organisms in the deposition sites. Mobile invertebrates would be expected to vacate the proposed project area during construction and return after construction is complete. Invertebrates, oysters, and fish that do not move out of the area would likely be injured by suffocation from suspended sediments. Dredging would change substrate topography, causing a temporary redistribution of organisms in the immediate vicinity. While increasing the water depth in borrow areas can decrease dissolved oxygen and thus adversely impact benthic organisms, studies suggest this is not likely at the depths being proposed (Palmer 2008, Flocks and Franze 2001, Tampa Bay Estuary Program 2005, Yip-Hoi 2003). There are no known decreased dissolved oxygen issues in borrow areas from previous coastal restoration projects. Post-construction DO surveys have been included in the construction-funding request to monitor any impacts for the first three years.

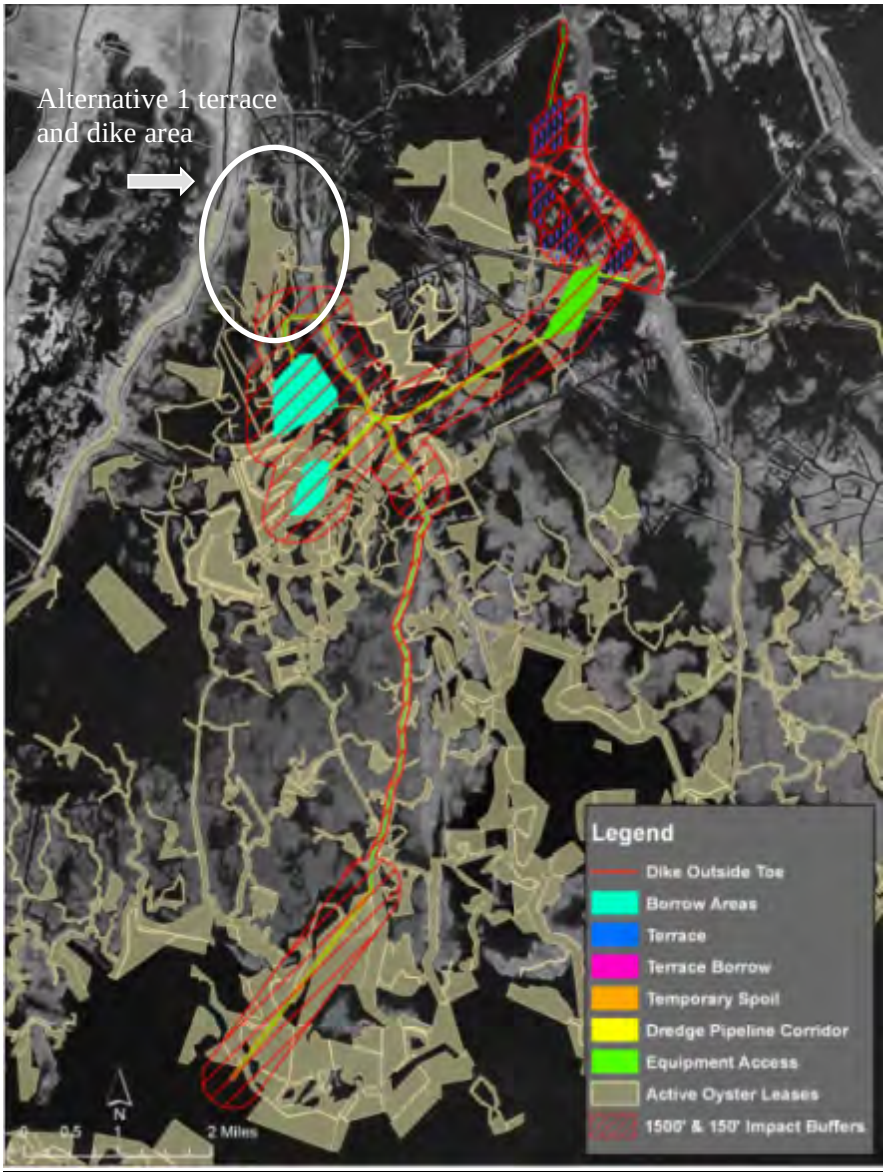
Benthic organisms would likely re-colonize borrow areas. Early-stage recruitment of defaunated sediments occurs rapidly in coastal systems (Grassle and Grassle 1974, McCall 1977, Simon and Dauer 1977, Ruth and others 1994, all as cited in EPA 2003). Dredged sites would be rapidly colonized by opportunistic infauna (EPA 2003). Later stages of colonization would be more gradual and would depend on environmental conditions after cessation of dredging. Fish and invertebrates are expected to recover as turbidity returns to pre-construction levels. There is expected to be a low potential for creation of persistent low dissolved oxygen conditions that would impact fisheries and aquatic biota in the borrow and placement areas given the patterns of water flow over the borrow sites and the shallow elevation of placement area.

Long-term, moderate, indirect benefits would result from the increase in quality aquatic and benthic habitat from increased primary productivity and habitat diversity. The created marsh would contribute to detritus and decrease turbidity. Terraces are known to increase the abundance and diversity of nekton (Rozas and Minello 2001, Rozas and others 2005, Bush Thom 2004), and are therefore attributed with improving aquatic habitat in shallow open water areas. By maintaining existing waterways with retaining dikes and ensuring tidal exchange after construction, fisheries access to the marsh would be maintained.

Impacts of Preferred- Build Alternative 2 This alternative differs slightly from the build alternative 1 in quantifiable measures that can influence the aquatic and benthic resource, such as oyster lease and marsh creation acres (Table 1). So, impacts may differ between build alternatives but the overall influence to the resource is indistinct. While there are fewer acres of marsh to be constructed with this alternative, the

productivity may be better than in alternative 1 because of the more stable soils. A map of the potential marsh creation and terrace areas shows more acres are leased for oyster production in build alternative 1 than in this alternative (Figure 8). It is therefore possible that this alternative would have less adverse impact to oyster resources than alternative 1, but quality of the habitat is unknown and expected to be poor in both locations. If the project is authorized for construction by the CWPPRA program, oyster surveys would be performed to verify the condition of oyster health.

FIGURE 8. OYSTER LEASES IN BUILD ALTERNATIVES.



3.2.3 Essential Fish Habitat (EFH)

The proposed project area is in an area that has been identified as EFH for various life stages of federally managed species (Table 4). The primary categories of EFH that would be affected by project implementation are areas designated by the Gulf of Mexico Fisheries Management Council (GMFMC) for species that are estuarine emergent wetlands, submerged aquatic vegetation, shell substrate, estuarine water bottoms, and estuarine water column. 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. The generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; P.L. 104-297).

Brown shrimp, white shrimp, and red drum are estuarine-dependent species. In other words, they require estuarine habitat at some point in their life cycle for existence. In the Terrebonne Basin, white and brown shrimp have shown decreasing trends over the last 10 to 20 years, while red drum has had an increasing trend and is projected to decrease toward the year 2050 (LCWCRTF and WCRA 1999).

TABLE 4. ESSENTIAL FISH HABITAT OF PROPOSED PROJECT AND BORROW AREAS

Common Name	Life Stage System M=marine, E=estuarine	Essential Fish Habitat (1 meter (m)= approximately 3.3 ft)
Brown shrimp	postlarvae M/E	Water column <82 m, planktonic, sand/shell/soft bottom, SAV, marsh, oyster reef
	juvenile E	Water column <18 m, sand/shell/soft bottom, SAV, marsh, oyster reef
White shrimp	postlarvae M/E	Water column <82 m, planktonic, soft bottom, marsh
	juvenile E	Water column <30 m, soft bottom, marsh
Red drum	postlarvae E	planktonic, SAV, sand/shell/soft bottom, marsh
	juvenile M/E	Water column <5 m, SAV, sand/shell/soft/hard bottom, marsh

Source: GMFMC 2005, Appendix C

In addition to being designated as EFH for the brown shrimp, white shrimp, and red drum, wetlands and water bottoms in the project area provide nursery and foraging habitats. A variety of economically important marine fishery species are supported by the habitat, such as Atlantic croaker, black drum, blue crab, gulf menhaden, spotted seatrout, sand seatrout, southern flounder, and striped mullet. Some of these species serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (e.g., mackerels, snappers, and groupers). They may also be prey of highly migratory species managed by NOAA Fisheries Service (e.g., billfishes and sharks).

Impacts of No Action The variety and quality of EFH associated with estuarine areas are expected to continue to decrease as the remaining marsh converts to open water. Only open-water EFH, which is not in short supply, would increase. The long-term, moderate, indirect adverse impacts would result from these changes.

Impacts of Build Alternative 1 Long-term, moderate, direct and indirect benefits of the build alternatives would result from re-establishing marsh and improving estuarine-related EFH. Marsh and marsh edge habitat would increase vegetation that would develop post-construction aided by vegetative plantings. Detrital material, formed by the breakdown of emergent vegetation, would contribute to the aquatic food web of the surrounding ecosystem. Decreases in wind erosion would protect estuarine mud

bottoms around the proposed project area. Thus, this alternative would restore more productive habitats supportive of brown shrimp, white shrimp, and red drum.

Short-term, unavoidable, direct and indirect adverse impacts to habitats supportive of various life stages of brown shrimp, white shrimp, and red drum would occur during the construction phase of the proposed project as marsh is filled and created. Potential short-term impacts to EFH include movement of prey species away from the construction area, interruption of feeding or spawning by some species, and other effects on behavioral patterns. Minor short-term adverse impacts on EFH are possible if oyster leased areas are shell bottom habitat, because such substrate is less available than soft-bottom open waters. The disturbance of the soft bottom substrate EFH in the project area would result in temporary, localized adverse impacts to that EFH. Post-construction long-term benefits of increased quality and quantity of the marsh would be greater than the short-term, minor adverse impacts. Turbidity would return to ambient conditions post-construction and improve in terrace-protected waters.

Impacts of Preferred-Build Alternative 2 All impacts would be similar to the build alternative 1 with the exception that the potential for minor adverse impacts to shell bottom would be less than the build alternative 1. Benefits would be similar to the build alternative 1 and greater than the no action alternative, because the quality of EFH would increase with construction of marsh and marsh edge habitat within the project area.

3.2.4 Marine Fishery Resources

Freshwater fisheries do not occur in the project area. Fishery guilds common to coastal Louisiana and their current population trends are (LCWCRTF and WCRA 1998):

- Spanish mackerel guild (marine) – increasing population trend for species within project area.
- red drum, black drum, blue crab (estuarine dependent) – increasing trend, and projected to decline toward the year 2050.
- spotted seatrout, Gulf menhaden, southern flounder, white shrimp, brown shrimp guilds (estuarine dependent) – generally decreasing population trend for species within project area.
- American oyster guild (estuarine resident) – decreasing population trend for species within project area and expected to steady toward the year 2050.

A wide variety of estuarine-dependent fishery species found in the Terrebonne Basin (LCWCRTF and WCRA 1999) are of national economic importance in accordance with Section 906(e)(l) of PL 99-602, the Water Resources Development Act of 1986. Most species vary in abundance from season to season due to their migratory life cycle, habitat preferences according to life stage, and the variation in salinity (Herke 1978, Rogers and others 1993, LCWCRTF and WCRA 1999). Most spawn offshore in the open Gulf of Mexico and enter the marsh area as postlarvae or young juveniles to use the marshes as a nursery, and return to the open Gulf as subadults or adults.

Impacts of No Action Open-water fisheries habitat is available and increasingly abundant in coastal Louisiana. The increase in open-water fisheries habitat comes at the expense of submerged vegetation and emergent fisheries habitats, which are less common and more vulnerable to disturbance than open-water habitat. The quality of fish habitat is expected to decrease as remaining marsh converts to open water reducing the nursery function of the area for estuarine-dependent species. Long-term, moderate, indirect adverse impacts would result from these changes.

Impacts of Build Alternative 1 Short-term, minor, direct, adverse impact to local fishery resources would occur during construction from dredging and placement of sediments. Dredging would directly move benthic organisms that live in the sediment and indirectly entrap the slow-moving organisms and

polychaetes of the borrow areas. In the placement area, smothering of benthic organisms and sessile fish and invertebrate species would occur. Mobile aquatic animals would move during construction and return after construction completes. Short-term severe effects on fish eggs and larvae in the immediate area may occur. These are temporary adverse impacts because benthic organisms would likely recolonize borrow areas. Early-stage recruitment of defaunated sediments occurs rapidly in coastal systems (Grassle and Grassle 1974, McCall 1977, Simon and Dauer 1977, Ruth and others 1994, all as cited in EPA 2003). Dredged sites would be rapidly colonized by opportunistic infauna (EPA 2003). Later stages of colonization would be more gradual and would depend on environmental conditions after cessation of dredging. Fish and invertebrates are expected to recover as turbidity returns to pre-construction levels.

Long-term, moderate, direct and indirect beneficial impacts would result from the increase in marsh habitat providing nursery for estuarine-dependent fisheries that would decline with the no-action alternative. Access to the marsh habitat would be maintained after construction through dike gapping.

Impacts of Build Alternative 2 Impacts are the same as build alternative 1. Both alternatives increase habitat diversity by disturbing sediments and temporarily adversely impacting turbidity with long-term benefits expected through increased fishery nursery area.

3.2.5 Marine Mammal Resources

Marine mammals that occur in Louisiana waters include the blue, sei, sperm, finback and humpback whales, the dolphin, and the endangered West Indian manatee. Whales are unlikely to occur in or near the shallow project area, so are not further discussed. West Indian manatees may be found in Louisiana coastal waters during the warmer months, and their occurrences appear to be increasing in Louisiana. Based on the proposed project location in shallow water, it is unlikely that West Indian manatees would occur in the project area. Dolphins are common along the shore. Dolphin follow schooling fishes, such as menhaden that are prey, and seek food and refuge in interior bay waters.

Impacts of No Action Long-term, moderate, indirect adverse impacts would be expected as the marsh used by marine mammal forage species, such as small fish, would decline.

Impacts of Build Alternatives Whales, manatee, and dolphin are unlikely to occur in the project area, though dolphin frequently use deeper coastal waters south of the proposed project area. Dolphin prey species would be temporarily displaced to other similar habitat, so short-term, minor, indirect adverse impacts may be associated with the build alternatives. In the long-term, moderate, indirect benefits would result from increasing the quantity and longevity of prey nursery grounds and refuges. Contractors would be instructed to watch for marine mammals. Should any manatee be seen, any workboats in the area would be instructed to cease work until the animal is over 500 ft away.

3.2.6 Migratory Bird Resources

Waterbirds were specifically considered pursuant to the Migratory Bird Treaty Act. No colonies of colonial nesting waterbirds have been observed in the proposed project area, but could occur. This resource consists of heron, egret, night-heron, ibis, roseate spoonbill, anhinga, and/or cormorant.

Impacts of No Action Long-term, moderate, indirect adverse impacts to migratory birds are expected as the marsh habitat that supports them and their forage species' declines. Ridge habitat used by roosting birds would be threatened as the banks of bayous in the area erode.

Impacts of Build Alternatives No migratory birds are known to nest in the area. Short-term, minor, indirect adverse impacts may occur, as foragers would be temporarily displaced to the abundance of nearby foraging habitat. Long-term, moderate, indirect benefits would occur after construction as a result

of increased habitat diversity, and longevity of the foraging marsh. Roosting ridge habitats would be protected from erosion. No substantial adverse impacts would occur.

It is uncertain whether nesting colonies occur within the project area vicinity and nesting is impermanent. A visit to the proposed project site in the nesting season prior to construction would determine if undocumented nesting water birds are present. If colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants are observed, all activities within 1,000 ft of the nesting colony 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). Because the anticipated construction duration is in excess of eight months and some construction activities may occur during the nesting season, time-of-year restrictions may not be practicable. Accordingly, an abatement plan may be necessary to ensure that birds do not nest at construction time. A plan would be developed in consultation with the USFWS, if required, to address potential nesting.

The USFWS would be contacted to report the colonies' location and consult on the species present and their non-nesting periods. If nesting were to occur it would be prior to construction, as the disturbance of construction would prevent colonies from selecting the area for nesting during construction. Long-term, moderate, direct and indirect benefits would occur by creating nesting habitat for colonial waterbirds once vegetation becomes established and increasing the quantity and quality of foraging area.

3.2.7 Wildlife Resources

Louisiana's coastal zone supports 19 percent of the United States' winter population for 14 species of ducks and geese. The North American Waterfowl Management Plan identified coastal Louisiana as one of the most important regions for the maintenance of continental waterfowl populations in North America (USACE 2004).

The Terrebonne Basin proposed project area is unlikely to support species that frequent woody or freshwater habitats. The basin is located at the bottom of the Mississippi Flyway, and birds from central and northern North America start to converge in the fall. Waterfowl populations in the Terrebonne basins have declined as marsh converts to open water (LCWCRTF and WCRA 1999). Rare wildlife of Terrebonne parish that utilize habitats similar to those of the proposed project area include the red wolf, diamondback terrapin, reddish egret, peregrine falcon (most likely in winter), gull-billed tern, bald eagle (whom feed in lakes), brown pelican, and roseate spoonbill (LDWF 2013).

Table 5 and 6 lists the wildlife species and/or species groups prominent (LCWCRTF and WCRA 1998) within coastal Louisiana along with the habitat function, status, trend, and projection within the project area.

TABLE 5. AVIAN POPULATION FUNCTIONS OF PARTICULAR INTEREST WITH THE STATUS OF PRESENCE IN THE PROJECT AREA, POPULATION TREND SINCE 1985, AND PROJECTED POPULATION THROUGH 2050 BY HABITAT TYPE.

1988 Habitat		Open Water	Saline Marsh
% of Area		85	12
Brown Pelican	Function	Nesting	.
	Status	Moderate numbers	Not historically present (NH)
	Trend/Proj.	Increasing/Increase	.
Bald Eagle	Status	NH	NH
Seabirds	Function	Multiple functions	Multiple functions
	Status	High numbers	High numbers
	Trend/Proj.	Steady/Steady	Steady/Steady
Wading Birds	Function	.	Multiple functions
	Status	NH	High numbers
	Trend/Proj.	.	Decreasing/Decrease
Shorebirds	Function	.	Multiple functions
	Status	NH	High numbers
	Trend/Proj.	.	Decreasing/Decrease
Dabbling Ducks	Function	Wintering area	Wintering area
	Status	Low numbers	Low numbers
	Trend/Proj.	Decreasing/Decrease	Decreasing/Decrease
Diving Ducks	Function	Wintering area	Wintering area
	Status	Low numbers	Low numbers
	Trend/Proj.	Steady/Decrease	Steady/Decrease
Geese	Status	NH	NH
Raptors	Status	NH	NH
Rails, Coots, and Gallinules	Function	Wintering area	Wintering area
	Status	Low numbers	Low numbers
	Trend/Proj.	Steady/Decrease	Steady/Decrease
Other Marsh/OW Residents	Function	.	Multiple functions
	Status	NH	High numbers
	Trend/Proj.	.	Decreasing/Decrease
Other Marsh/OW Migrants	Function	.	Multiple functions
	Status	NH	High numbers
	Trend/Proj.	.	Steady/Decrease

*Projection (Proj.) Source: LCWCRTF and WCRA 1998 Appendix E. Terrebonne Mapping Unit

TABLE 6. FUNCTIONS, STATUS AND TRENDS OF OTHER POPULATIONS OF PARTICULAR INTEREST.

1988 Habitat Type			Open Water	Saline Marsh
% of area			85	12
Furbearers	Nutria	Function	.	Multiple functions
		Status	Not historically present (NH)	Low numbers
		Trend/Proj.	.	Decreasing/Decrease
	Muskrat	Function	.	Multiple functions
		Status	NH	Low numbers
		Trend/Proj.	.	Steady/Decreasing
	Mink, Otter, Raccoon	Function	.	Multiple functions
		Status	NH	Low numbers
		Trend/Proj.	.	Decreasing/Decrease
Game	Rabbits	Function	.	Multiple functions
		Status	NH	Low numbers
		Trend/Proj.	.	Decreasing/Decrease
	Squirrels	Status	NH	NH
	Deer	Status	NH	No longer present
Reptiles	American Alligator	Function	.	Multiple functions
		Status	No longer present	Low numbers
		Trend/Proj.	.	Decreasing/Decrease

*Projection (Proj.) Source: LCWCRTF and WCRA 1998 Appendix E, Terrebonne Mapping Unit

Impacts of No Action Long-term, moderate, indirect adverse impacts would be expected as the remaining marsh and mud flat convert to open water. Habitat would become less suitable for waterfowl, small mammals, and increase for aquatic species that are not habitat limited, such as alligator. Current waterfowl declines would continue (LCWCRTF and WCRA 1999).

Impacts of Build Alternatives Short-term, minor, localized, direct adverse impacts to wildlife would result from displacement. Wildlife would vacate or avoid the area and return once construction is complete. Proposed project modifications to move the location to avoid impacts to wildlife were coordinated with USFWS. Long-term, moderate, direct benefits would result from increasing wildlife habitat through marsh creation. Projection of the banks of the bayous north of the project would provide habitat for birds, furbearer and game, and mammal populations. Many bird species are migratory or permanent residents and depend on marsh of the proposed project area. Population numbers of bird species are expected to increase in response to project implementation.

3.2.8 Threatened and Endangered Species

The USFWS and NOAA Fisheries Service manage critical habitats and threatened or endangered listings of the Endangered Species Act (ESA). Information below is from several sources provided on the websites for these agencies and the LDWF Natural Heritage Program all accessed in September of 2013.

Loggerhead, Kemp's ridley, hawksbill, leatherback, and green sea turtles occur along the coast in Louisiana. Hawksbill sea turtles have both federal and state endangered status but are "one of the most infrequently encountered sea turtles" in Louisiana (LDWF 2013), so are not further discussed. Green sea turtles have both federal and state threatened status, and are "relatively rare, with most sightings from the eastern coast" in Louisiana (LDWF 2013). They may occur in Louisiana bays while migrating between their nesting and foraging sites in Florida and Texas. Kemp's ridley sea turtles nest in Mexico and immature individuals are believed to stay in shallow, warm, nearshore waters in the northern Gulf of

Mexico. Loggerhead sea turtles regularly enter marshes, estuaries, and coastal rivers but their range in Louisiana is in parishes to the east (LDWF 2013). Leatherback sea turtles occur in coastal bays of Terrebonne parish (LDWF 2013). The nearest proposed critical habitat is at barrier islands near Mobile Bay, Alabama.

There is no critical habitat designated for sea turtles in Louisiana and no sea turtle nesting is known to occur in the vicinity of the project. There has been an increase since 2010 in reports of sea turtles being found dead, ill or stranded along the north-central Gulf of Mexico, including coastal shores south of the project area (NOAA 2013). The cause of the increased deaths is unknown and no strandings have been reported in Terrebonne Parish. Strandings have been reported in parishes directly to the east on the Gulf coast – not as far inland as the proposed project and borrow areas. The majority of strandings are of Kemp's ridley in spring and summer. Investigation of strandings continue by the Sea Turtle Stranding and Salvage Network, which includes federal, state, and private participants (NOAA 2013).

Fishermen have reported sea turtle sightings in bays, such as the Vermilion Bays, and inland within about 2 miles of a direct connection to the Gulf, and its bays (Beth Bourgeois, NOAA, personal communication). Given that the location of the project borrow area is 6 miles north of Terrebonne Bay, it is unlikely any sea turtle would occur in the shallow inland waters there. They would occur in the project borrow area if high tides of a hurricane pushed them in.

Gulf sturgeons utilize southeast Louisiana rivers in the summer and marine waters in the winter. They do not have designated critical habitat occurring in the project area (NOAA Protected Resources 2013) and the proposed project area is outside of the habitat range listed by the Louisiana Natural Heritage Program (LDWF 2013), so the species is not further considered.

The smalltooth sawfish favors warm, estuarine, shallow waters over mud or sand such as those of the proposed project area and historically occurred along the coast from Texas to North Carolina. However, range of the species has decreased and currently only includes areas of Florida. No critical habitat is designated for this species in Louisiana and sightings in Louisiana are very rare (Wiley and Simpfendorfer 2010), so the species is not further considered.

Threatened or endangered marine mammals are not known to occur near the project, but those that occur in Louisiana are the blue, sei, sperm, finback, and humpback whale, under jurisdiction of the NOAA Fisheries Service, and the West Indian manatee under the jurisdiction of the USFWS. Whales typically occur in water depths greater than 650 feet, and may occasionally be sighted in shallower depths of Louisiana. The West Indian manatee may be found in lakes Pontchartrain and Maurepas, and the Louisiana coastal waters during the winter. Based on the proposed project location in inland shallow water, it is unlikely that whale or manatee would occur in the project area.

Piping plover is "known or believed to occur" in Terrebonne parish. They utilize beaches, mudflats, and sandflats along the Gulf of Mexico in the winter. The proposed project area does not contain habitat suitable for the species, but could be created by the proposed build alternatives prior to the establishment of dense vegetation on terraces and marsh creation areas.

Sprague's pipit, a candidate for ESA species listing, is "known or believed to occur" in Terrebonne parish. This songbird utilizes prairie and may winter in the grasslands of Terrebonne Parish at its far eastern winter range, so is unlikely to occur in the marsh and shallow water project area.

Impacts of No Action Without action, existing marsh that is habitat for the sea turtle and marine mammal forage species, such as species of shrimp and fish, would continue to be lost resulting in long-term, moderate, indirect adverse impacts. Habitat suitable for the threatened piping plover would not be created.

Impacts of Build Alternatives The leatherback sea turtle, hawksbill sea turtle, Gulf sturgeon, smalltooth sawfish, and endangered whales are not likely to be adversely affected, because they do not commonly occur in the project area. Whales were extremely unlikely to overlap geographically with the action area. We do not expect these species to be adversely affected from this project and do not discuss them further. Placement of dredged material is unlikely to adversely affect threatened and endangered species. Manatees rarely occur in coastal Louisiana during the warmer months and are unlikely to occur in the project area.

Both USFWS and NOAA Fisheries Service have concurred that the proposed project is not likely to adversely affect federally listed threatened or endangered species or associated critical habitat (Appendix C). Long-term, moderate, indirect benefits to listed species may result from increasing the quality of forage species habitat and quantity of refuge area. Habitat suitable for the threatened piping plover would be temporarily (1 to 3 years) created by the proposed build alternatives prior to the establishment of dense vegetation on terraces and marsh creation areas.

3.3 Cultural Resources

3.3.1 Historic, Prehistoric and Native American

This section considers both terrestrial and submerged cultural resources**.** There are no known terrestrial or submerged cultural resources. Archeological surveys near the project were considered in this analysis (Gulf South Research Institute 1975). No Archeological surveys were conducted of the proposed project areas, as they are in areas of shallow open waters unlikely to contain submerged or terrestrial cultural resources, as explained in the cultural history of the area quoted below.

> *In lower Terrebonne Parish no occupation has been identified earlier than [A.D. 1200-1500]. Prehistoric peoples and residents of today have no other choice than to live on the natural levees of streams. Because of the shifts in the Mississippi River discharge into the Gulf, the distributaries have varied between mere low water sluggish streams to active channel systems such as the Atchafalaya today. Probably few of the aborigines lived throughout the year on these streams but occupied them seasonally. Large middens suggesting continuous occupation by a relatively large group are mostly confined to southwestern Louisiana or to large main stream natural levees.*
> *At historic contact times the area that is now Terrebonne Parish did not have a reportedly large Indian population. A resident of lower Montegut assured that no Indians had lived there because her father had settled there in 1904 and there were none then. European people probably began settling the region as early as the latter half of the 18th century.*
>
> *During the Civil War Bayou Lafourche was the scene of frequent skirmishes between harassed Union forces and Confederate units. In particular, the Terrebonne Regiment and other partisans or local militia caused embarrassment to Union troops and Louisiana defenders as well. Their guerilla-like attacks on Union troops and supply vessels on the Mississippi River brought costly reprisals, such as the almost total destruction of Donaldsonville in 1962. No great battles were fought in Terrebonne and there is little likelihood that any material evidence of Great Unpleasantness would be found in the specific areas under study here.*
>
> *In recent decades, especially since about 1930, there has been an intensification of settlement and building along many of the bayous in lower Terrebonne Parish. Just how extensive was revealed by the damaging effects of the [1985] hurricane Juan …the landscape was dotted with mattresses, destroyed furniture, refrigerators and car bodies. Virtually all of the displaced residents are returning to rebuild or to refurbish their homes.* - Hagg 1985

Impacts of No Action No historic cultural resources have been identified in the area. The State Historic Preservation Office was consulted in preparation of this analysis (Appendix C).

Impacts of Build Alternatives No historic cultural resources have been identified in the area so no effect of the build alternatives is expected. Dredging would primarily be located where previous settlements, therefore artifacts, are unlikely. Hydraulic dredging of open-water bay areas and mechanical dredging in shallow open waters that were marsh within recent history would be used. No resources are likely to be affected by these actions, because these would not have been elevations suitable for habitation, major waterways, nor the banks of shorelines.

3.3.2 Socioeconomics (Income and Environmental Justice)

The population of Terrebonne Parish is 111,860 (U.S. Census 2010). The population has grown approximately 1% per year in the last twenty years and is projected to continue to grow at a slower rate (Terrebonne Parish 2012). Within the parish, a significant migration of residents to the north has occurred, where they seek less flood-prone elevations. The nearest town and road are one mile west of the proposed project area (Terrebonne Parish 2012). Table 7 provides population/poverty data for the parish, State, and the nearest town. Additional information on environmental justice indices is in Appendix B.

TABLE 7. POPULATIONS OF LOUISIANA, TERREBONNE PARISH, AND MONTEGUT

Topic	Louisiana*	Terrebonne Parish*	Montegut CDP**
Total Population	4,574,766	111,917	1,540
White alone	63.8%	72.1%	98.2%
Black or African American alone	32.4%	19.2%	1%
American Indian and Alaska Native alone	0.7%	5.5%	9.1%
Asian alone	1.6%	1.1%	0.4%
Native Hawaiian and Other Pacific Islander alone	0.1%	0.1%	0%
Two or More Races:	1.4%	2.0%	1.8%
2007-2011 percent persons below poverty level	18.4%	17.3%	not available

*U.S. Census 2011 estimates and ** U.S. Census 2010 (U.S. Census 2013).

Impacts of No Action As the remaining marsh is lost to open water, the threat of structural flooding increases. The cost of flooding to the livelihood of businesses and community reduces the local economy. People have migrated toward less flood-prone elevations to the north, and this can be expected to continue for the remaining population. A loss of shrimp habitat is expected. Loss of local fisheries leads to loss of local income as fisheries-related activities decline. The result is a long-term, minor, indirect adverse impact.

Impacts of Build Alternatives This alternative would have a short-term, minor, indirect adverse impact through disruption of localized fishing during construction. Short-term, minor, direct benefits through local job creation would result from construction activities. Long-term, indirect, moderate benefits would result from increasing shrimp habitat, and recreational and fishing value of the area. Oyster production in the area would be compensated by the state of Louisiana at fair market value following the requirements set by the Louisiana Department of Wildlife and Fisheries, and therefore have no significant impact to lease holders.

3.3.3 Land Use and Infrastructure

Over 90% of Terrebonne Parish is classified as environmentally sensitive in development terms (Appendix B). "Buildings or structures and access are severely limited by the nature of this land itself, and by the additional layers of mitigation and permitting that are required (Terrebonne Parish 2012)." The proposed project area is within this development category, and the proposed terrace creation area is within the Pointe Aux Chenes Wildlife Management Area. Residential, commercial, industrial, and agricultural land uses are located in linear patches along natural bayou banks. Oil and gas pipelines are throughout the basin and project area as active or remnant conveyance of oil/natural gas (Figure 2). Magnetometer surveys of the borrow area had several anomalies that are being investigated. Pipelines and infrastructure would be removed or avoided to use the borrow area. Commercial fisheries and recreational activities influence the local economy. The proposed project area is accessible only to shallow draft boats.

The marshes and bayous of Terrebonne Basin are used for recreation, such as hunting, fishing and birding. The State of Louisiana leases areas to private entities for oyster production throughout Terrebonne Basin. There are a total of 107 oyster leases within a 500 ft radius of the preferred project's borrow, construction, and access areas (Byland, Boeneke, and Foret 2013; Figure 8). Public oyster seed grounds are located at Lake Chien (8 miles southeast of the proposed borrow area) and Lake Felicity (2 miles south of Lake Chien).

The *Morganza to the Gulf* project is proposed north of the project area and could be constructed in the foreseeable future. The plan includes a levee running to the north of the proposed marsh creation area and several water control structures at other locations.

Impacts of No Action Conversion of the proposed project area to open water increases exposure of pipelines (both active and inactive), posing threats to human safety, and decreases the commercial and recreational value of the area. Increased storm surges would erode nearby land and increase structural damages from storms. The result of these changes would be long-term, minor, indirect impacts.

Impacts of Build Alternative 1 Long-term, moderate, indirect benefits would result from the terrace and marsh acting as a buffer from waves during storms. Wave erosion would decrease for surrounding land, pipelines, and infrastructure. Short-term, minor, direct and indirect adverse impacts on recreational fishing would occur during construction. However, habitat suitable for fishing is common in the region, and the temporary loss of opportunity for fishing in the proposed project area is considered minimal. Construction would avoid pipelines and maintain waterways of the area used by local boaters. The expected benefits would not be as long lasting, because the created habitat would settle to below marsh elevation in 10 years, which is sooner than estimated for the preferred alternative (GeoEngineers 2011).

Impacts of Preferred-Build Alternative 2 Impacts to land use/recreation would be similar to the preferred alternative. The expected benefits would be longer lasting than with no action or the build alternative 1, because the created habitat would not subside as quickly as the build alternative 1. There would be benefits to the area north of this alternative location of buffering storm-generated water impacts, including the *Morganza to the Gulf* levee. The pipeline companies have been notified of the potential project and all associated features; there are no anticipated issues. Formal agreements for crossing pipelines would be made with the companies prior to construction (Byland, Boeneke, and Foret 2013).

3.3.4 Hazardous, Toxic, and Radioactive Wastes

Magnetometer surveys have been conducted in the proposed marsh creation area. Pipelines have been identified and anomalies mapped for the area. NOAA Fisheries Service personnel conducted a site investigation of the project area for hazardous, toxic, and radioactive waste (HTRW). There were no signs of HTRW problems, such as dead or discolored vegetation, stained soil, chemical sheens or odors, or dead or dying fish, amphibians, reptiles, or mammals, or discarded drums, tanks, or chemical containers. In an

analysis of applicable federal and state regulatory agency records, historical records, and interviews with persons knowledgeable about the subject property, NOAA Fisheries Service discovered no evidence of HTRW issues (Parker 2013).

Impacts of No Action Although existing pipelines would be at increased risk of exposure with continued subsidence and land loss, there are no foreseeable HTRW issues.

Impacts of Build Alternatives During construction activities, existing oil and gas infrastructure within the project area would be avoided. Hazard avoidance is included in state of Louisiana contracts, and in the interest of the construction workers' personal safety and company finance, so no impacts are anticipated.

3.3.5 Noise

The proposed marsh creation and borrow areas are remote with no industry other than oil production and fisheries. Ambient noise in the area results from oil and gas production, boats, and wildlife.

Impacts of No Action The no-action alternative would not cause any change to the existing noise conditions in the proposed project area.

Impacts of Build Alternatives Short-term, minor, direct adverse impacts through the increase in noise associated with construction equipment would occur. No long-term changes in ambient noise levels would result from the build alternatives, as noise-producing equipment would vacate the area after construction.

3.4 Other Considerations

3.4.1 Cumulative Impacts

Direct and indirect impacts of past, present, and reasonably foreseeable future events were considered in the analysis of the proposed project consequences. These impacts include historical and predicted future land loss rates for the area and other restoration projects in the vicinity. The preferred alternative would have temporary adverse impacts to some environmental resources but cumulative benefits to the environmental resources.

Coastal Louisiana, including the project area, has been greatly impacted by natural subsidence (Reed and Yuill 2009), levees, hurricanes, and oil and gas infrastructure. Recent events, such as hurricanes or oil spills, contribute to the loss of habitat but are nearly indiscernible from other impacts.

Through the CWPPRA program, projects are ranked independently and have individual merit. The cumulative value of all wetland restoration and protection projects in an area can far exceed the summed values of the individual projects. Similar wetland restoration projects in the area, as shown in Appendix B, would operate synergistically with the preferred alternative to enhance the structural and functional integrity of the ecosystem, improve primary productivity rates, and thereby improve the overall environmental resources. The Mississippi River Reintroduction into Bayou Lafourche is the nearest of these projects that is currently being considered and designed by the State of Louisiana. Since CWPPRA's inception, 151 coastal restoration or protection projects have been authorized, benefiting over 110,000 acres in Louisiana (Appendix B). Information on similar and nearby CWPPRA projects in the vicinity is available at www.lacoast.gov.

Physical cumulative impacts of this and other restoration projects are to slow the land loss rate in coastal Louisiana. Currently, land loss is at an average rate of an acre every 38 minutes. If the current rate of loss is not slowed by the year 2040, an additional 800,000 acres of wetlands will convert to open water. Other physical cumulative impacts are related to mining borrow sediments.

The cumulative impact of the proposed action on air and water quality would not differ substantially from the effects of the alternatives considered individually, as similar impact producing events would not co-occur in space or time. The cumulative beneficial impact to water quality would be a long-term increase in quality as a result of reduced turbidity, and decreased nitrogen and phosphorus, thereby reducing low dissolved oxygen.

Biological cumulative impacts would be similar to the direct and indirect impacts of the alternatives described previously. Both build alternatives would work with existing projects to enhance habitat for fish, wildlife, vegetation, and EFH. Cumulatively, both build alternatives would increase benefits to the area by decreasing land loss rates. No cumulative adverse impacts are anticipated.

Cultural cumulative impacts would result from synergy of the build alternatives with nearby restoration projects. These projects would cumulatively decrease losses of habitat, thereby maintaining more of the economy and storm protection than with no action. The build alternatives are similar to previous actions in the area that have had no adverse cultural impacts. No adverse cumulative impacts would be expected.

3.4.2 Invasive Species

Executive Order 13112 requires federal agencies to use authorities to prevent introduction and control (in cost effective and environmentally sound manners) of invasive species, and to provide for restoration of native species and habitats in ecosystems that have been invaded. As stated above, the purpose of the preferred alternative is to restore the native habitat. The proposed project would not introduce invasive species. The State of Louisiana, whom administers contracts for plantings, uses only plantings authorized for release. This insures appropriate (noninvasive) species and cultivars are provided.

3.4.3 Coordination

Coordination in development of the proposed action, its alternatives and selection of the preferred alternative has been maintained with each CWPPRA Task Force agency. The project was vetted publicly through the CWPPRA process, which includes opportunities for the public and CWPPRA agencies to comment on the proposed project. The project was discussed in public meetings for CWPPRA where project details were made available on several occasions. A draft EA will be circulated to participating restoration agencies and the public. Comments received to date are provided in Appendix C. The preferred alternative is not expected to cause adverse environmental impacts that would require compensatory mitigation.

3.4.4 Compliance with Laws and Regulations

Many federal, state, and local laws and regulations are considered during development of the proposed restoration project, as well as several regulatory requirements that are typically evaluated during the permitting process. A brief review of potentially applicable laws and regulations that may pertain to this proposed project is available in Appendix A. Relevant correspondence is provided in Appendix C and the status in Table 8. The project manager would ensure that there is coordination among these programs where possible and that project implementation and monitoring comply with all applicable laws and regulations.

TABLE 8. STATUS OF LAW AND REGULATION COMPLIANCE

Status	Law or Regulation
Completed SHPO correspondence as of letter received 4/9/2013	Archeological & Historic Preservation Act of 1974
Completed LDEQ coordination as of email received 6/5/13	Clean Air Act of 1970
Pending, Permit application to USACE for section 404 is being prepared concurrent with the completion of this EA	Clean Water Act
Pending	Coastal Zone Management Act of Louisiana
NOAA coordination completed June/9/2014. Completed USFWS coordination with letter received 4/30/13	Endangered Species Act of 1973
In compliance	Executive Order 11990, Protection of Wetlands
Coordinated with Office of Floodplain Administration the Houma-Terrebonne Planning and Zoning, and FEMA	Executive Order 11998, Floodplain Management
In compliance, assessed with this EA	Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations & Low-Income Populations
Completed, Coordination with USFWS for ESA 4/30/13, and as a CWPPRA participating agency	Fish & Wildlife Coordination Act
Completed as per letter received 6/26/13	Magnuson-Stevens Fishery Conservation & Management Act
May require an abatement plan, coordination with USFWS continuing	Migratory Bird Treaty Act of 1918
In Process with this EA draft	National Environmental Policy Act of 1969
Completed correspondence in person with SHPO prior to 4/12/13, no additional surveys required	National Historic Preservation Act of 1966

4 CONCLUSIONS

The natural processes of subsidence, habitat switching, and erosion of wetlands have been exacerbated by widespread human alterations of sediment delivery and other processes, resulting in marked degradation of the Louisiana coastal area. Without intervention to slow down or reverse the loss of marshes, Louisiana's healthy and highly productive coastal ecosystem would not be maintained.

Initial investigations of build alternative 1 showed complications in achieving the environmental benefits of the project goals from the areas poor load-bearing capacity. The location for marsh creation had over 1,200 landowners with 3 dual claims, meaning that landrights were in legal dispute. The cost to acquire landrights was estimated at over $1,000,000. Concurrent with project design, part of the proposed area was defined for levee improvements in the *Morganza to the Gulf* (Reach H-3), which would limit construction area. A survey found 108 magnetometer anomalies at that location and state maps identify pipelines, and active or abandoned wellheads. Given complications of landrights, infrastructure (hazards) to avoid, and unstable soils, build alternative 2 is the preferred alternative to lower costs, increase feasibility, and thus increase the likelihood of meeting the project goals.

This EA discloses information on the direct, indirect, and cumulative impacts on the human environment likely to result from the Madison Bay Marsh Creation and Terracing Project. It has disclosed long-term beneficial impacts on the coastal resources of south Louisiana and does not anticipate any significant long-term adverse environmental impacts. Construction-related adverse impacts are considered minor, as

they are temporary or reversible. This EA predicts beneficial impacts that would be minor to moderate. The analysis is based on a review of relevant literature, site-specific data, and project-specific engineering reports related to biological, physical, and cultural resources, as well as on the cumulative experience gained through many similar coastal restoration projects in south Louisiana over the past two decades. The increase of fisheries habitat is anticipated to have long-term beneficial impacts on the local economy and culture as it relates to recreational and commercial fishing. In addition, the preferred alternative would result in increased protection of adjacent marsh in the area to be restored. NOAA Fisheries Service will review, evaluate and consider the information in this EA to determine whether to issue a Finding of No Significant Impact for the proposed action.

5 PREPARERS

This EA was prepared by biologists Joy Merino, Cecelia Linder, and John Foret Ph.D. of NOAA Fisheries Service.

6 PERSONS / AGENCIES CONSULTED

References in the literature cited and the following persons / agencies were consulted in the preparation of this EA.

- Beth Altazan-Dixon, Louisiana Department of Environmental Quality
- Beth Bourgeois, NOAA port agent, personal communication
- Charles McGimsey, State Archaeologist, Louisiana Office of Cultural Development
- Christi Reid, NOAA NEPA Coordinator
- Inland Fisheries Division, Louisiana Department of Wildlife and Fisheries
- Jeff Weller, US Fish and Wildlife Service
- Johnnie Jacobs, NHPA Section 106 Coordinator, Choctaw Nation of Oklahoma
- Pam Breaux, State Historic Preservation Officer
- Philip Parker, NOAA Environmental Engineer
- Patrick Banks, Marine Biologist, Louisiana Department of Wildlife and Fisheries
- Ryan Hendren, NOAA Endangered Species Branch
- Virginia Fay, Assistant Regional Administrator, NOAA Habitat Conservation Division

A solicitation of comments on the proposed project was conducted by mailing letters to the following listed entities prior to this analysis. Comments received are summarized in Appendix C and considered in analysis and project design. Full letters of reply are available in the project files maintained by the NOAA Fisheries Service.

- 8th Coast Guard District Commander
- Choctaw Nation of Oklahoma
- Chitimacha Tribe
- Coalition to Restore Coastal Louisiana
- Coushatta Tribe of Louisiana
- Department of Health and Hospitals Chief Sanitarian and Division of Environmental Health
- Department of Public Safety Highway Safety Commission
- Department of the Army Technical Support
- Department of Wildlife & Fisheries Louisiana Natural Heritage Program

- Department of Agriculture and Forestry - Office of Soil & Water Conservation and Office of Forestry
- Department of Culture Recreation & Tourism/Division of Archaeology and Office of State Parks
- Department of Economic Development Office of Business Development
- Division of Administration State Land Office and State Planning Office
- Environmental Protection Agency Source Water Protection and Federal Activities
- Federal Transit Administration Region 6
- Federal Emergency Management Agency Region VI
- Floodplain Management Program District 64
- Habitat Conservation Division of Louisiana State University Center for Wetlands Research
- Houma -Thibodaux Metropolitan Planning Organization
- Inter-Tribal Council of Louisiana, Inc
- Jena Band of Choctaw Indians
- Louisiana Department of Environmental Quality Beth Altazan-Dixon, Office of the Secretary
- Louisiana House of Representatives District 51 - Joe Harrison, District 52 - Gordon E Dove, SR, District 53 Lenar L. Whitney
- Louisiana Senate District 20 - Norby Chabert, District 21 - R. L. “Bret” Allain
- Lafourche -Terrebonne Soil and Water Conservation District of Louisiana
- Louisiana Department of Natural Resources Office of Conservation, Office of Mineral Resources, and Coastal Management Division
- Louisiana Forestry Association
- Louisiana Good Roads Association
- Louisiana State Police
- Louisiana State University Sea Grant Legal Advisory Service
- Mississippi Band of Choctaw Indians
- Natural Resources Conservation Service
- Nichols State University
- Office of Indian Affairs
- Seminole Nation of Oklahoma
- South Central Planning and Development Commission
- South Louisiana Economic Council
- Terrebonne Parish Civil Defense
- Terrebonne Parish Consolidated Government
- Terrebonne Parish Police Floodplain Administrator
- Terrebonne Parish School
- Terrebonne Port Commission
- Tunica - Biloxi Tribe of Louisiana
- U.S. Geological Survey
- U.S. House of Representatives; District 1 - Steve Scalise, District 2 - Cedric Richmond, District 3 - Charles Boustany, Jr. MD, District 4 - John Fleming, MD, District 5 - Rodney Alexander, District 6 - Bill Cassidy, MD
- U.S. National Park Service
- U.S. Senate - David Vitter and Mary Landrieu

7 DISTRIBUTION LIST

This EA was distributed for comment to agencies of the CWPPRA Task Force and resource agencies as listed below. A minimum 30-day comment period was provided. A draft EA was available for public review. A final EA will be made available to the public at http://www.lacoast.gov along with other public records for the project. The EA was distributed to:

Thomas A. Holden Chairman Deputy District Engineer, U.S. Army Engineer District, New Orleans Office of the Chief. 7400 Leake Ave. New Orleans, Louisiana 70160-0267

Darryl Clark Senior Field Biologist, U.S. Fish and Wildlife Service. 646 Cajundome Blvd, Suite 400 Lafayette, Louisiana 70506

Bren Haas Deputy Chief- Studies & Environmental Branch, Coastal Protection and Restoration Authority. 617 North 3rd Street Baton Rouge, Louisiana 70804-4027

Richard Hartman Fishery Biologist, National Marine Fisheries Service. Rm 266 Military Science Bldg South Stadium Drive, LSU Baton Rouge, Louisiana 70803-7535

Karen McCormick Section Chief Environmental Protection Agency, Region 6 Marine and Coastal Protection Division (6WQ-EC). 1445 Ross Avenue Dallas, Texas 75202-2733

Britt Paul, P.E. Assistant State Conservationist, Water Resources, Natural Resources Conservation Service. 3737 Government Street Alexandria, Louisiana 71302

Dana Masters Cultural Director**,** Jena Band of Choctaw Indians P.O. Box 14. Jena Louisiana 71342-0014 (in response to request for area information)

8 LITERATURE CITED

American Lung Association. 2012. State of the Air: Terrebonne Parish, Louisiana. Accessed January 15, 2013 at stateoftheair.org/2012/states/louisiana/terrebonne-parish-22109

BTNEP. 2010. *Shedding Light on Our Estuary and Our Economy: environmental indicators in the Barataria-Terrebonne estuary system.* Accessed January 16, 2013 at btnep.org/BTNEP/resources/

BTNEP. 2013. *Ecological Management Action Plans*. Accessed January 16, 2013 at btnep.org/BTNEP/about/theplan/EcologicalManagement

Boesch, DF, MN Josselyn, AJ Mehta, JT Morris, WK Nuttle, CA Simenstad, and DJP Swift. 1994. *Scientific Assessment of Coastal Wetland Loss, Restoration and Management in Louisiana.* Journal of Coastal Research. Special Issue No. 20. 103 pp.

Bush Thom, CS. 2004. Evaluation of nekton use and habitat characteristics of restored Louisiana marsh. *Ecological Engineering* 23(2):63-75.

Byland, T, K Boeneke, and J Foret. 2013. *95% Design Report for Madison Bay Marsh Creation and Terracing (TE-51).*

Byland, T, D Kar, and J Foret. 2013. *Preliminary 30% Design Report for Madison Bay Marsh Creation and Terracing (TE-51).*

C&C Technologies. 2008. *Magnetometer Survey*: Madison Bay Marsh Creation and Terracing Project. Lafayette, LA. June.

Cannaday, C. 2006. *Effects of terraces on submerged aquatic vegetation in shallow marsh ponds in coastal southwest Louisiana.* M.S. Thesis. Louisiana State University. Baton Rouge, LA.

Conner, WH and JW Day, Jr. (editors). 1987. *The Ecology of Barataria Basin, Louisiana: An Estuarine Profile*. U.S. Fish and Wildlife Service. Biological Report 85(7.13). July. 166 pp.

Council on Environmental Quality (CEQ). 1992. *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*, Reprint, 40 CFR Parts 1500-1508, Executive Office of the President, Council on Environmental Quality.

Day, Jr, JW, CAS Hall, WM Kemp, and A Yanez-Arancibia. 1989. *Estuarine Ecology.* John Wiley and Sons, Inc.

Engle, VD. 2011. *Estimating the provision of ecosystem services by Gulf of Mexico Coastal Wetlands.* Wetlands. 31:179-193.

Flocks, J. and C Franze. 2001. Dredge Pit Characterization *In* S Penland, A Beall, and J Waters (eds) *Environmental Atlas of the Lake Pontchartrain Basin.* Lake Pontchartrain Basin Foundation, New Orleans, LA. Accessed January 8, 2014 at http://pubs.usgs.gov/of/2002/of02-206/env-issues/pit-characterization.html

GeoEngineers. 2011. *Geotechnical Investigation Report*: Madison Bay Marsh Creation and Terracing (TE-51) Alternate Sites Investigation. Baton Rouge, LA. November 18.

Gulf of Mexico Fishery Management Council (GMFMC). 2005. *Final Generic Amendment Number 3 for Addressing Essential Fish Habitat Requirements, Habitat Areas of Particular Concern, and Adverse Effects of Fishing in the following Fishery Management Plans of the Gulf of Mexico: Shrimp Fishery of the Gulf of Mexico, United States Water, Red Drum Fishery of the Gulf of Mexico, Reef Fish Fishery of the Gulf of Mexico, Coastal Migratory Pelagic Resources (Mackerels) in the Gulf of Mexico and South Atlantic, Stone Crab Fishery of the Gulf of Mexico, Spiny Lobster in the Gulf of Mexico and South Atlantic, Coral and Coral Reefs of the Gulf of Mexico.* GMFMC, Tampa, FL.

Gulf South Research Institute. 1975. Archaeological survey In: *Environmental assessment of proposed pipeline construction in Terrebonne, Lafourche, Jefferson, and Plaquemines Parishes.* Baton Rouge, LA. Accessed online February 27, 2013 at kronos.crt.state.la.us/website/lahpweb/

Hagg, WG, Jr. 1985. Archaeological survey of three proposed forced drainage projects. Parish Project No. 83-G-25. Accessed online February 27, 2013 at kronos.crt.state.la.us/website/lahpweb/

Herke, WH. 1978. Some effects of semi-impoundment on coastal Louisiana fish and crustacean nursery usage. In: RH Chabreck (ed.) *Proceedings of the Third Coastal Marsh and Estuary Management Symposium.* Division of Continuing Education, Louisiana State University, Baton Rouge, LA.

Lear, E, A Ledet, G Curole, J Curole, and L Sharp. *2011. 2011 Operations, Maintenance, and Monitoring Report for Lake Chapeau Sediment Input and Hydrologic Restoration, Point Au Fer Island (TE-26*), Coastal Protection and Restoration Authority of Louisiana, Office of Coastal Protection and Restoration, Thibodaux, Louisiana. 44 pp and Appendices.

Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCWCRTF). 1993. *Louisiana Coastal Wetlands Restoration Plan: Main Report and Environmental Impact Statement*. 163 pp.

LCWCRTF. 2006. *16th Priority Project List Report (Appendices).* Louisiana Department of Natural Resources. Baton Rouge, LA.

LCWCRTF and the Wetlands Conservation and Restoration Authority (WCRA). 1998. *Coast 2050: Towards a Sustainable Coastal Louisiana.* Louisiana Department of Natural Resources. Baton Rouge, LA. 161 pp.

LCWCRTF and WCRA. 1999. *Coast 2050: Towards a Sustainable Coastal Louisiana, The Appendices. Appendix E – Region 3 Supplemental Information.* Louisiana Department of Natural Resources. Baton Rouge, LA. 260 pp.

Louisiana Department of Environmental Quality (LDEQ). 2013a. *National Ambient Air Quality Standards.* Accessed January 15, 2013 at http://www.deq.louisiana.gov/portal/DIVISIONS/AirPermitsEngineeringandPlanning/NationalAmbientAirQualityStandards.aspx

LDEQ. 2013b. The 2012 Louisiana Water Quality Inventory: Integrated Report (305(b)/303(d)) Appendix A Integrated Report Assessment final- post EPA Final Decision 7-18-13 Accessed August 6, 2013 at http://www.deq.louisiana.gov/portal/DIVISIONS/WaterPermits/WaterQualityStandardsAssess

Louisiana Department of Wildlife and Fisheries (LDWF). 2013. Animal Fact Sheets accessed September 19, 2013 at http://www.wlf.louisiana.gov/wildlife/rare-animals-fact-sheets

McCall, BD and SC Pennings. 2012. Disturbance and recovery of salt marsh arthropod communities following BP Deepwater Horizon Oil Spill. *PLoS ONE* 7(3): e32735.

Mendelssohn, IA, GL Andersen, DM Baltz, RH Caffey, KR Carman, JW Fleeger, SB Joye, Q Lin, E Maltby, EB Overton, and LP Rozas. 2012 Oil impacts on coastal wetlands: implications for the

Mississippi River Delta ecosystem after the Deepwater Horizon Oil Spill. *BioScience* 62(6): 562-574.

Morton, RA, G Tiling, and NF Ferina. 2002. *Primary causes of wetland loss at Madison Bay, Terrebonne Parish, Louisiana.* U.S. Geological Survey. St. Petersburg, FL open file 03-60.

NOAA. 2012. *Commercial Fisheries Landings Data for 2010 and 2011*. Office of Science and Technology. Available on-line at t.nmfs.noaa.gov/commercial-fisheries/fus/fus11/index

NOAA. 2013. Sea Turtle Strandings in the Gulf of Mexico. Office of Protected Resources. Available at http://www.nmfs.noaa.gov/pr/species/turtles/gulfofmexico.htm

NOAA Fisheries Service. 2006. *Final Project Information Sheet for Wetland Value Assessment: Madison Bay Marsh Creation and Terracing.* August 31 and 2013 revisions of October 22.

NOAA Fisheries Service. 2013. *Final Project Information Sheet for Wetland Value Assessment: Madison Bay Marsh Creation and Terracing.*

NOAA Protected Resources. 2013. Critical Habitat Maps accessed September 19, 2013 at http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm

Office of Coastal Protection and Restoration (OCPR). 2012. *Louisiana's Comprehensive Master Plan for a Sustainable Coast.* Accessed January 16, 2013 at coastalmasterplan.louisiana.gov/2012-master-plan/final-master-plan

Osterman, LE, R Poore, and PW Swarzenski. 2008. *The last 1000 years of natural and anthropogenic low-oxygen bottom-water on the Louisiana shelf, Gulf of Mexico.* Marine Micropaleontology 66:291-303.

Palmer, TA, PA Montagna, and RB Nairn. 2008. The effects of a dredge excavation Pit on benthic macrofauna in offshore Louisiana. *Environmental Management. 41:573-583.*

Parker, Phillip L. 2013. Hazardous, Toxic, and Radioactive Waste Report for Terrebonne Parish. NOAA Fisheries Service Project Files. August 28

Rabalais, NN, Q Dortch, D Justic, MB Kilgen, PL Klerks, PH Templet, RE Turner, B Cole, D Duet, M Beacham, S Lentz, M Parsons, S Rabalais, and R Robichaux. 1995. *Status and Trends of Eutrophication, Pathogen Contamination, and Toxic Substances in the Barataria and Terrebonne Estuarine System.* BTNEP Publ. No. 22, Barataria-Terrebonne National Estuary Program, Thibodaux, Louisiana, 265 pp. plus Appendices.

Reed, DJ and B Yuill. 2009. *Understanding Subsidence in Coastal Louisiana.* Pontchartrain Institute for Environmental Sciences. University of New Orleans, New Orleans, LA.

Rogers, BD, RF Shaw, WH Herke, and RH Blanchet. 1993. *Recruitment of postlarval and juvenile brown shrimp (Penaeus aztecus Ives) from offshore to estuarine waters of the northwestern Gulf of Mexico*. Estuarine, Coastal and Shelf Science 36:377-394.

Rozas, LP and TJ Minello. 2001. Marsh terracing as a wetland restoration tool for creating fishery habitat. *Marine Ecology Progress Series.* 21(3):327-341.

Rozas, LP, P Caldwell, and TJ Minello. 2005. The fishery value of salt marsh restoration projects. *Journal of Coastal Research.* 4:37-50.

Roth, D. 1998. *Louisiana Hurricane History* (srh.noaa.gov/images/lch/tropical/lahurricanehistory.pdf)

Sasser, CE, JM Visser, E Mouton, J Linscombe, and SB Hartley. 2008. *Vegetation types in coastal Louisiana in 2007*: U.S. Geological Survey Open-File Report 2008-1224, 1 sheet, scale 1:550,000. Accessed April 2009 at ubs.usgs.gov/of/2008/1224/

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic Database for Terrebonne Parish, Louisiana. Accessed January 15, 2013 at soildatamart.nrcs.usda.gov.

Soniat, TM, SM King, MA Tarr, and MA Thorne. 2011. Chemical and physiological measures on oysters (*Crassostrea virginica*) from oil-exposed sites in Louisiana. *Journal of Shellfish Research* 30(3):713-717.

Steyer, G. 1993. *Annual monitoring report: Sabine terracing project*. DRN Project No.: 4351089. Louisiana Department of Natural Resources 94 pp.

Tampa Bay Estuary Program. 2005. *Tampa Bay Dredged Hold Habitat Assessment Project Final Report*. Technical Publication #04-05 Accessed January 8, 2014 at http://dl.cr.usgs.gov/tampa/prod_search_tampa.aspx

Terrebonne Parish. 2012. *Vision 2030*: Terrebonne Parish Comprehensive Plan Update. Accessed January 22, 2013 and August 13/29, 2013 at http://www.tpcg.org/planning/pdf/Vision2030/Draft/revised-2012-11-29/TP Comp Plan Update - Complete Document.pdf

Terrebonne Parish. 2009. *Comprehensive Plan for Coastal Restoration in Terrebonne Parish*. Accessed august 29, 2013 at http://www.tpcg.org/coastal_restoration/docs/TPCPCR_FINAL DRAFT.pdf

Turner, RE and B Streever. 2002. *Approaches to Coastal Wetland Restoration: Northern Gulf of Mexico.* SPB Academic Publishing. The Hague. 147 pgs

U.S. Army Corps of Engineers (USACE). 2004. *Final Programmatic Environmental Impact Statement.* Volume 2 of the Louisiana Coastal Area Ecosystem Restoration Study. November 2004.

U.S. Census Bureau. 2010. Census 2010.

U.S. Census Bureau. 2013. *State and County QuickFacts*. Accessed January 22, 2013 at quickfacts.census.gov/qfd/meta/long_RHI125211 Last Revised: January 10, 2013.

U.S. Department of Agriculture. 2000. *Soils Survey of Terrebonne Parish, Louisiana*. Natural Resource Conservation Service.

U.S. Environmental Protection Agency (EPA). 2003. *New Cut / Marsh Restoration and Whiskey Island West Flank Restoration Projects Using Ship Shoal Sediment: Survey, Data Collection, and Analysis for Use by EPA in Determination of Impacts from Use of Ship Shoal Sand: Benthic Impacts – Sampling and Analysis.*

Wiley, TR and CA Simpfendorfer. 2010. Using public encounter data to direct recovery efforts for the endangered smalltooth sawfish *Pristis pectinata. Endangered Species Research*. 12:179-191.

Yip-Hoi, TA. 2003. *An Investigation of effects of dissolved oxygen level, sediment type, stocking density and predation on the growth rate, survivorship, and burrowing behavior of juvenile brown and white shrimp*. Dissertation North Carolina State University, Zoology.

APPENDIX A- ENVIRONMENTAL LAWS AND REGULATIONS

The proposed action is compliant or in the process of compliance with the following laws and regulations. A current status of compliance in provided in the attached EA.

Archeological and Historic Preservation Act of 1974 The Archeological and Historic Preservation Act of 1974 states that, if an activity may cause irreparable loss or destruction of significant scientific, prehistoric, historic, or archeological data, the responsible agency is authorized to undertake data recovery and preservation activities, in accordance with implementing procedures promulgated by the Secretary of the Interior.

Clean Air Act of 1970 Under the Clean Air Act of 1970, Congress established procedures for developing National Ambient Air Quality Standards (NAAQS) for the protection of human health and public welfare. EPA published the NAAQS in 1971, and they became effective at that time. Standards are provided for the following criteria pollutants: carbon monoxide, sulfur dioxide, nitric oxide, ozone, lead, and fine particulate matter.

Clean Water Act (CWA) The CWA is the principal law governing pollution control and water quality of the nation's waterways. It requires the establishment of guidelines and standards to control the direct or indirect discharge of pollutants to waters of the United States. Discharges of dredged or fill material into waters of the U.S., including wetlands, are regulated under Section 404 of the CWA. The USACE has the primary responsibility for administering the Section 404 permit program.

Coastal Zone Management Act The Coastal Zone Management Act (CZMA) provides for protection of resources found in the coastal zone, proactive land management practices, and preservation of unique coastal resources. Included in the CZMA is the requirement that all federal actions within the coastal zone of Louisiana must be consistent with the federally approved State of Louisiana Coastal Resource Management Plan.

Endangered Species Act of 1973 (ESA) The ESA directs all federal agencies to conserve endangered and threatened species and their habitats and encourages such agencies to utilize their authorities to further these purposes. Under the Act, NOAA Fisheries Service and USFWS publish lists of endangered and threatened species. Section 7 of the act requires that federal agencies consult with these agencies to minimize the effects of federal actions on endangered and threatened species.

Executive Order 11990, Protection of Wetlands The intent of Executive Order 11990, Protection of Wetlands, is 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 for new construction in wetlands whenever there is a practicable alternative.

Executive Order 11998, Floodplain Management Executive Order 11998, Floodplain Management, requires each agency (including military departments) to determine whether any action undertaken would occur in a floodplain. The Federal Emergency Management Agency provides Flood Insurance Rate Maps (FIRM) for more than 19,000 communities in the country as part of the Flood Insurance Studies the agency completes. In addition to the 100-year floodplain, which is the area of the community with a 1 percent chance of flooding in any given year, the FIRM also illustrates coastal high hazard areas, the floodway, and the 500-year floodplain, which is the area of the community with a 0.2 percent chance of flooding in any given year.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations Executive Order 12898, Federal Actions to Address Environmental

Justice in Minority Populations and Low-Income Populations, directs that the programs of federal agencies identify and address disproportionately high and adverse effects on human health and the environment of minority or low-income populations.

Fish and Wildlife Coordination Act The Fish and Wildlife Coordination Act requires agencies to consult with the USFWS, NOAA Fisheries Service, and appropriate state agencies, prior to modification of any stream or other body of water, to ensure conservation of wildlife resources. Compliance with the FWCA is integrated into the USACE interagency review process under Section 404 of the CWA as well as through the NEPA review process.

Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) In 1996, the act was reauthorized and changed by amendments to require that fisheries be managed at maximum sustainable levels and that new approaches be taken in habitat conservation. EFH is defined broadly to include "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (62 Fed. Reg. 66551, § 600.10 Definitions). The act requires consultation for all federal agency actions that may adversely affect EFH. Under Section 305(b)(4) of the act, NOAA Fisheries Service is required to provide advisory EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. Where federal agency actions are subject to ESA Section 7 consultations, such consultations may be combined to accommodate the substantive requirements of both ESA and the Magnuson-Stevens Act.

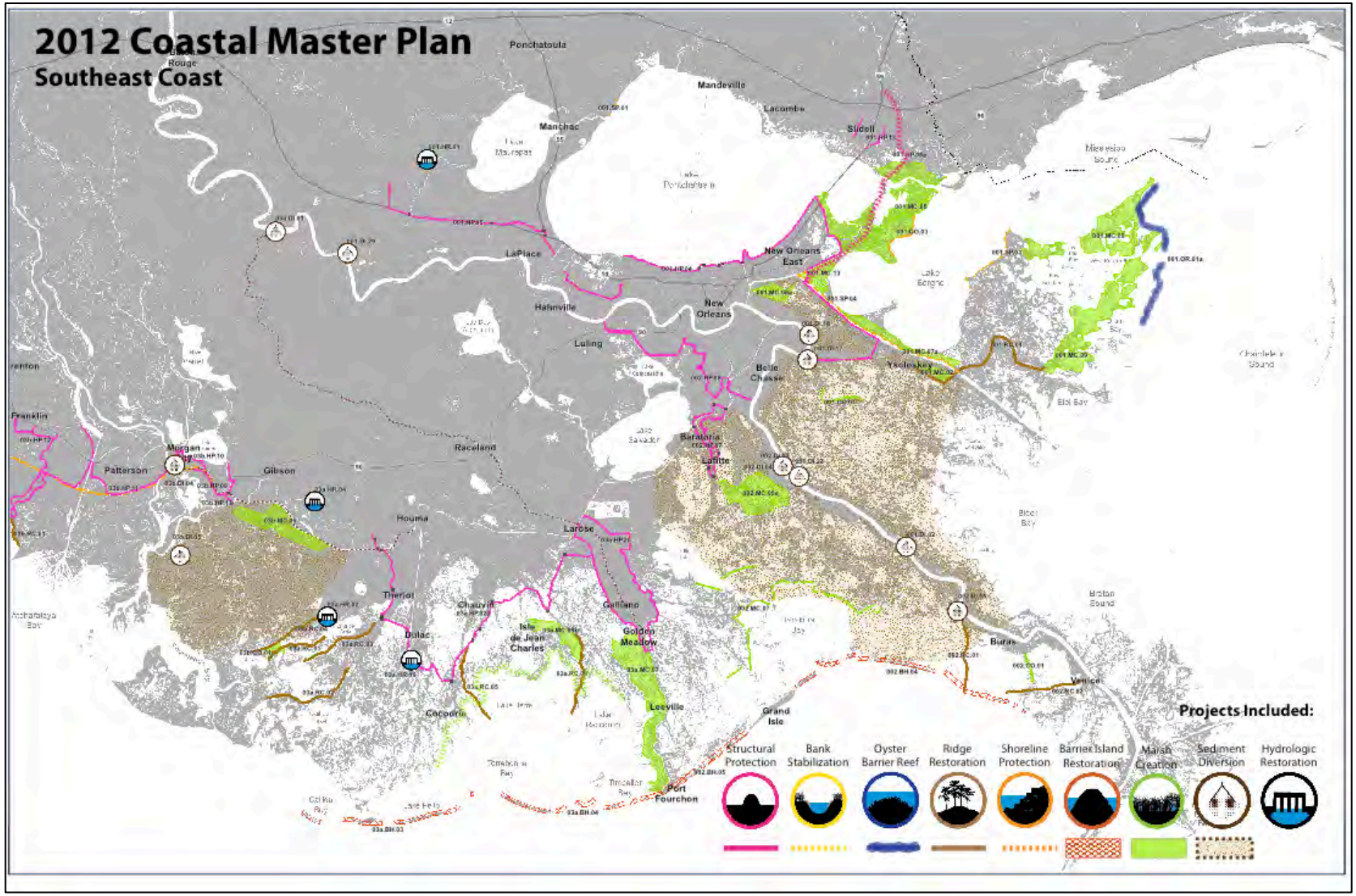
Migratory Bird Treaty Act of 1918 (MBTA) The MBTA requires the protection of all migratory bird species and protection of ecosystems of special importance to migratory birds against detrimental alteration, pollution, and other environmental degradation. Coordination under MBTA is generally incorporated into Section 404 of the CWA, NEPA, or other federal permit, license or review requirements.

National Environmental Policy Act of 1969 NEPA was enacted in 1969 to establish a national policy for the protection of the environment. The CEQ was established to advise the President and to carry out certain other responsibilities relating to implementation of NEPA by federal agencies. Pursuant to Presidential Executive Order, federal agencies are obligated to comply with NEPA regulations adopted by the CEQ (40 CFR Parts 1500-1508). These regulations outline the responsibilities of federal agencies under NEPA and provide specific procedures for preparing environmental documentation to comply with NEPA.

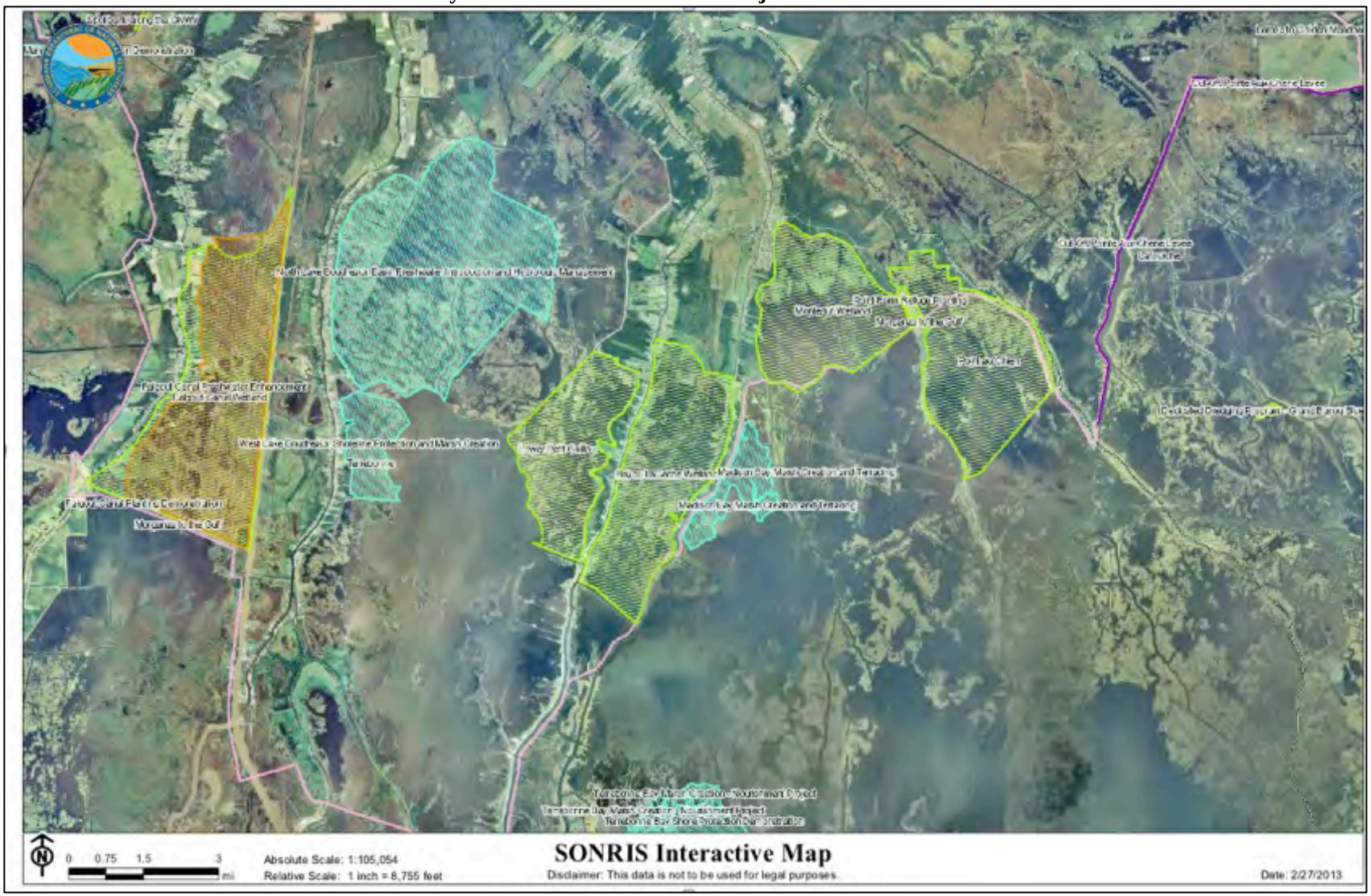
National Historic Preservation Act of 1966 The National Historic Preservation Act of 1966, as amended in 1992, requires that responsible agencies taking action that affects any property with historic, architectural, archeological, or cultural value that is listed on or eligible for listing on the National Register of Historic Places (NRHP) comply with the procedures for consultation and comment issued by the Advisory Council on Historic Preservation. The responsible agency also must identify properties affected by the action that are potentially eligible for listing on the NRHP, usually through consultation with the state historic preservation officer.

APPENDIX B- SUPPORTING DOCUMENTATION

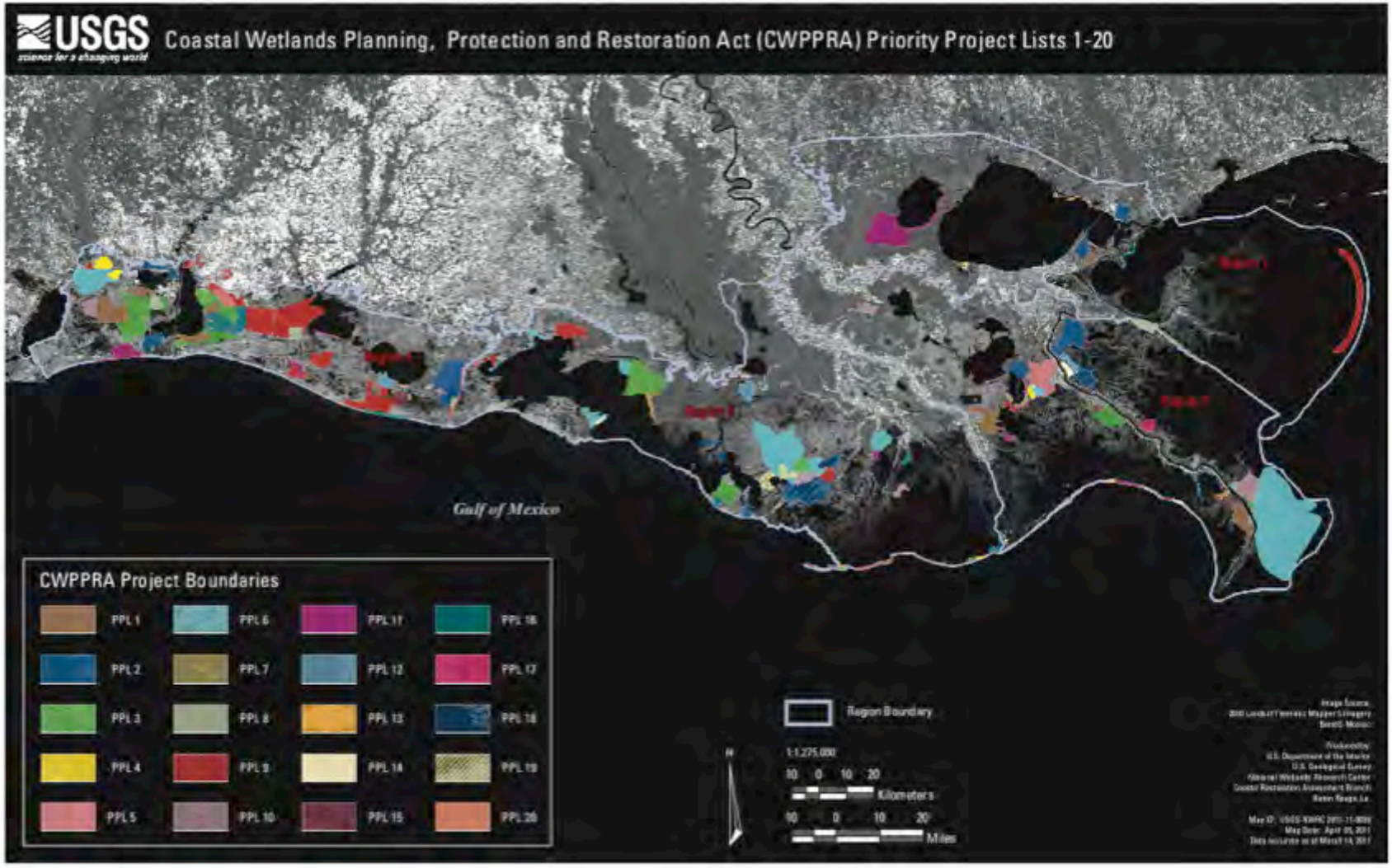
Coastal Master Plan For Southeast Louisiana



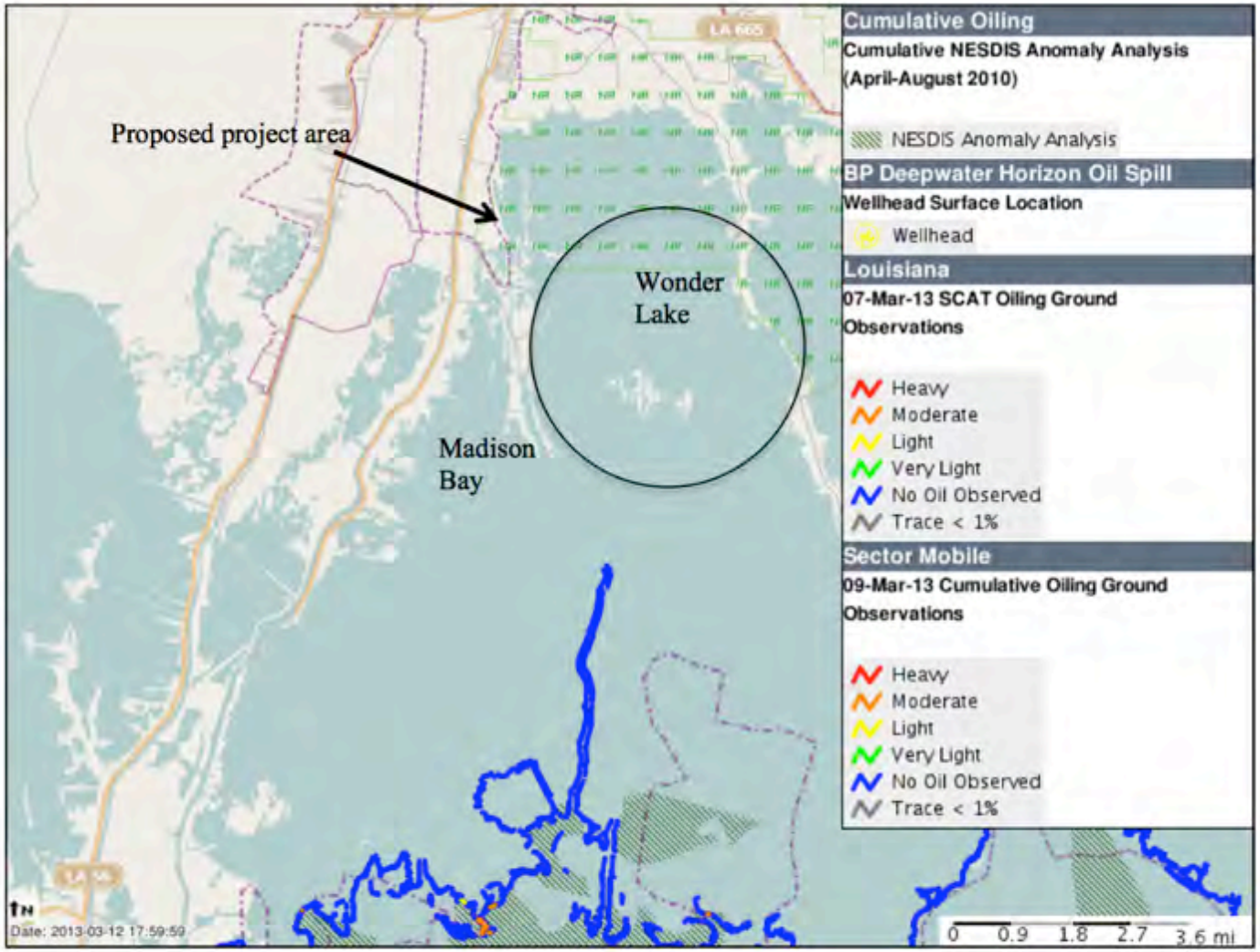
Coastal Protection and Restoration Authority of Louisiana Restoration Projects



CWPPRA Restoration Projects



Deepwater Horizon



US DOC | NOAA | NOS | NOAA Office of Response & Restoration
Email Comments: orr.erma@noaa.gov
Coastal Response Research Center
© 2007-2013 University of New Hampshire
ERMA GULF RESPONSE

Source: http://gomex.erma.noaa.gov/erma

Environmental Justice

EJView ACS Summary Report

Location: -90.522537,29.468297,-90.571976,29.412087,-90.604935,29.357043,-90.612488,29.336693,-90.602188,29.31993

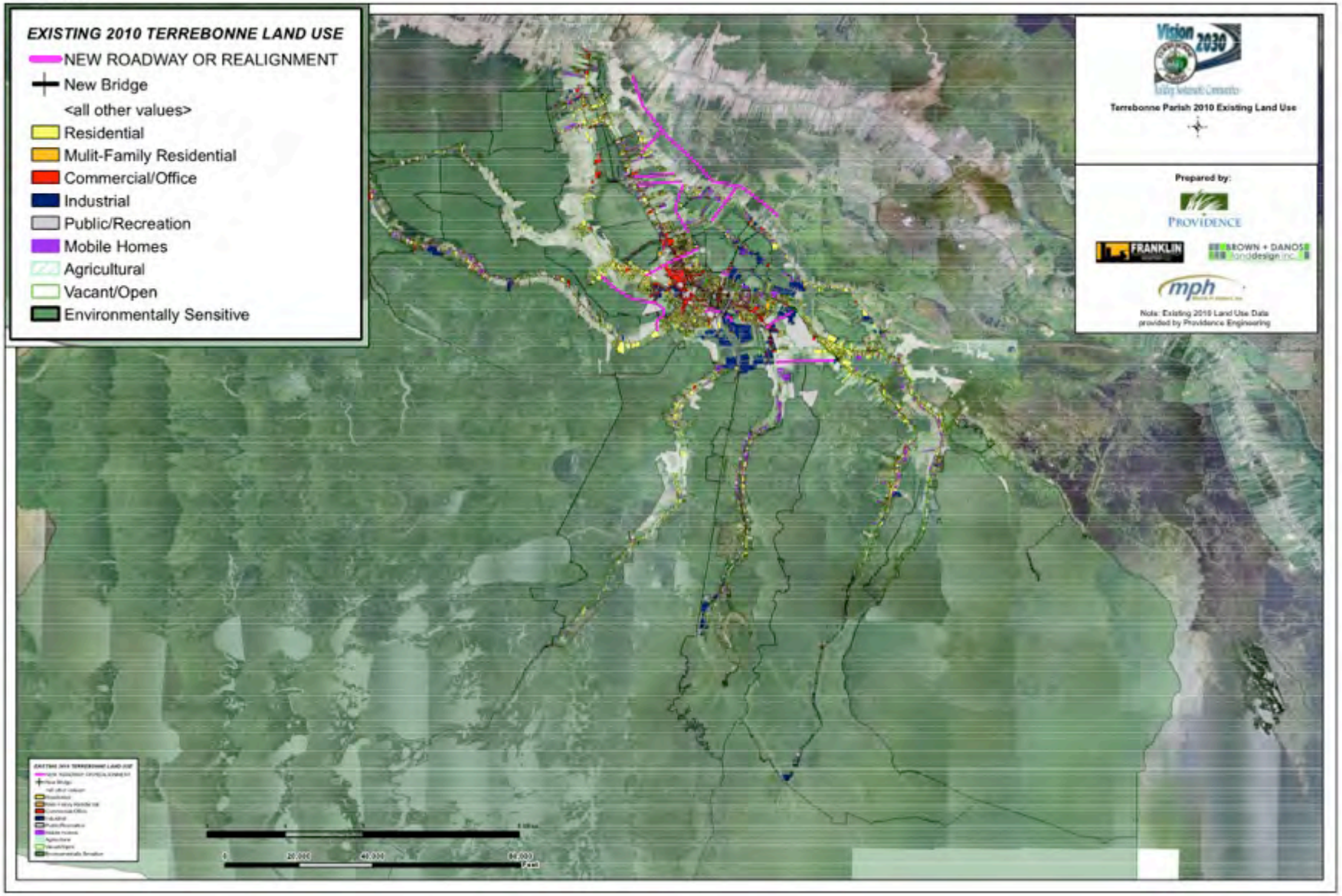
Study Area: 1 mile around the polygonal location

Summary of ACS Estimates	2006 - 2010
Population	798
Population Density (per sq. mile)	15
Minority Population	179
% Minority	22%
Households	290
Housing Units	430
Housing Units Built Before 1950	74
Per Capita Income	18,264
Land Area (sq. miles) (Source: SF1)	53.72
% Land Area	54%
Water Area (sq. miles) (Source: SF1)	46.45
% Water Area	46%

	2006 - 2010 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	798	100%	399
Population Reporting One Race	798	100%	1,069
White	620	78%	356
Black	0	0%	123
American Indian	178	22%	221
Asian	0	0%	123
Pacific Islander	0	0%	123
Some Other Race	0	0%	123
Population Reporting Two or More Races	0	0%	123
Total Hispanic Population	1	0%	123
Total Non-Hispanic Population	797		
White Alone	619	78%	356
Black Alone	0	0%	123
American Indian Alone	178	22%	221
Non-Hispanic Asian Alone	0	0%	123
Pacific Islander Alone	0	0%	123
Other Race Alone	0	0%	123
Two or More Races Alone	0	0%	123
Population by Sex			
Male	375	47%	184
Female	423	53%	255
Population by Age			
Age 0-4	72	9%	85
Age 0-17	226	28%	142
Age 18+	572	72%	298
Age 65+	104	13%	169

Data Note: Detail may not sum to totals dues to rounding. Hispanic population can be of any race. N/A meant not available.
Source: U.S. Census Bureau, American Community Survey (ACS) 2006 - 2010.

Land use


EXISTING 2010 TERREBONNE LAND USE
NEW ROADWAY OR REALIGNMENT
New Bridge
<all other values>
Residential
Mulit-Family Residential
Commercial/Office
Industrial
Public/Recreation
Mobile Homes
Agricultural
Vacant/Open
Environmentally Sensitive
Vision 2030
Terrebonne Parish 2010 Existing Land Use
Prepared by:
PROVIDENCE
FRANKLIN
BROWN + DANOS landdesign inc.
mph
Note: Existing 2010 Land Use Data provided by Providence Engineering

APPENDIX C- CORRESPONDENCE

Department of Environmental Quality- no objection

Fwd: DEQ SOV 130530/1005 US Dept of Commerce-NOAA-Mad...

Subject: Fwd: DEQ SOV 130530/1005 US Dept of Commerce-NOAA-Madison Bay Marsh Creation and Terracing TE-51-Terrebonne Basin
From: John Foret - NOAA Federal <john.foret@noaa.gov>
Date: 6/5/13 1:56 PM
To: "Joy Merino (E-mail)" <joy.merino@noaa.gov>

For the file

-------- Original Message --------
Subject:DEQ SOV 130530/1005 US Dept of Commerce-NOAA-Madison Bay Marsh Creation and Terracing TE-51-Terrebonne Basin
Date: Wed, 5 Jun 2013 18:53:46 +0000
From: Beth Altazan-Dixon <Beth.Dixon@LA.GOV>
To:john.foret@noaa.gov <john.foret@noaa.gov>, joy.merino@noaa.gov <joy.merino@noaa.gov>

June 5, 2013

John Foret, PhD-NOAA Fisheries Service
US Department of Commerce-NOAA-National Fisheries Service
646 Canjundome Blvd, Room 175
Lafayette, LA 70506
john.foret@noaa.gov
joy.merino@noaa.gov
RE: 130530/1005 US Dept of Commerce-NOAA-Madison Bay Marsh Creation and Terracing TE-51-Terrebonne Basin
CWPPRA Funding
Terrebonne Parish

Dear Mr. Foret:

The Department of Environmental Quality (LDEQ), Business and Community Outreach Division has received your request for comments on the above referenced project.

After reviewing your request, the Department has no objections based on the information provided in your submittal. However, for your information, the following general comments have been included. Please be advised that if you should encounter a problem during the implementation of this project, you should immediately notify LDEQ's Single-Point-of-contact (SPOC) at (225) 219-3640

- Please take any necessary steps to obtain and/or update all necessary approvals and environmental permits regarding this proposed project.
- If your project results in a discharge to waters of the state, submittal of a Louisiana Pollutant Discharge Elimination System (LPDES) application may be necessary.
- If the project results in a discharge of wastewater to an existing wastewater treatment system, that wastewater treatment system may need to modify its LPDES permit before accepting the additional wastewater.
- All precautions should be observed to control nonpoint source pollution from construction activities. LDEQ has stormwater general permits for construction areas equal to or greater than one acre. It is recommended that you contact the LDEQ Water Permits Division at (225) 219-9371 to determine if your proposed project requires a permit.
  If your project will include a sanitary wastewater treatment facility, a Sewage Sludge and Biosolids Use or Disposal Permit application or Notice of Intent must be submitted no later than January 1, 2013. Additional information may be obtained on the LDEQ website at http://www.deq.louisiana.gov/portal/tabid/2296/Default.aspx or by contacting the LDEQ Water Permits Division at (225) 219- 9371.
- If any of the proposed work is located in wetlands or other areas subject to the jurisdiction of the U.S. Army Corps of Engineers, you should contact the Corps directly regarding permitting issues. If a Corps permit is required, part of the application process may involve a water quality certification from LDEQ.
- All precautions should be observed to protect the groundwater of the region.
- Please be advised that water softeners generate wastewaters that may require special limitations depending on local water quality considerations. Therefore if your water system improvements include water softeners, you are advised to contact the

1 of 2 6/5/13 2:21 PM

LDEQ Water Permits to determine if special water quality-based limitations will be necessary.

- Any renovation or remodeling must comply with LAC 33:III.Chapter 28, Lead-Based Paint Activities; LAC 33:III.Chapter 27, Asbestos-Containing Materials in Schools and State Buildings (includes all training and accreditation); and LAC 33:III.5151, Emission Standard for Asbestos for any renovations or demolitions.
- If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-of-Contact (SPOC) at (225) 219-3640 is required. Additionally, precautions should be taken to protect workers from these hazardous constituents.

Currently, Terrebonne Parish is classified as attainment with the National Ambient Air Quality Standards and has no general conformity determination obligations.

Please send all future requests to my attention. If you have any questions, please feel free to contact me at (225) 219-3958 or by email at beth.dixon@la.gov.

Sincerely,

Beth

Beth Altazan-Dixon, EPS III
Performance Management
LDEQ/Office of the Secretary
Business and Community Outreach and Incentives Division
P.O. Box 4301 (602 N. 5th Street)
Baton Rouge, LA 70821-4301
Phone: 225-219-3955
Fax: 225-325-8148
Email: beth.dixon@la.gov

John D. Foret <john.foret@noaa.gov>
Research Fisheries Ecologist
NOAA/NMFS/SEFSC/EHCFC

NOAA Fisheries Service - EFH Concurrence

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

June 26, 2013 F/SER46/RH:jk
225/389-0508

Dr. John Foret
National Marine Fisheries Service
SEFC/Estuarine Habitats & Coastal Fisheries Center
646 Cajundome Boulevard
Lafayette, Louisiana 70506

Dear Dr. Foret:

NOAA's National Marine Fisheries Service (NMFS) has received your letter dated May 29, 2013, pertaining to the Madison Bay Marsh Creation and Terracing Project (TE-51). In your letter, you solicited our views about the resources, concerns, and issues to be addressed in an Environmental Assessment (EA) for the TE-51 project under provisions of the National Environmental Policy Act.

Aquatic and tidally influenced wetland habitats in portions of the study area are designated as essential fish habitat (EFH) for postlarval and juvenile life stages of brown shrimp, white shrimp, and red drum. Fishery management plans (FMPs) for these species have been developed by the Gulf of Mexico Fishery Management Council (GMFMC). Detailed information on federally-managed fisheries and their EFH is provided in the 2005 generic amendment of the FMPs for the Gulf of Mexico prepared by the GMFMC. The generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act, P.L. 104-297).

In addition to being designated as EFH for the brown shrimp, white shrimp, and red drum, water bodies and wetlands in the study area provide nursery and foraging habitats supportive of a variety of economically important marine fishery species, such as striped mullet, Atlantic croaker, gulf menhaden, spotted and sand seatrout, southern flounder, black drum, 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). NMFS recommends the EA include separate sections titled "Essential Fish Habitat" and "Marine Fishery Resources" which identify the EFH and fisheries resources of the study area and describe the potential impacts and benefits to those resources that could be caused by various activities to be described and evaluated in the document. Potential direct adverse impacts of project implementation could result from the construction of impediments to marine fishery movements, smothering of benthos, or the filling of marsh or water bottoms to supratidal or higher elevations if desired marsh elevations are exceeded by the dredging contractor. Potential direct beneficial impacts could result from the restoration or maintenance of more productive categories of EFH (i.e., marsh and marsh edge).

The EFH and marine fishery resources sections of the document also should describe and quantify the potential impacts and benefits of the proposed construction activities on EFH sub-categories (e.g., marsh, marsh edge, mud bottoms, submerged aquatic vegetation, and estuarine water column). The EA should evaluate alternatives to any activities which would result in an adverse impact to those resources to determine if there are less damaging methods to achieve the same result. The overall net benefits of the project on wetland habitats supportive of marine fishery resources should not preclude efforts to avoid or minimize negative impacts of some design features on those resources.

We appreciate the opportunity to identify resources that should be evaluated in the EA, and to recommend alternatives and issues to be addressed. If you have any questions regarding comments, please contact Mr. Richard Hartman of our Baton Rouge Habitat Conservation Division office at (225) 389-0508, extension 203.

Sincerely,

Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

c:
F/SER46, Swafford
F/SER4, Rolfes, Dale
Files

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MAR 03 2014
NMFS, LAFAYETTE

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

February 27, 2014 F/SER46/RH:jk
225/389-0508

John D. Foret, Ph.D.
NOAA Fisheries Service/SEFSC
Estuarine Habitats and Coastal Fisheries Center
646 Cajundome Boulevard, Room 175
Lafayette, Louisiana 70506

Dear Dr. Foret:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the draft Environmental Assessment (EA) for the Madison Bay Marsh Creation and Terracing Project (TE-51) in Terrebonne Parish, Louisiana. The project entails the creation of 470 acres of marsh and 42 acres of wetland terrace. To date, engineering and design activities have been supported using funds from the Coastal Wetlands Planning, Protection and Restoration Act.

NMFS has reviewed the draft EA and believes all pertinent resources have been adequately described and likely impacts to those resources fully characterized. As such, we have no comments to provide on the draft EA. We also concur with the determination that project implementation would be beneficial over the long term to essential fish habitat supportive of marine fishery resources. As such, NMFS fully supports rapid project implementation.

We appreciate the opportunity to review and comment on the draft EA.

Sincerely,

Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

c:
F/SER46, Swafford
Files

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MAR 1 0 2014
NMFS, LAFAYETTE

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

February 28, 2014 F/SER46/RH:jk
225/389-0508

John D. Foret, Ph.D.
NOAA Fisheries Service/SEFSC
Estuarine Habitats and Coastal Fisheries Center
646 Cajundome Boulevard, Room 175
Lafayette, Louisiana 70506

Dear Dr. Foret:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the draft Environmental Assessment (EA) for the Madison Bay Marsh Creation and Terracing Project (TE-51) in Terrebonne Parish, Louisiana. The project entails the creation of 470 acres of marsh and 42 acres of wetland terrace. To date, engineering and design activities have been supported using funds from the Coastal Wetlands Planning, Protection and Restoration Act.

NMFS has reviewed the draft EA and believes most pertinent resources have been adequately described and likely impacts to those resources fully characterized. However, the section titled "Essential Fish Habitat" suggests dredging associated with project construction would not adversely impact soft bottom substrate categorized as essential fish habitat (EFH) due to the availability of similar habitat elsewhere. The widespread availability of soft bottom substrate in the project area should not be considered a factor in the determination of adverse impacts of dredging on such habitats. Rather, it should be noted the dredging of soft bottoms would result in a temporary, localized adverse impact to that category of EFH. The NMFS recommends the final EA be revised to include such a statement. That section of the final EA should also note temporary adverse impacts would be offset through the creation of more productive categories of EFH supportive of federally managed fishery resources. While we recommend the final EA be revised as described, we also concur with the determination that project implementation would be beneficial over the long term to essential fish habitat supportive of marine fishery resources. As such, NMFS fully supports rapid project implementation.

We appreciate the opportunity to review and comment on the draft EA.

Sincerely,

Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

SHPO Concurrence

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
SEFC/Estuarine Habitats & Coastal Fisheries Center
646 Cajundome Boulevard
Lafayette, Lousiana 70506

April 9, 2013

No known historic properties will be affected by this undertaking. This effect determination could change should new information come to our attention.

Pam Breaux 4-19-13
Pam Breaux Date
State Historic Preservation Officer

Pam Breaux
State Historic Preservation Officer
Louisiana Office of Cultural Development
P.O. Box 44247
Baton Rouge LA 70804-44247

Dear Ms. Breaux,

The NOAA, National Marine Fisheries Service is reviewing a terrace and marsh creation project in Terrebonne Basin, Terrebonne Parish. We have prepared a cultural resources assessment for this activity (see attachment), as required under Section 106 of the National Historic Preservation Act of 1966, as amended. By transmittal of this letter and the attached cultural resource assessment, we request consultation with your office for cultural resources, and request a concurrence with our determination of effect.

The Madison Bay Marsh Creation and Terracing Project (TE-51) is funded under the Coastal Wetlands Planning, Protection and Restoration Act. The Area of Potential Effects (APE) is located in the Montegut Quadrangle. During a recent visit to your office, we found no records of identified sites in the APE, nor in the Montegut Quadrangle.

Our proposed action includes creating and nourishing marsh from nearby bay sediments. Potential impacts can occur from dredging that could unearth unknown sites. The dredging proposed for this project will primarily be located where previous settlements are unlikely, such as shallow open water. We propose constructing terraces and marsh to reduce wave erosion to existing and created marsh and increase SAV habitat suitability. The area marked as "terrace" in the attached map is where mechanical dredging would occur in shallow open waters that were marsh within recent history. Figure 3 illustrates a typical cross section of a terrace and borrow area. The bay borrow area would be excavated to up to a 10 feet depth.

Attached are portions of the draft environmental assessment for this project that includes the project location and cultural resources summary. We consulted historic records including previous surveys of the area (your report # 22-1160 and 22-317). Your response would be appreciated no later than May 10, 2013, and may be addressed to me.

Sincerely,

Dr. John Foret
NOAA Fisheries Service
646 Cajundome Blvd
Lafayette, LA 70506
John.foret@noaa.goV

APR 11-13

Summary of Comments from Solicitation of Views

- Office of Floodplain Administration and the Houma-Terrebonne Planning and Zoning "fully support the Madison Bay Marsh Creation and Terracing Project in Terrebonne Parish and would request that this project be constructed as soon as possible."
- Choctaw Nation of Oklahoma "defer to the other Tribes that have been contacted."
- Terrebonne Port Commission commented that the project "does not interfere with navigation…[we have] no objection."
- SHPO commented that "no known historic properties will be affected."
- South Central Planning and Development Commission believe the project "will not have a negative impact on open space, recreational, or cultural facilities…[and they] do not anticipate any impact on the existing demographic employment or income patterns of the area…[and] no one will be displaced by the project."
- Louisiana Office of Conservation refers to the SONRIS data website where records for the project area indicate "numerous oil and/or gas wells located in the project area. The DNR water well database indicates that there are no registered water wells in the vicinity of the project area. However, it is possible that unregistered water wells may be located in the area."
- Office of the Parish President was "delighted to support the efforts…[and] encourages continued efforts to design and seek funding for this project and would like to help further in any way."
- Louisiana Department of Wildlife and Fisheries "indicates that the proposed project occurs within the boundaries of Pointe Aux Chenes Wildlife Management Area. No activities shall occur within any LDWF wildlife management area/ refuge without first obtaining proper authorization from LDWF. Please contact Mr. Mike Windham at 504-284-5268 to coordinate authorization…no other impacts to rare, threatened or endangered species or critical habitats are anticipated…" They reviewed records on the Louisiana Natural Heritage Program for known rare, endangered or otherwise significant plant and animal species, plant communities (not wetlands), and other natural features, however, many areas of Louisiana have not been surveyed, the review does not address the occurrence of wetlands, and should not be substituted for onsite surveys. They ask to be contacted at 225-765-2643, if any tracked species is encountered.
- EPA "concluded that the project does not lie within the boundaries of a designated sole source aquifer and is thus not eligible for review under the SSA."
- FEMA Region VI "request that the Parish Floodplain Administrator be contacted [which has been done]…and be in compliance with EO11988 and EO11990 [as described in appendix A]."
- Louisiana Office of Public Health has "no objection" and advises compliance with any applicable State Sanitary Code regulations such as Title 51, Public Health –Sanitary Code [to be included in the States contracting for project work] and Title 48, Public Health-General [not applicable].
- Louisiana Department of Environmental Quality response was provided in full for attainment status reference purposes.
- USACE "do not anticipate any adverse impacts to [USACE] projects" and advise on permitting.
- Jena Band of Choctaw Indians requests we provide "a cultural resource report or any information in regards to the presence of survey site within the area.

USFWS Concurrence

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
SEFC/Estuarine Habitats & Coastal Fisheries Center
646 Cajundome Boulevard
Lafayette, Louisiana 70506

April 2, 2013

Jeffery Weller
U.S. Fish and Wildlife Service
646 Cajundome Blvd.
Lafayette, LA 70506

Dear Jeffery Weller,

The NOAA National Marine Fisheries Service is the federal sponsor of the *Madison Bay Marsh Creation and Terracing Project* (TE-51) in the Terrebonne Basin. As part of the preparation of the Environmental Assessment, in compliance with the National Environmental Policy Act, we ask the Service to provide a list of endangered, threatened, and proposed species and designated and proposed critical habitats that may occur in the project area, shown in the enclosed information.

This TE-51 project is being funded under the Coastal Wetland Planning, Protection, and Restoration Act (CWPPRA), of which your agency is a cooperating partner. We appreciate your participation in identifying any concerns you have regarding fish and wildlife resources, including threatened and endangered species that may be affected by the proposed project.

The project location is saline marsh and open water, and is shown on the map provided. Our proposed action includes creating and nourishing marsh from nearby bay sediments. We propose constructing terraces and marsh to reduce wave erosion to existing and created marsh and increase SAV habitat suitability.

Please do not hesitate to call or write (337) 291-2107, john.foret@noaa.gov with any questions or concerns that this request raises.

Sincerely,

John Foret, PhD
NOAA NMFS

This project has been reviewed for effects to Federal trust resources under our jurisdiction and currently protected by the Endangered Species Act of 1973 (ESA). The project, as proposed,
✓ will have no effect on ESA resources.
[ ] is not likely to adversely affect those resources.
[ ] is being reviewed for consideration under Section 7(a)(2) of the ESA.

April 30, 2013
Date

Acting Supervisor
Louisiana Field Office
U.S. Fish and Wildlife Service

NRCS Concurrence

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
3737 Government Street
Alexandria, LA 71302

(318) 473-7751
Fax: (318) 473-7626

RECEIVED
JAN 06 2014
NMFS, LAFAYETTE

December 31, 2013

John D. Foret, Ph.D.
NOAA Fisheries Service/SEFSC
Estuarine Habitats and Coastal Fisheries Center
646 Cajundome Boulevard, Room 175
Lafayette, Louisiana 70506

Re: Madison Bay Marsh Creation and Terracing Project (TE-51) Draft EA

Dear Dr. Foret:

The Natural Resources Conservation Service (NRCS) has received your email dated November 22, 2013, requesting agency comments on the draft Ecological Assessment (EA) entitled "Madison Bay Marsh Creation and Terracing Project (TE-51)." The project is authorized for engineering and design under the auspices of the Coastal Wetland Planning, Protection and Restoration Act (CWPPRA). The draft EA evaluates NOAA Fisheries Service's proposal to create and nourish 470 acres of marsh using nearby bay sediments and construct approximately 25,000 linear ft. (42 acres) of terraces and marsh to reduce wave erosion of created and existing marsh located in Terrebonne Parish, Louisiana. The document is well written, comprehensive and provides a thorough and well thought-out analysis of the project. NRCS agrees with the NOAA findings of the EA that the project would have long-term beneficial impacts on the coastal resources of south Louisiana and likewise does not anticipate any substantial long-term adverse environmental impacts. We believe that the alternatives were appropriately analyzed and agree with the preferred action. We provide these specific minor comments:

Page ii (Contents): under Land Use, there is a typo.

Page 3, Second Paragraph: In the discussion about the CWPPRA process, might want to add that the projects have to re-compete for the funding of construction (Phase II) following the Phase I design.

Page 7, Section 2.2.2 – typo – remove word "is."

Page 12-Table 3 – Under Essential Fish Habitat the Potential Avoidance and Minimization Measures is listed as "None." The project calls for breaching or gapping of the dikes within a short period after construction. This would effectively allow fish access. Therefore, we suggest that the avoidance/minimization action here could list dike breach/degradation.

Page 12 under Impact of No Action, you state that "Under the no-action alternative, material from the borrow areas is likely to be used for other restoration projects in the area as sediment sources have long been recognized as a limited resource." Not sure if this is an accurate statement or even adds support to argument. The borrow site for this project is located deep within the bounds of the historic coastal wetland complex and is currently a relatively small interior lake. There have been very few occasions in which large volume marsh creation borrow areas have been established in such a location. Usually large lakes or navigation channels have been used in interior locations, but this area is somewhat isolated. Although nearby Lake Boudreaux has been used as borrow to create marsh effectively without apparent lasting impact, unlike Lake Boudreaux, this location is very shallow, a good portion of the area recently consisted of emergent marsh, and the bottoms will be significantly altered for the short to perhaps

NOAA Fisheries Service – Protected Resources Concurrence

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:AH
SER-2014-12870

JUN 6 2014

John D. Foret, Ph.D.
National Marine Fisheries Service
Habitat Conservation Division
Estuarine Habitats and Coastal Fisheries Center
646 Cajundome Boulevard, Room 175
Lafayette, Louisiana 70506

Re: National Marine Fisheries Service, Habitat Conservation Division, Madison Bay Marsh Creation and Terracing Project, Madison Bay and Wonder Lake, Terrebonne Parish, Louisiana

Dear Dr. Foret:

This letter responds to the National Marine Fisheries Service, Habitat Conservation Division's (NMFS HCD) request for Endangered Species Act (ESA) consultation received December 19, 2013. NMFS HCD requested concurrence with its project-effect determinations under Section 7 of the ESA. We requested additional information via email on January 30, 2014, and following a phone call to clarify our request, we received an email response on February 25, 2014. NMFS HCD determined the project may affect, but is not likely to adversely affect, blue, fin, sei, or humpback whales, swimming sea turtles, smalltooth sawfish, and Gulf sturgeon. Our findings on the project's potential effects are based on the project description in this response. Changes to the proposed action may negate our findings and may require reinitiation of consultation.

The Madison Bay Marsh Creation and Terracing project consists of 2 parts: (1) a marsh creation/terracing portion located at 29.426861°N, 90.506639°W; and (2) a sediment borrow site located at 29.395722°N, 90.552861°W (Figure 1). The entire project is located within Madison Bay and Wonder Lake, Terrebonne Parish, Louisiana, approximately 16 miles southeast of Houma, Louisiana. The existing project site is an area that used to be brackish to saline marsh that is now mostly open water less than 3 feet (ft) deep, with all mud bottom. Surveys and testing conducted by Ardman and Associates in the spring of 2013 determined the soils in the project area were clay muck and the water is turbid due to suspended solids. Water depths where the marsh creation will occur are 0.75-2.75 ft. Soil borings performed in March 2009 by Professional Service Industries indicate the sediment depth at the borrow site range from 1.3-3.6 ft. The Environmental Protection Agency lists the water quality in the entire project area as poor. Water routes for ferrying personnel and equipment to and from the project site are 3-8 ft deep. No mangroves or coral occur in the project site. No substantial seagrasses are known to occur in the project area, though some sparse vegetation could occur undetected because of the poor water quality.

The applicant is requesting authorization to restore salt marsh habitat by creating 470 acres of new marsh, nourish approximately 200 acres of existing marsh, and create approximately 42 acres of terraces and marsh to reduce wave erosion and protect the existing and proposed marshes. The applicant proposes to use a 24-inch hydraulic cutterhead dredge and mechanical (clamshell type) dredging to create 25,000 linear ft (42 acres) of terraces. A mechanical bucket dredge (ca. 8-cubic-yard capacity) and/or marsh buggy backhoe may also be used in conjunction with the cutterhead

dredge to create 47,838 linear ft of containment dikes. The earthen terraces would be constructed to a +3.0 ft (max), with a 10-ft crown and 1:5 side slopes. The containment dikes would be constructed to a +3.5 ft (max), with a 5-ft crown, and 1:5 side slopes. In both cases, the features would be constructed in a "2 lift" scenario (i.e., build to +1.5 ft elevation, let that stabilize, then add a second "lift" to design height). Hydraulic dredges with floating pipelines would be used to acquire and transport sediment from the borrow site to the fill sites. No hopper dredge use is proposed. The borrow site will be dredged from the current depth of -1.5 ft to -4 ft down to a maximum of -15 ft deep over a 715-acre (315,145,000 ft^2) area. The resulting marsh will be filled to an elevation of +2.5 ft. The applicant will comply with NMFS' *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006. Construction is anticipated to take 6-12 months and will likely be conducted during spring months.

Figure 1. Location of the proposed borrow and marsh creation site (©2009 Google)

Species That Will Not Be Affected

You determined that smalltooth sawfish and humpback, blue, fin, and sei whales may be affected, but are not likely to be adversely affected, by the proposed action. The proposed action occurs outside the known range of the smalltooth sawfish and humpback whales; thus, we believe it will not affect these species. Similarly, we do not believe the proposed action will affect blue, fin, or sei whales. Blue and sei whales are predominantly found seaward of the continental shelf. Sei and blue whales also typically occur in deeper waters and neither is commonly observed in the waters of the Gulf of Mexico.[1,2,3] Fin whales are generally found along the 100-m isobath with sightings also spread over

[1] Waring, G.T., E. Josephson1, K. Maze-Foley, and P. E. Rosel (eds). 2013. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments-2012. Available at: http://www.nmfs.noaa.gov/pr/sars/pdf/ao2012.pdf

deeper water including canyons along the shelf break.[1] Given the rarity of these species in the Gulf of Mexico and their preferred depth ranges, we believe the proposed action will not affect these species.

Due to their preferred habitats, hawksbill and leatherback sea turtles are not likely to be found in the action area. Hawksbill sea turtles have a circumtropical distribution and usually occur between latitudes 30°N and 30°S in the Atlantic, Pacific, and Indian Oceans. Adult foraging habitat is typically coral reefs. The hawksbill's diet is highly specialized and consists primarily of sponges. Leatherbacks are the most pelagic of the sea turtles, only entering coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated or to nest. Coral, sponges, or jellyfish are not anticipated to be in the action area in any concentration that would attract hawksbills or leatherbacks. In addition, this project is at the extreme northern end of the hawksbill's range and far too shallow to be consistent with leatherback preferred habitat. No hawksbill or leatherback nesting beaches occur near the action area. Therefore, as these species are not likely to occur in the action area, the proposed action will not affect them.

There is no designated critical habitat in or near the project area, thus none will be affected.

Species Not Likely to be Adversely Affected
The project may affect 3 ESA-listed species of sea turtles (Kemp's ridley, green, and loggerhead) and the Gulf sturgeon as they can be found in or near the action area. NMFS has analyzed potential effects of the project and concluded the above-named species are not likely to be adversely affected. Gulf sturgeon and sea turtles risk injury from sediment placement in the littoral nearshore environment; however, the risk is discountable due to the species' mobility. Gulf sturgeon and sea turtles could be killed or injured if touched by the rotating cutterhead of the hydraulic cutterhead dredge, but NMFS believes the risk is discountable. There have been no reported interactions of Gulf sturgeon with hydraulic cutterhead dredges, and NMFS believes they can actively avoid the noisy, slowly-rotating cutterhead. Similarly, NMFS believes sea turtles actively avoid cutterhead dredges. Stranding data suggests that cold-stunned turtles may be overtaken by cutterhead dredges while they are lethargic or dying; however, these occurrences are rare and discountable. *To further reduce this risk, NMFS recommends that cutterhead dredging be performed during warmer months when possible and that dredging be delayed after cold snaps, particularly in shallow waters if water temperatures have fallen rapidly and if sea turtles are present.*

The likelihood of sea turtles being struck by the transit of equipment and barges at the project site is discountable due to these species' mobility and the slow speeds associated with such vessels. The implementation of NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* will further reduce their risk of injury. Gulf sturgeon and sea turtles may be affected by having to avoid the areas of construction disturbance (i.e., the offshore sediment borrow site, the pipeline corridor, and the littoral nearshore environment surrounding Madison Marsh where filling/restoration activities are occurring) where they may be foraging or sheltering. However, avoidance would be temporary and insignificant, and the loss of potential foraging/sheltering habitat from the creation of the marsh is

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2 Wenzel, F., D. K., Mattila and P. J., Clapham. 1988. *Balaenoptera musculus* in the Gulf of Maine. Marine Mammal Science, 4(2):172-175.
3 CeTAP. 1982. A characterization of marine mammals and turtles in the mid- and north Atlantic areas of the U.S. outer continental shelf. Cetacean and Turtle Assessment Program, University of Rhode Island. Final Report #AA551-CT8-48 to the Bureau of Land Management, Washington, D.C, 538 pp.

insignificant as well, because there is adequate alternative foraging/sheltering habitat in the nearby surrounding bayous.

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 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.

We have enclosed additional information on other statutory requirements that may apply to this action, and on NMFS's Public Consultation Tracking System to allow you to track the status of ESA consultations. If you have any questions, please contact Andrew Herndon, Consultation Biologist, at (727) 824-5312 or by email at Andrew.Herndon@noaa.gov.

Sincerely,

Miles M. Croom

for Roy E. Crabtree, Ph.D.
Southeast Regional Administrator

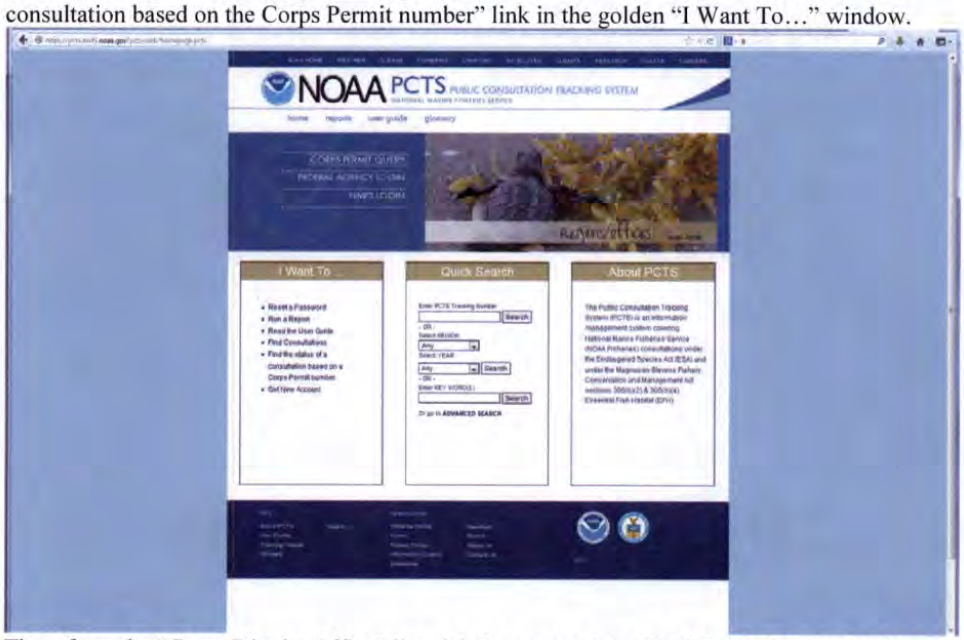
Enclosure

File: 1514-22.C

PCTS Access and Additional Considerations for ESA Section 7 Consultations
(Revised 6-11-2013)

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 Eric Hawk at Eric.Hawk@noaa.gov or (727) 551-5773.

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.

CWPPRA Agency Comments with Responses

The Madison Bay draft EA was emailed to CWPPRA Technical Committee representatives November 22, 2013 with comments due January 10, 2014. Below are the comments received with responses for the purpose of recording changes made to the draft EA.

Natural Resources Conservation Service

Page ii (contents): under Land Use, there is a typo
Response: we've updated the index table.

Page 3, Second Paragraph: In the discussion about the CWPPRA process, might want to add that the projects have to re-compete for the funding of construction (Phase I) following the Phase I design.
Response: noted.

Page 7, Section 2.2.2 typo
Response: corrected.

Page 12-Table 3- Under Essential Fish Habitat the Potential Avoidance and Minimization Measures is listed as "none". The project calls for breaching or gapping of the dikes within a short period after construction. This would effectively allow fish access. Therefore, we suggest that the avoidance/minimization action here could list dike breach/degradation.
Response: Fish access is part of the project. To avoid potential confusion that this is a mitigation action or added feature, we purposely do not list it as an avoidance measure though we concur that it could be.

Page 12 under Impact of No Action, you state that "under the no-action alternative, material from the borrow areas is likely to be used for other restoration projects in the area as sediment sources have long been recognized as a limited resource." Not sure if this is an accurate statement or even adds support to argument. The borrow site for this project is located deep within the bounds of the historic coastal wetland complex and is currently a relatively small interior lake. There have been very few occasions in which large volume marsh creation borrow areas have been established in such a location. Usually large lakes or navigation channels have been used in interior locations, but this area is somewhat isolated. Although nearby Lake Boudreaux has been used as borrow to create marsh effectively without apparent lasting impact, unlike Lake Boudreaux, this location is very shallow, a good portion of the area recently consisted of emergent marsh, and the bottoms will be significantly altered for the short to perhaps long-term with the removal of material to -15 ft. elevation. NRCS recognizes the need for the project and the lack of alternatives, but we also see it necessary to fully evaluate the potential impacts of borrowing 4 to 6 million cubic yards from this deep interior location.
Response: We have added the following revised statement, "Under the no-action alternative, material from the borrow areas would remain shallow open water. Geotechnical surveys, historical land/water analyses, and land/loss expectations for the basin suggest the area will continue to subside, deepen, and coalesce with surrounding water areas over time (USGS on lacoast.gov/CRMS2; GeoEngineers 2011). There are no foreseeable actions that could reverse the trend of subsidence and decreasing integrity. The previously existing emergent marsh is viewable in land/water analyses from 1956, 1978, 1988 (USGS on lacoast.gov/CRMS2). We have added this information about the impacts of borrowing from this area that was land in the 1950-1970's. It has been permanent shallow open water for over 25 years.

US Fish and Wildlife Service

Page 19 Section 3.2.2 Impacts of Build Alternative 1 Paragraph 3: Further address low dissolved oxygen conditions and related adverse impacts to benthic and aquatic organisms.
Response: We had included in our analysis that "direct, adverse impacts include entrapment and likely death" during dredging activities. We have added "While increasing the water depth in borrow areas can

decrease dissolved oxygen and thus adversely impact benthic organisms, studies suggest this is not likely at the depths being proposed (Palmer 2008, Flocks and Franze 2001, Tampa Bay Estuary Program 2005, Yip-Hoi 2003). There are no known decreased dissolved oxygen issues in borrow areas from previous coastal restoration projects." We elaborate on those sources below. Funding for post-construction DO survey has been included in the construction-funding request for the purpose of monitoring any impacts in the first three years.

Nearshore:
Palmer (2008) did find that benthic diversity had decreased inside the pit (however, Tampa Bay Estuary Program (2005) found more diverse and abundant fisheries resources in dredged area). They surveyed the Holly Beach dredge pit over 3 years after its excavation where water depths of about 26 deep were dredged to about 60 feet. Bottom DO in June 2006 did not vary appreciably between stations located with the pit and outside of the pit (range 3.0 to 3.5 ppm). Mean DO values for the entire water column were 4.5 to 5 ppm for stations located inside the dredged pit and 5.7 ppm outside the pit. Although the authors qualify that their DO data does not capture the seasonal events, they did find that overall water quality was the same inside and outside the excavated dredged pit.

Estuarine Lake:
An assessment of dredged pits located in Lake Pontchartrain indicated chronic, low (<2ppm) DO conditions only occurred at depths of 40 feet and greater and infrequently occurred at shallower depth (Flocks and Franze 2001). DO concentrations at depths in the 20-foot range rarely dropped below the critical threshold of 2 PPM.

Saline Estuary:
In Tampa Bay, 11 dredged pits were monitored in 2002-2003 to assess if these navigational pits should be back filled (Tampa Bay Estuary Program 2005). Water depths in the surrounding areas were 1 to 3 feet and dredge-pit to depths from 9.5 to 24.4 feet deep. The near-bottom DO concentrations were generally higher than 4 ppm; hypoxic conditions (> 2 ppm) were only observed at one site in the fall of 2002. The result was a recommendation that the majority of the sites (7 of the 11) be left alone because they provided favorable fisheries and benthos. We note that soils of the study area are less organic than in the proposed project, which could result in lower DO conditions than they found.

Benthic Behavior:
Yip-Hoi (2003) investigated the effects of dissolved oxygen level on behavior of brown and white shrimp. White shrimp were more responsive (susceptible) to low dissolved oxygen than brown shrimp. Growth rates were lower in white shrimp at hypoxic (2ppm) DO than at super-saturated (6ppm) DO. Population density was a critical factor, however. Overall, hypoxia increased the vulnerability of shrimp to predation.

Page 22 Elaborate on the no impact to soft bottom substrate EFH because of the hundreds of acres of similar substrate outside the area.
Response: To clarify, our statement "No impacts to soft bottom substrate EFH are expected because hundreds of acres of this habitat type are available to organisms outside of the proposed project area" has been revised to: "The disturbance of the soft bottom substrate EFH in the project area would not cause a noticeable decrease in this resource because hundreds of acres of this habitat type are available to organisms outside of the proposed project area."