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U.S. ARMY CORPS OF ENGINEERS, NEW ORLEANS DISTRICT
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Regional Planning and Environment
Division South
Environmental Planning Branch

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT 543a BRACKISH MARSH AND SWAMP MITIGATION FOR THE NEW ORLEANS TO VENICE HURRICANE RISK REDUCTION PROJECT: INCORPORATION OF NON-FEDERAL LEVEES FROM OAKVILLE TO ST. JUDE AND NEW ORLEANS TO VENICE FEDERAL HURRICANE PROTECTION LEVEE, PLAQUEMINES AND ST. TAMMANY PARISHES, LOUISIANA

Description of the Proposed Action: The U.S. Army Corps of Engineers (USACE), New Orleans District (CEMVN), has prepared a Supplemental Environmental Assessment (SEA 543a) to evaluate the potential impacts associated with completing compensatory mitigation for the impacts incurred to intermediate, brackish, and saline marsh, open water, and swamp habitats from construction of the New Orleans to Venice Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees from Oakville to St. Jude and New Orleans to Venice Federal Hurricane Protection Levee (collectively referred to as "NFL NOV"). The proposed mitigation in SEA 543a would fully compensate for these impacts.

The Proposed Action Tentatively Selected Plan (TSP) includes:

1. The TSP for mitigating the swamp features would be the purchase of sufficient swamp credits from a permitted bank within the Barataria Basin to mitigate a total of 33.9 Average Annual Habitat Units (AAHUs). The particular bank to be utilized is unknown at this time. Since permitted banks exist as reasonably foreseeable projects in the Future Without Project (FWOP) conditions, no new direct, indirect or cumulative impacts to wetlands and other surface waters, wildlife, threatened and endangered species, fisheries, aquatic resources, water quality, essential fish habitat (EFH), cultural resources, recreational resources, air quality, noise, aesthetics, prime and unique farmland, hazardous, toxic, and radioactive waste (HTRW), socioeconomics/land use, environmental justice, transportation, navigation, and commercial fisheries would be incurred from the purchase of these bank credits for the NFL NOV mitigation.

2. Construction of the Fritchie Flood Side (FS) Brackish Marsh project to mitigate 106.9 AAHUs of intermediate, brackish, and saline marsh and open water impacts. This project would restore up to 350 acres of brackish marsh from open water with material mined from approximately 258 acres of a Lake Pontchartrain water bottoms. The proposed Fritchie mitigation project is located in St. Tammany Parish within the Big Branch National Wildlife Refuge (NWR) on the north shore of Lake Pontchartrain, east and north of Highway (Hwy) 433, and west of Chef Menteur Hwy.

The compensatory mitigation in the Proposed Action would replace the lost functions and services of the impacted intermediate, brackish, and saline marsh, open water and swamp habitat, including essential fish habitat, through restoration activities designed to create/increase/improve the habitat functions and services at specific mitigation sites. Impacts to swamp habitat would be mitigated within the same river basin watershed where the impacts occurred. Impacts to tidal marsh habitat would be mitigated within the expanded watershed, the deltaic plain.

If any of the TSPs cannot be implemented or if additional substantive information pertinent to the projects becomes available, CEMVN may re-examine the Alternative Evaluation Process (AEP) results and may consider moving to the next ranked project for that habitat type; or would explore other options to mitigate these impacts in coordination with the resource agencies and the non-Federal sponsor.

Background: The impacts caused by NFL NOV projects were first assessed in "Final Environmental Impact Statement New Orleans to Venice, Louisiana Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana" (NFL FEIS); "Supplemental Environmental Assessment 537 New Orleans to Venice Hurricane Risk Reduction Project: Changes to the Non-Federal Levees Project, Oakville to St. Jude, Plaquemines Parish, Louisiana" with a FONSI signed March 25, 2016; and "Final Supplemental Environmental Impact Statement New Orleans to Venice Federal Hurricane Protection Levee Plaquemines Parish, Louisiana" (NOV SEIS) with a Record of Decision (ROD) signed October 31, 2011.

At the time draft EA 543 titled "New Right of Way and Mitigation for the New Orleans to Venice Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees from Oakville to St. Jude and New Orleans to Venice Federal Hurricane Protection Levee, Plaquemines Parish, Louisiana" was released for public review and comment, the Proposed Action included a plan to mitigate all habitat types impacted by the NFL NOV projects including swamp, intermediate, brackish, and saline marsh, and open water habitats. Additional data obtained during a site visit in July 2017 to the project mitigating the marsh and open water impacts (Coleman) resulted in a downward adjustment of the mitigation potential for this project. This adjustment rendered the project, as designed

and described in draft EA 543, unable to meet 100 percent of CEMVN's need for these habitat types. Also problematic was the lack of sufficient response to the solicitation to purchase compensatory mitigation bank credits to mitigate for 100% of the swamp impacts. As a result CEMVN reformulated a plan to mitigate for impacts to intermediate, brackish, and saline marsh, open water and swamp habitats, which is presented for public review and comment in this SEA 543a. Although the purchase of mitigation bank credits for the NFL NOV swamp impacts is again being considered as part of the proposed action in this SEA, additional projected credit releases for swamp are anticipated such that implementation of the TSP may now be successful.

Factors Considered in Determination: The CEMVN has assessed the impacts of the No Action Alternative and the Proposed Action on important resources including: wetlands and other surface waters; wildlife; threatened and endangered species; fisheries, aquatic resources and water quality; EFH; cultural resources; aesthetics; prime and unique; recreational resources; air quality; noise; socioeconomics/land use, environmental justice, transportation, navigation, commercial fisheries and the potential of the project to encounter HTRW. No significant adverse impacts were identified for any of the relevant resources. The risk of encountering HTRW is low.

On October 23, 2019, draft SEA 543a and the associated draft Finding of No Significant Impact were mailed out for a 45-day public review and comment period. Environmental compliance for the Federal action will be achieved based upon the following actions:

Executive Order (E.O.) 11988 Floodplain Management: E.O. 11988 directs Federal agencies to reduce flood loss risk; minimize flood impacts on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by flood plains. The proposed action represents the least environmentally damaging alternative to accomplish the needed risk reduction system modifications.

Clean Air Act of 1970 (CAA): The proposed action project area is located in St. Tammany Parish which is currently in attainment of National Ambient Air Quality Standards; therefore, a general conformity determination is not required.

Clean Water Act (CWA) Section 404(b)(1): A Section 404(b)(1) evaluation and public notice for the proposed Fritchie Brackish Marsh mitigation project were mailed out for public and agency review and comment on October 23, 2019. The Section 404(b)(1) and public notice is included in Appendix E of this SEA 543a and was signed on January 7, 2020 upon completion of public review and comment.

Clean Water Act Section 401: A revised 401 State Water Quality Certification (WQC) was completed for the proposed Fritchie Brackish Marsh mitigation project and coordinated with the Louisiana Department of Environmental Quality (LDEQ). SEA 543a will be incorporated into LDEQ's administrative record for WQC 110520-01.

WQC 110520-01 remains valid for this project, see coordination email in Appendix M.

Coastal Zone Management Act: The CEMVN received a consistency determination C20100384 for the NFL FEIS on January 24, 2011 and C20110045 for the NOV SEIS on April 6, 2011. Coordination with the Louisiana Department of Natural Resources (LADNR) for modification to the coastal zone determination (CZD) was initiated by letter dated May 1, 2019 for the Fritchie brackish marsh creation project. In their letter dated July 10, 2019, the LADNR determined that the project as proposed is consistent with the Louisiana Coastal Resources Plan and issued CZD C20100384 mod 13 (Appendix M).

Endangered Species Act: On May 13, 2019, the CEMVN submitted an updated threatened and endangered species Biological Assessment (BA) to the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) determination of "may affect, but not likely to adversely affect" the federally listed species of Gulf sturgeon, West Indian manatee, and the green, Kemp's Ridley, and loggerhead sea turtles; and a "may affect, but not likely to adversely affect" determination for Gulf sturgeon critical habitat for the proposed action in SEA 543a. The USFWS concurred with CEMVN's determinations on September 20, 2019 and NMFS concurred on October 18, 2019 that the proposed action is "not likely to adversely affect the NMFS ESA-listed species and/or designated critical habitat.

Fish and Wildlife Coordination Act: The USFWS reviewed the proposed action in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 USC 661 et seq.) and provided a Final Fish and Wildlife Coordination Act Report (FCAR) dated December 20, 2019, which is located in Appendix M.

The WVA mitigation potential values are shown in the Final Coordination Act Report located in Appendix M. This office has concurred with, or resolved, all recommendations contained in the CAR, and project-specific recommendations have been addressed in section 8.2 of SEA 543a.

Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA): CEMVN will continue to work with NMFS to resolve their comments on SEA 543a and no EFH conservation recommendations were received on SEA 543a. Coordination between the agencies is included in Appendix M and incorporated into this FONSI.

Migratory Bird Treaty Act: On May 13, 2019, the CEMVN submitted an updated BA to the USFWS. This BA covered protected species that could potentially be present in the project area. The CEMVN determined that the proposed action would not adversely impact other protected species. USFWS concurred with the determination on September 20, 2019.

National Historic Preservation Act: Section 106 cultural resources coordination for the mitigation areas was initiated with SHPO and with Federally-recognized Tribes, in letters dated October 23, 2019. Required determinations of National Register-eligibility and findings of effect will be accomplished, and coordination of results with the SHPO and Federally-recognized Tribes will be completed prior to approval of the Project Description Document (PDD) and federal funding for the proposed undertaking.

Executive Order (E.O.) 13175 Consultation and Coordination with Indian Tribal Governments: This E.O. requires consultation with Federally-recognized Indian tribes on actions that have the potential to significantly affect protected tribal resources, tribal rights, or Indian lands. At this time, no effects to tribal resources, rights, or lands is anticipated by implementing this action. USACE distributed the SEA 543a on October 23, 2019 for review. The results of the Section 106 process will augment this determination. Any conditions will be documented in the PDD and federal funding for the proposed undertaking.

Environmental Design Commitments: The following commitments are an integral part of the proposed action:

1. USACE will continue to coordinate with USFWS National Wildlife (NWR) personnel during planning process and construction and obtained a Special-Use Permit from USFWS on October 29, 2019.

2. USACE developed the target marsh elevation range of 1.0 ft to 1.5 ft NAVD88 for the Fritchie marsh creation project for the 35% design level from professional judgment, assumptions, and limited data for soil conditions and settlement rates for the borrow and the marsh creation area. During the Planning engineering and design (PED) phase field data (which includes surveys, borings, etc.) will be collected as well as any available data for surrounding sites including the Zydeco Ridge project would be utilized to finalize design. Design requirements for the Fritchie marsh creation site (such as max fill elevation) will be revised based on the gathered field data, a Geotechnical analysis, and results from Zydeco Ridge project.

3. The Interagency team will be included in PED discussions and future reviews of plans and specifications. During PED, CEMVN will review existing and available hydrologic information as well as collect site specific data (borings, water elevations, etc.) to confirm assumptions made for the Fritchie Marsh mitigation project and adjust the final design as necessary to maintain drainage. Any unintended wetland loss was accounted for in the WVA as well as including a buffer (~10% additional acreage) of brackish marsh in the project design. In response to NMFS comment on SEA 543a the project description in the SEA section 2.4.1 Common Elements in the Corps Constructed Project Description (p.

22) has been adjusted to read as follows: "Elements common to all mitigation projects constructed from open water unless otherwise stated within the specific description are:

- Earthen retention dikes would be mechanically constructed along the perimeter of the proposed mitigation feature.

- The retention dike borrow would be obtained from within or exterior to the mitigation project footprint. Trenasses and dike borrow canals would be constructed to help maintain drainage."

4. USACE would fulfill its consultation responsibilities and reinitiate consultation as required under the Endangered Species Act (ESA) with USFWS to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their critical habitat.

5. All contract personnel associated with the project will be informed of the potential presence of the West Indian manatees, sea turtles and Gulf sturgeon and the need to avoid collisions with manatees. Standard manatee protection measures, found in sections 3.2.3.3.1 and 5.3.3.2 of SEA 543a, would be implemented when activities are proposed that would impact habitat where manatees and Gulf sturgeon could occur.

6. USACE will carefully design project features, and time construction to implement best management practices to avoid adverse impacts to protected birds and their nests. These are described in SEA 543a and include the following: a qualified biologist would inspect the proposed worksite for the presence of undocumented nests during the nesting seasons (i.e., February 15 through October 31 for wading birds and October through mid-May for bald eagles) prior to construction. To minimize disturbance to nesting birds all activity occurring within 1,000 feet of a rookery or 660 feet of an eagle nest would be restricted to the non-nesting period. During nesting season the no-work distances would be implemented and coordinated with USFWS and LDWF.

7. During marsh creation, colonies containing nesting gulls, terns, and/or black skimmers may nest on newly deposited marsh creation material or retaining dikes; all activity occurring within 650 feet of a nesting site should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present). If time of year restrictions cannot be implemented and the project area is within areas known to be occupied by nesting shorebirds, a bird abatement plan would be developed in coordination with the USFWS and the LDWF. The abatement plan would include a monitoring plan including pre-construction and construction monitoring,

anticipated abatement procedures, a report outline of daily monitoring and abatement activities, and include a post-construction report.

8. If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation would be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation would be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle, and those results would be forwarded to USFWS.

9. USACE will finalize mitigation plans upon completion of the NEPA process and proceed to mitigation construction so that it will be concurrent with project construction. USACE understands that if construction is not concurrent with mitigation implementation then revising the impact and mitigation period-of-analysis to reflect additional temporal losses will be required.

10. USACE will follow a Stormwater Pollution Protection Plan (SWPPP) and best management practices to implement non-point source erosion control measures to protect wetlands and water bodies prior to initiation of construction and maintain during construction.

11. If any unrecorded cultural resources are determined to exist within the proposed project site, then work will not proceed in the area containing those cultural resources until a CEMVN staff archeologist has been notified, and coordination with the Louisiana State Historic Preservation Officer (SHPO) and Tribal Historic Preservation Officer has been completed.

12. Section 106 cultural resources coordination for the mitigation areas has been initiated with SHPO and with Federally-recognized Tribes, in letters dated October 23, 2019. Discussions with the Louisiana State Archaeologist on December 12, 2019 concluded that Phase I surveys need to be conducted for the marsh restoration area, borrow area, access, and other project activity areas. Required cultural resources surveys will be completed and coordination of results with the SHPO and Federally-recognized Tribes will be completed prior to approval of the Project Description Document and federal funding for the proposed undertaking.

Public Involvement: The proposed action has been coordinated with appropriate Federal, state, and local agencies and businesses, organizations, and individuals through distribution of SEA 543a for a 45-day public review and comment period. Comments on the Draft SEA 543a and Draft FONSI received, are addressed and responded to (Appendix G of the SEA 543a) and in the above environmental design commitments.

Decision: The CEMVN Environmental Planning Branch has assessed the potential environmental impacts of the proposed action described in SEA 543a and considered and responded to the comments received during the public review period for the SEA 543a (Appendix G).

In accordance with the environmental considerations discussed above, the public interest will be best served by implementing the proposed action described in SEA 543a, namely: the purchase of mitigation bank credits as mitigation for NFL NOV swamp impacts; and the construction of the Fritchie FS Brackish Marsh Project as mitigation for NFL NOV intermediate, brackish, and saline marsh and open water impacts.

I have reviewed the SEA 543a and considered public and agency comments and recommendations. Based on the assessment conducted in SEA 543a and the implementation of the environmental design commitments listed above, I have determined that the Proposed Action would have no significant impact on the human environment. Therefore, an Environmental Impact Statement will not be prepared.
The plan is justified and in accordance with environmental statutes. It is in the public interest to implement the Proposed Action in Final SEA 543a.

8/6/20

Date

Stephen F. Murphy
Colonel, U.S. Army
District Commander

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT 543a

BRACKISH MARSH AND SWAMP MITIGATION FOR THE NEW ORLEANS TO VENICE HURRICANE RISK REDUCTION PROJECT: INCORPORATION OF NON-FEDERAL LEVEES FROM OAKVILLE TO ST. JUDE AND NEW ORLEANS TO VENICE FEDERAL HURRICANE PROTECTION LEVEE, PLAQUEMINES AND ST. TAMMANY PARISHES, LOUISIANA

1/31/2020

U.S. Army Corps of Engineers
Mississippi Valley Division
New Orleans District
Regional Planning and Environment Division South

Contents

List of Tables

Appendices

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT 543a

BRACKISH MARSH AND SWAMP MITIGATION FOR THE NEW ORLEANS TO VENICE HURRICANE RISK REDUCTION PROJECT: INCORPORATION OF NON-FEDERAL LEVEES FROM OAKVILLE TO ST. JUDE AND NEW ORLEANS TO VENICE FEDERAL HURRICANE PROTECTION LEVEE, PLAQUEMINES AND ST. TAMMANY PARISHES, LOUISIANA

1.0 INTRODUCTION

The U.S. Army Corps of Engineers, New Orleans District (CEMVN), Regional Planning and Environment Division South (RPEDS), has prepared this Supplemental Environmental Assessment (SEA 543a) to evaluate the potential impacts associated with completing the compensatory mitigation for impacts associated with construction of the approved New Orleans to Venice Non-Federal Levees (NFL) and the New Orleans to Venice (NOV) Federal Hurricane Protection Levee (HPL) projects. As a result of the NFL NOV levee construction, dry bottomland hardwoods (BLH-Dry), wetland bottomland hardwoods (BLH-Wet), scrub shrub, swamp, wet pasture, freshwater marsh, intermediate marsh, brackish marsh, saline marsh, and open water habitats within the Barataria Basin ("The Basin") are being impacted. EA 543 presented a plan to mitigate these impacts, but the brackish marsh and swamp features of the plan were found to be unimplementable due to required design changes and budgetary constraints. As such, additional plan formulation was conducted to identify new/revise current projects that could take the place of those projects identified in EA 543 mitigating the intermediate marsh, brackish marsh, saline marsh, and open water habitats (see section 2.2.1). Mitigation for these impacted habitat types are the subject of SEA 543a. The other features of the plan mitigating BLH-Dry, BLH-Wet, scrub shrub, wet pasture, and freshwater marsh impacts, have either been implemented or are currently being implemented.

Please see Appendix I for a list of acronyms used in this document. Table 1 (also Appendix B Table B-1) presents the remaining impacts by habitat type that will require mitigation for construction of the following NFL NOV reaches: NOV 02, NOV 05, NOV 06b, NOV 07, NOV 08b, NOV 13, NOV 14, P-14a, and P-17a and NFL sections 1-5. If a reach is not listed in the table, it did not incur impacts that required mitigation for brackish marsh or swamp. Figure A-1 in Appendix A shows what reaches are being constructed.

This SEA 543a is prepared in accordance with National Environmental Policy Act (NEPA) and the Council on Environmental Quality's Regulations (40 Code of Federal Regulations [CFR] §1500-1508), as reflected in USACE Engineer Regulation (ER) 200-2-2. In accordance with the Procedures for Implementing NEPA, 40 CFR Part 1502.20, this SEA 543a provides sufficient information on the potential adverse and beneficial

environmental effects of the proposed action to allow the District Commander to make an informed decision on the appropriateness of a Supplemental Environmental Impact Statement (SEIS) or FONSI.

1.1 PROJECT NAME AND STUDY AREA

Project Name: Brackish Marsh and Swamp Mitigation for New Orleans to Venice Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees from Oakville to St. Jude and New Orleans to Venice Federal Hurricane Protection Levee, Plaquemines and St. Tammany Parishes, Louisiana.

Study Area for Swamp: The Barataria Basin is bounded to the north and east by the Mississippi River, to the west by Bayou Lafourche, and to the south by the Gulf of Mexico. The Basin is confined within hydrologic unit code (HUC) 08090301 and is shown in light purple in Figure 1 (also Appendix A Figure A-2). The study area has been limited to those areas within the Coastal Zone (CZ) in the Basin since the swamp habitats impacted from construction of the NFL NOV occurred within the CZ. Parishes within the study area include parts of Plaquemines, St. Charles, Lafourche, and Jefferson Parishes, Louisiana. Major estuaries within the Basin include Barataria Bay, an estuary of the Gulf of Mexico, lies on the west side of the Mississippi River delta, Lake Salvador, Lake Cataouatche, Lake Judge Perez, Bay Batiste, and Bastian Bay.

Study Area for Brackish Marsh: The deltaic plain is defined by the CZ, from the Vermilion/Iberia Parish line in the west to the easternmost limits in St. Tammany Parish near the Pearl River (Figure 1 and Appendix A, Figure A-1). Major estuaries within the deltaic plain include those of the Barataria Basin as well as the Vermilion Bay, West Cote Blanche Bay, Lake Maurepas, Lake Pontchartrain, and Lake Borgne.

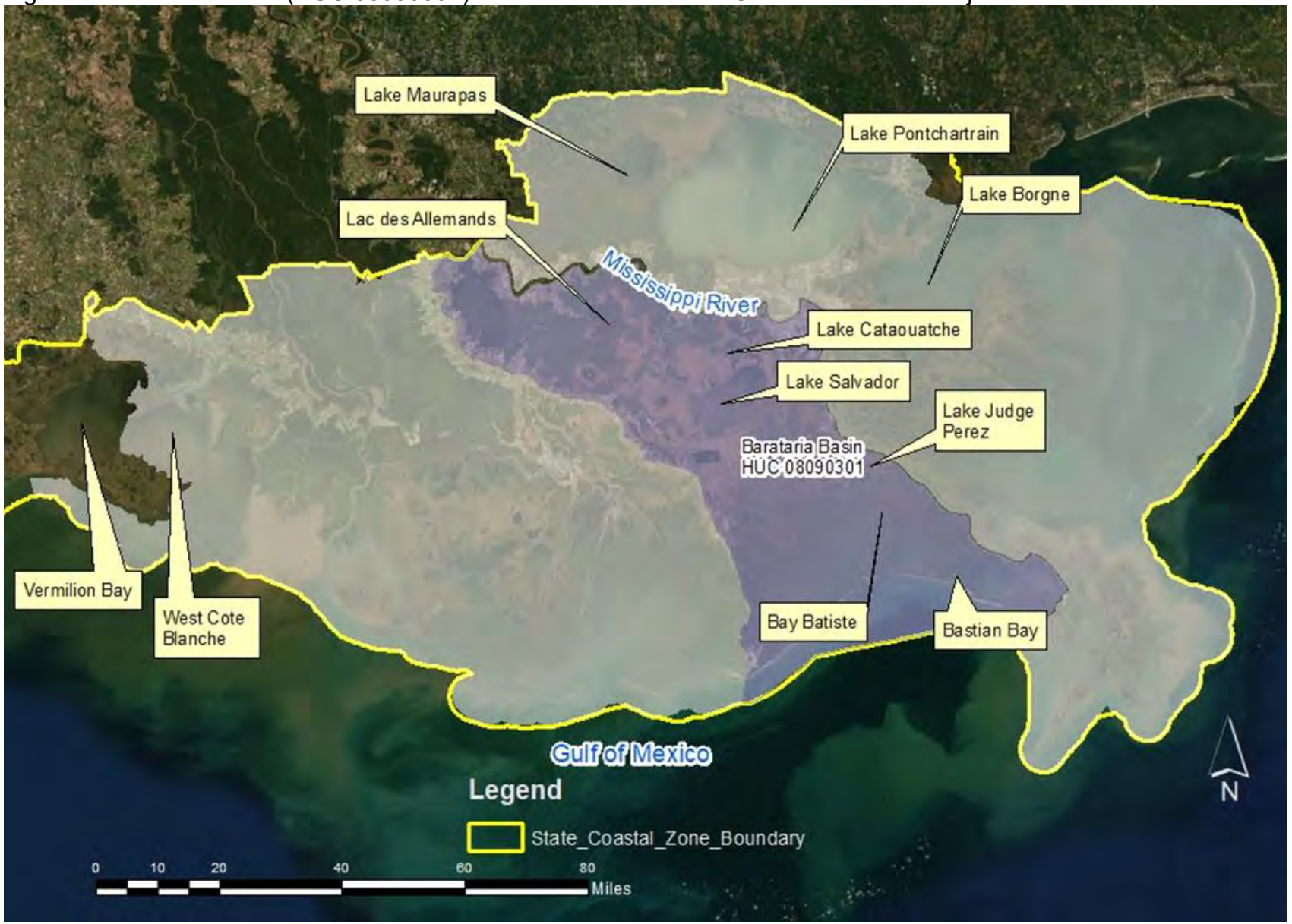
Table 1. Remaining Impacts for NFL NOV Projects to be Mitigated

NOV***	**Swamp**		**Intermediate Marsh**		**Brackish Marsh**		**Open Water**		**Saline Marsh**		**Total**	
Levee Reach	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	**Acres**	**AAHUs**
NOV 05	0.0	0.0	0.0	0.0	0.0	0.0	*0.1*	*0.0*	*47.6*	*32.0*	**47.6**	**32.0**
NOV 07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.1	14.7	**22.1**	**14.7**
NOV 09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
NOV 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
NOV 11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
NOV 02, NOV 06b, NOV 08b, NOV 13, NOV 14, P14A, P17A	0.0	0.0	0.8	0.4	0.0	0.0	0.0	0.0	64.0	48.5	**64.8**	**48.9**
Total NOV	**0.0**	**0.0**	**0.8**	**0.4**	**0.0**	**0.0**	**0.1**	**0.0**	**133.7**	**95.1**	**134.6**	**95.5**
NFL***	**Swamp**		**Intermediate Marsh**		**Brackish Marsh**		**Open Water**		**Saline Marsh**		**Total**	
Levee Reach	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	**Acres**	**AAHUs**
NFL Section 1	*39.6*	*33.9*	0.0	0.0	0.0	0.0	*0.3*	*0.0*	0.0	0.0	**39.9**	**33.9**
NFL Section 2	*0.0*	*0.0*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
NFL Section 3	0.0	0.0	0.0	0.0	7.6	3.2	0.4	0.0	0.0	0.0	**8.0**	**3.2**
NFL Section 4	0.0	0.0	0.6	0.2	5.1	4.6	10.4	0.0	0.0	0.0	**16.1**	**4.8**
Section 2+ 4 Canals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Section 2+ 4 Canal Access Road	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
NFL Section 5	0.0	0.0	0.0	0.0	6.0	3.4	4.3	0.0	0.0	0.0	**10.3**	**3.4**
Total NFL	**39.6**	**33.9**	**0.6**	**0.2**	**18.7**	**11.2**	**15.3**	**	**0.0**	**0.0**	**74.2**	**45.4**
Total NOV + NFL	39.6	33.9	1.4	0.6	18.7	11.2	15.3	**	133.7	95.1	208.7	140.9

Text in italics indicates adjusted totals for umitigated impacts from EA 513 that were not purchased in a prior solicitation, and avoided impacts for SEA 565 as result of the realignment of the NF-W-05a.1 levee in NFL Section 2. Specifically, EA 513 impacted in NOV 05, 1.3 acres (1.29 AAHUs) saline marsh and 0.06 acres (0.05AAHUs) saline open water, and in NFL section 1, 0.49 acres (0.36AAHUs) swamp and 0.09 acres (0.04 AAHUs) fresh open water and 0.09 acres of open water (the 0.04 AAHUs were added to swamp impacts not the fresh marsh) were unmitigated due to lack of response and available credits in a previous mitigation bank credit solicitation. SEA 565 avoided impacts to swamp habitat in NFL Section 2 previously predicted to be 0.3 acres (0.2 AAHUs).

**Note: Open Water AAHUs are captured in the total for the Marsh AAHUs.

Figure 1. Barataria Basin (HUC 08090301) and Deltaic Plain in the Coastal Zone with Major Waterbodies



1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to complete compensatory mitigation for habitat losses incurred to intermediate, brackish, and saline marsh; open water; and swamp during construction of the NFL NOV project. Although efforts to avoid and minimize impacts to wetlands, such as protected side levee shifts, were utilized during plan formulation for all NFL NOV reaches, unavoidable impacts to these habitats were incurred. The proposed compensatory mitigation would replace the lost functions and services of the impacted habitat through restoration activities designed to create/increase/improve the habitat functions and services at specific mitigation sites.

1.3 PROJECT AUTHORITY

Congress approved a series of supplemental appropriations acts following Hurricanes Katrina and Rita to repair or improve Federal and non-Federal hurricane and storm damage reduction and flood damage reduction projects and related works in the affected area. USACE, New Orleans and Vicksburg Districts, conducted the study described in this document under the authorities described below.

Under these authorities, a total of $671,000,000 was allocated for construction at full Federal expense to replace or modify the NFL on the west bank in Plaquemines Parish from Oakville to St. Jude, and to incorporate the levees into the Federal levee system for the purpose of providing enhanced storm surge risk reduction and protection of the evacuation route.

The New Orleans to Venice, Louisiana Project is originally authorized in section 203, Title II, Flood Control, Lower Mississippi River Basin, P.L. 87-874, and was previously named “Mississippi River Delta At and Below New Orleans, Louisiana.”

The Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery of 2006 (4th Supplemental - Public Law 109-234, Title II, Chapter 3, Flood Control and Coastal Emergencies [120 STAT. 454-455]) provides: ‘‘For an additional amount for ‘Flood Control and Coastal Emergencies,’ as authorized by section 5 of the Act of August 18, 1941 (33 U.S.C. 701n), for necessary expenses relating to the consequences of Hurricane Katrina and other hurricanes, $3,145,024,000, to remain available until expended: Provided, that the Secretary of the Army is directed to use the funds appropriated under this heading to modify, at full Federal expense, authorized projects in southeast Louisiana to provide hurricane and storm damage reduction and flood damage reduction in the greater New Orleans and surrounding areas; . . . *$215,000,000 shall be used to replace or modify certain non-Federal levees in Plaquemines Parish to incorporate the levees into the existing New Orleans to Venice hurricane protection project*; . . . .’’ The Flood Control and Coastal Emergencies Section of Title II, Chapter 3, of the Joint Explanatory Statement of the Committee of Conference, page 115, states: ‘‘Funds totaling $3,145,024,000 are

recommended to continue repairs to flood and storm damage reduction projects . . . *These projects are to be funded at full Federal expense* . . . Additionally, the Conferees include: . . . *$215,000,000 for incorporation of non-Federal levees on the west bank of the Mississippi River in Plaquemines Parish in order to provide improved storm surge protection and to protect evacuations routes*; . . . .''

The U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007 (5th Supplemental - Public Law 110-28, Title IV, Chapter 3, Flood Control and Coastal Emergencies [121 STAT. 153-154]) provides: "For an additional amount for 'Flood Control and Coastal Emergencies,' as authorized by Section 5 of the Act of August 18, 1941 (33 U.S.C. 701n), for necessary expenses relating to the consequences of Hurricanes Katrina and Rita and for other purposes, $1,407,700,000, to remain available until expended: "Provided, . . . The Secretary of the Army is . . . to prosecute these projects in a manner which promotes the goal of continuing work at an optimal pace, while maximizing, to the greatest extent practicable, levels of protection to reduce the risk of storm damage to people and property . . . ."

The Act Making Appropriations for Military Construction, the Department of Veterans Affairs, and Related Agencies for the Fiscal Year Ending September 30, 2008, and For Other Purposes (6th Supplemental – Public Law 110-252, Title III, Chapter 3, Flood Control and Coastal Emergencies [122 STAT. 2349-2350]) provides: ''For an additional amount for 'Flood Control and Coastal Emergencies,' as authorized by Section 5 of the Act of August 18, 1941 (33 U.S.C. 701n), for necessary expenses relating to the consequences of Hurricane Katrina and other hurricanes of the 2005 season, $2,926,000,000, to become available on October 1, 2008, and to remain available until expended: *Provided*, That funds provided herein shall be used to reduce the risk of hurricane and storm damages to the greater New Orleans metropolitan area, at full Federal expense, for the following: . . . *$456,000,000 shall be used to replace or modify certain non-Federal levees in Plaquemines Parish to incorporate the levees into the existing New Orleans to Venice hurricane protection project*; . . . ."

1.4 PRIOR REPORTS

Information and data on previous and existing floodwall and levee conditions associated with the proposed action were derived from the following reports and are incorporated herein by reference:

1974, *Final EIS, New Orleans to Venice, Louisiana, Hurricane Protection, U.S. Army Engineer District, New Orleans*. This document discussed the enlargement of the west bank back levee from City Price to Venice (Reaches A, B1, and B2) and construction of a new levee from Phoenix to Bohemia on the east bank of the Mississippi River (Reach C). Barrier levees from Bohemia to 10 miles Above Head of Passes (AHP) on the east bank and Fort Jackson to Venice on the west bank were also discussed in the EIS. The ROD was signed on December 9, 1974.

1985*, Final Supplement I to the EIS, New Orleans to Venice Hurricane Protection Project*. This document discussed the deficiencies of the 1974 Final EIS and also the enlargement of the locally constructed west bank back levee from City Price to Venice, Reaches A (City Price to Tropical Bend), B1 (Tropical Bend to Fort Jackson), and B2 (Fort Jackson to Venice). The ROD was signed on June 27, 1985.

1985*, Mitigation Report, New Orleans to Venice Hurricane Protection Project.* This document discussed the mitigation for the levees from Tropical Bend to Venice – Reaches B1 and B2. This mitigation was accomplished with the creation of 300 acres of marsh in the Delta National Wildlife Refuge (NWR) by breaching the existing Main Pass bank resulting in accretion of marsh by natural deposition of sediments.

1987, *Final Supplement II to the EIS, New Orleans to Venice Hurricane Protection Project.* This document discussed additional impacts for the east bank (Reach C) and west bank Mississippi River Levee (MRL). The east bank barrier levee (1974 EIS, from Bohemia to 10 miles AHP) was dropped from further consideration. The ROD was signed on January 25, 1988.

2010, *Final SEIS, New Orleans to Venice (NOV), Federal Hurricane Protection Levee, Plaquemines Parish, Louisiana*. This document discussed restoring, armoring, and accelerating completion of the NOV Federal levee system in Plaquemines Parish that would provide enhanced storm risk reduction. The ROD was signed on October 31, 2011.

2011, *Final EIS, New Orleans to Venice (NOV), Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana.* This document discussed the replacement or modification of the NFL system for incorporation into the NOV Federal project in Plaquemines Parish. The Recommended Plan, Alternative C, included replacement or modification of 21 miles of existing non-federal back levees on the west bank of the Mississippi River in Plaquemines Parish from Oakville to Citrus Lands (Sections 1-3) for incorporation into the existing NOV federal levee system. The southern terminus of Section 3, at Myrtle Grove, was designed to turn 90 degrees to the east and tie into the existing MRL. Enhancement of Sections 1-3 of the NFL system included raising the levee to an authorized 2 percent design elevation, or approximately a 50-year LORR based on hurricane modeling techniques current at the time. The ROD was signed on October 31, 2011.

2012, *EA 508, New Orleans to Venice Hurricane Protection Project, West Bank River Levee, Staging Areas and Rights-of-Way (ROW) Additions, Contracts p-14A and P-17A, Plaquemines Parish, Louisiana.* This document was prepared to evaluate the potential impacts associated with additional acreages for construction rights-of-way and staging areas for Contracts P-14A and P-17A reaches located between the communities of Empire and Buras in Plaquemines Parish, Louisiana. The FONSI was signed on July 3, 2012.

2012, *EA 513, New Orleans to Venice Hurricane Protection Project, Federal Hurricane Protection Levee, Fronting Protection for Diamond and Ollie, Louisiana, Pump Stations Plaquemines Parish, Louisiana*. This document discussed the potential impacts of the expansion of construction right-of-way beyond the scope addressed in the NOV SEIS and NFL EIS that are necessary to complete the fronting protection features at the Diamond and Ollie pump stations. The FONSI was signed on September 6, 2012.

2014, *EA 528, New Orleans to Venice Hurricane Protection Project, Federal Hurricane Protection Levee, Utilization of the Woodland North Borrow Area for Use at the Wilkinson Pump Station (Contract NF-05b), Plaquemines Parish, Louisiana.* This document discussed the utilization of the Woodlands North Borrow Area as a source of clay borrow material for use in construction of a new pump station, the levee tie-in features, and fronting protection features. The FONSI was signed on June 16, 2014.

2014, *EA 529, New Orleans to Venice Hurricane Protection Project, Federal Hurricane Protection Levee, Utilization of the Woodland North Borrow Area for Use on the Oakville to La Reussitte Levees, USACE Contract NF-04a (W912P8-13-C-0024), Plaquemines Parish, Louisiana.* This document discussed the utilization of the Woodlands North Borrow Area as a source of clay borrow material for modification of 8.2 miles of non-federal levees between Oakville and La Reussite in Plaquemines Parish. The FONSI was signed on July 9, 2014.

2016, *SEA 537, New Orleans to Venice Hurricane Risk Reduction Project: Changes to the Non-Federal Levees Project, Oakville to St. Jude, Plaquemines Parish, Louisiana.* This document builds upon the 2011 FEIS and reverting the NFL project design back to Alternative B with modifications related to impacts outside the original project ROW as well as a relocation of a drainage canal. The FONSI was signed on March 25, 2016.

2017, EA 543, *Mitigation for New Orleans to Venice Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees from Oakville to St. Jude and New Orleans to Venice Federal Hurricane Protection Levee, Plaquemines Parish, Louisiana*. This document discussed impacts for additional right of way and mitigation for BLH-Dry, BLH-Wet, scrub shrub, wet pasture and freshwater marsh. The FONSI was signed on December 12, 2017.

2019, SEA 565, NOV-NF-W-05a.1—La Reussite to Myrtle Grove Levee, Plaquemines Parish Louisiana. This document discussed the impact of changing the alignment of the NOV-NF-W-05a.1 levee reach closer to Highway 23. The FONSI was signed on May 2, 2019.

1.5 PUBLIC INVOLVEMENT

As committed to in the ROD for both the NFL EIS and the NOV SEIS, the USACE formed a mitigation project delivery team (PDT) consisting of USACE members and other interested state and Federal agencies to identify potential mitigation sites, develop screening criteria to determine the sites that would undergo further engineering as part of the final array, and develop plans to implement and monitor the mitigation projects in the TSA. In addition, on October 28, 2014 letters were sent by Plaquemines Parish Government (PPG) to property owners in Plaquemines Parish, Louisiana to solicit interest and identify willing sellers of properties for use as mitigation for the NFL NOV project. Mitigation measures were developed from input received during public meetings held for the NFL EIS and NOV SEIS, from responses to the October 28, 2014 letters, and from the PDT and stakeholders.

This SEA was mailed to the public for a 45 day public review and comment starting October 23, 2019 and was made available for download on http://www.mvn.usace.army.mil/About/Projects/NOV/. Any comments received during the review period have been considered part of the official record. See Appendix G for public and agency comments.

1.6 NFL NOV MITIGATION COMPLETED TO DATE

Compensatory mitigation bank credits were acquired in 2013 for 2.3 acres (0.97 average annual habitat units, or “AAHUs”) of fresh marsh impacts resulting from construction of the Diamond (NOV-05B) and Ollie (NOV NF-W-04B) Pump Station Fronting Protections projects. Impacts resulting from the construction of the Diamond and Ollie Pump Stations were assessed in EA 513, with a signed FONSI dated September 6, 2012.

Compensatory mitigation bank credits were acquired March 8, 2018 for 5.8 acres (3.28 AAHUs) of BLH non-coastal (BLH-Dry) from Lucky Hit Mitigation Bank, and on March 9, 2018 for 22.62 acres of BLH non-coastal (14.25 AAHUs) from Enterprise Woodlands Bank.

Compensatory mitigation bank credits were acquired August 15, 2018 for 32.16 acres (11.9 AAHUs) of fresh marsh (LDNR) and on August 21, 2018 the option was exercised to acquire an additional 64.59 acres (23.9 AAHUs) of fresh marsh (LDNR) from Jesuit Bend Mitigation Bank. The total fresh marsh (LDNR) compensatory mitigation acquired was 96.75 acres (35.8 AAHUs).

Compensatory mitigation bank credits were acquired July 1, 2019 for 27.7 acres (15.79 AAHUs) of BLH non-coastal (BLH-Dry) from Lucky Hit Mitigation Bank, and for 7.1 acres (4.26 AAHUs) of BLH non-coastal from Enterprise Woodlands Bank.

1.7 OUTSTANDING NFL NOV MITIGATION

Approximately 39.6 acres (33.9 AAHUs) of swamp, 169.1 acres (106.9 AAHUs) of intermediate, brackish, and saline marsh and open water impacts remain to be mitigated for the NFL NOV construction. Open water impacts are assessed using the marsh model for similar salinities. When open water is impacted at the same time marsh impacts are incurred, the marsh model incorporates the open water impacts and produces a total number of AAHUs impacted. As such, Marsh AAHU totals include open water AAHUs. See Table 1 for impacts by habitat type and levee section.

2.0 ALTERNATIVE FORMULATION

The following sections walk the reader through the planning process for the brackish marsh and swamp features of the NFL NOV mitigation plan, from development of the potential mitigation projects (measures) for each habitat type to identification of the tentatively selected alternative (TSA).

2.1 MITIGATION MEASURE DEVELOPMENT AND SCREENING CRITERIA

Implementation of the parts of EA 543's mitigation plan for fresh marsh, scrub shrub, wet pasture, BLH-Dry, and BLH-Wet impacts is under way and mitigation bank credits have been purchased for many of these habitat impacts already. The remaining habitat types that require mitigation are open water; intermediate, brackish, and saline marsh; and swamp.

Intermediate marsh is found between brackish marsh and freshwater marsh and has an irregular tidal regime. This marsh is characterized by a diversity of species, many of which are found in freshwater marsh and some of which are found in brackish marsh (e.g. *Cyperus spp*., wiregrass). Species found in intermediate marsh (salinity 2-8 ppt) are a combination of salt meadow cordgrass (*Spartina patens*), yellow cowpea (*Vigna luteola*), California bullwhip (*Scirpus californicus*), coast cockspur (*Echinochloa walteri*), bulltongue, sawgrass (*Cladium jamaicense*), and common reed (*Phragmites australis*) (Visser et al., 1998).

Brackish marsh is found in low-lying frequently flooded tidally influenced areas, with the water level remaining on or near the surface for extended periods during growing season. It contains emergent herbaceous vegetation adapted to tidal conditions. Species found in brackish marsh (salinity 4-18 ppt) are a combination of salt meadow cordgrass, chairmaker's bulrush (*Scirpus americanus*), saltmarsh bulrush (*Scirpus robustus*), and dwarf spikerush (*Eleocharis parvula*) (Visser et al., 1998).

Saline Marsh is similar habitat to brackish marsh but at a lower elevation and more tidally influenced. Species found in saline marsh (salinity 8-29 ppt) are a combination of smooth cordgrass (*Spartina alterniflora*), needlegrass rush (*Juncus roemerianus*),

turtleweed (*Batis maritima*), black mangrove (*Avicennia germinans*), and *Distichlis spicata* (saltgrass) (Visser et al., 1998).

Swamps are broadleaf and needleleaf deciduous forested wetlands that experience inundation either permanently or seasonally throughout the year. They are generally found along the edges of lakes and rivers. A swamp is defined as an area supporting or capable of supporting a canopy of woody vegetation that covers at least 33 percent of the area's surface and with at least 60 percent of that canopy consisting of any combination of bald cypress (*Taxodium distichum*), tupelo gum (*Nyssa aquatica*), red maple (*Acer rubrum*), buttonbush (*Cephalanthus occidentalis*), and planer trees (*Planera aquatica*).

The proposed compensatory mitigation would replace the lost functions and values of the impacted areas through restoration or enhancement activities that increase/improve the habitat functions and services within a particular mitigation site. Enhancement would involve implementing actions to improve already existing low quality habitat. Restoration would involve creating a habitat type from open water or agricultural fields where none currently exists, but which historically occurred in the vicinity of the project area.

2.1.1 Mitigation Formulation Requirements:

The CEMVN is required by law and regulation to compensate for habitat losses through in-kind mitigation. In accordance with the WRDA of 1986 and 2007, unavoidable habitat impacts would be offset through compensatory mitigation by replacing the lost habitats' functions and services in-kind to the extent possible. WRDA 1986, Section 906(d)(1), as amended by WRDA 2007, Section 2036(a), provides: "Specific mitigation plans shall ensure that impacts to bottomland hardwood forests are mitigated in-kind and other habitat types are mitigated to not less than in-kind conditions to the extent possible."

As such, mitigation measures were required to either restore or enhance the same habitat types that were impacted (e.g. "habitat type for habitat type") from the NFL NOV construction to the extent possible. The phrase "mitigation measures" refers to potential actions at a given site that could mitigate NFL NOV impacts. Impacts to swamp habitats will be mitigated with a swamp project. Open water impacts are assessed using the model for the marsh type closest to the impacts; and mitigation of open water impacts occurs through establishment of the marsh type closest to the impacts. As such, the NFL NOV marsh mitigation projects mitigate for both marsh and open water impacts. Since brackish marsh and saline marsh provide similar functions and services for many of the same species, brackish and saline marsh impacts are being mitigated with a brackish marsh project. This is consistent with how USACE 404 Mitigation Bank Program mitigates marsh impacts: credits mitigate either fresh/intermediate impacts or brackish/saline impacts. However, since the brackish marsh mitigation projects are located in areas where salinities fluctuate to such an extent that the sites could support

both intermediate and brackish marsh species, and since the intermediate marsh impacts were so small (1.4 acres), the brackish marsh mitigation projects were designed to mitigate for all intermediate, brackish, and saline marsh impacts as well as the open water impacts.

In accordance with USACE Implementation Guidance for Section 2036 of the Water Resources Development Act (WRDA) 2007, Mitigation for Fish and Wildlife and Wetlands Losses, as well as the standards and policies set forth in 33 CFR Part 332, compensatory mitigation was formulated to occur within the same watershed or hydrologic basin as the impacts and to replace the functions and services of each habitat type with functions and services of the same habitat type. 33 CFR Part 332.2 defines a watershed as "a land area that drains to a common waterway, such as a stream, lake, estuary, wetland, or ultimately the ocean". The Plaquemines NFL NOV Project, used the Barataria River Basin (Basin) as the watershed to reformulate options to mitigate swamp impacts. This watershed is also commensurate with US Geological Survey's (USGS) 8-digit hydrologic unit code (HUC). The HUC system of classification provides a national, consistent, seamless, and hierarchical hydrologic unit dataset based on topographic and hydrologic features across the US and its territories (USGS, 1994).

The Plaquemines NFL NOV Project used the Deltaic Plain as the watershed to reformulate options to mitigate tidal intermediate, brackish, and saline marsh impacts. Unlike forested systems that can be unique and distinct due to the geographic features of the watershed they exist in, watersheds become tidally connected along the coast as elevations decrease resulting in similar habitat and species being found on a larger scale. This approach is consistent with the approach used by the CEMVN 404 Regulatory Program. In an effort to provide more mitigation opportunities for 404 permits, the CEMVN 404 Regulatory Program established the service area of tidal banks using a two plain system (Chenier and Deltaic). Additionally, official guidance on the Water Infrastructure Improvements for the Nation Act of 2016 (PL 114-322) (WIIN Act) states that mitigation banks with service areas that include the impacted areas should be considered as reasonable alternatives. As such, using the Deltaic Plain as the watershed for NFL NOV tidal marsh mitigation planning is consistent with law and policies pertaining to Civil Works projects.

Additionally, all intermediate, brackish and saline marsh impacts as well as the swamp impacts incurred by the Plaquemines NFL NOV project occurred in the CZ. As such, consistent with the Coastal Zone Management Act (CZMA), all impacts that occurred in the CZ would be mitigated within the CZ.

Figure 1 and Appendix A Figure A-2 shows the Deltaic Plain within the CZ and hydrologic unit code (HUC) 08090301, which is commiserate with the Barataria Basin (where NFL NOV impacts occurred).

2.1.2 Measure Development

Once the swamp feature of EA 543's mitigation plan was found to be unimplementable (insufficient credits were available), the Plaquemines team revisited EA 543's final array of projects for swamp in Barataria Basin as well as identified new opportunities in the Basin provided by National Park Service land acquisition and the realignment of the NOV 05a.1 levee reach to complete the required mitigation. The purchase of in-kind mitigation bank credits was also kept as an option since new banks and additional credit releases are expected in the future. Doing so was consistent with WRDA 2016, Section 1163 Implementation Guidance that directs the USACE to consider available and potential in-kind credits from mitigation banks and in-lieu fee programs, where appropriate, when planning compensatory mitigation for proposed water resources development projects.

Similarly, the final array of projects for brackish marsh within the Basin was also reconsidered and then augmented with options within the Deltaic Plain, when the brackish marsh feature of EA 543's mitigation plan was found to be unimplementable. Included was the purchase of in-kind mitigation bank and/or Louisiana Department of Natural Resources (LDNR) In Lieu Fee (ILF) Program credits as well as Corps Constructed projects on public land. Only public land options were considered for Corps Constructed options outside of the Basin due to the time required to obtain the necessary real estate interests and the need to mitigate concurrent with NFL NOV construction (WRDA 1986, Section 2283) as well as address the stipulations provided in USEPA's April 12, 2012 letter regarding the NOV projects (see EA 543, section 1.3 for more details).

Once the new options were identified, initial research was conducted to gather readily available information to develop these options into measures and plot each of the potential measures with Geographic Information System (GIS) software.

It is not known which banks will be available when the decision whether to purchase bank credits is made: some banks may not have enough credits remaining, some may be closed, and additional mitigation banks may be approved. As such, mitigation banks are discussed generally for those measures involving credit purchase and no specific banks are identified. The Regulatory ILF and Bank Information Tracking System (RIBITS) (http://geo.usace.army.mil/ribits/index.html) has information on all currently approved banks in the basin including their credit availability. Information obtained from existing banks in the basin was used during analysis of the final array of mitigation measures (see section 2.4).

2.1.3 Initial Screening

The following screening criteria were developed by the PDT to identify the potential sites that should be carried forward as measures. Screening criteria respond to

congressional authority, USACE internal policy, law (such as NEPA, et al), and the MVN Commander's Intent (see Appendix F) and include, but are not limited to, constraints. Sites that did not meet any one of the following criteria were eliminated from further consideration.

- No conversion of existing wetlands to uplands
- No preservation measures
- Compliant with applicable laws and policies (avoid adverse impacts to cultural resources, threatened and endangered species, oyster leases, existing pipeline leases; no sites with HTRW)
- Technically viable (e.g. salinity suitable for target habitat type)
- Must have independent utility (not dependent on implementation or modification of other projects)
- Each project must be capable of providing 100% of the mitigation need as a stand-alone measure.

Using the screening criteria above, a list of possible measures were developed by the PDT for impacts to swamp (Table 2) and brackish marsh habitats (Table 3). In addition to these screening criteria, measures with excessive timelines for real estate acquisition were removed from further consideration to be consistent with WRDA 1986, Section 2283 which requires mitigation be undertaken before or concurrent with construction of the project that incurred the impacts. Tables 2 and 3 depict each possible measure, details about that measure, and whether it was carried forward into the final array. Also included in the table are the previous measures from EA 543's final array for each habitat type.

Table 2: Swamp Measures Considered

Measure	Type of Bank	AAHUs	Outcome	Notes
Mitigation Bank	Bank	33.9	Retained	Current/future available credits

Jesuit Bend	Corps Constructed	33.9	Dropped	Implementability concerns due to large number of land owners, unacceptable delay in mitigation implementation
Lake Salvador	Corps Constructed	33.9	Dropped	Long term sustainability concerns due to exposure to future high salinities and high erosive forces
NF NOV 05a.1 Swamp	Corps Constructed	33.9	Retained	Adjacent to NOV levee alignment, currently a willing landowner
Flemming Property Swamp	Corps Constructed	33.9	Dropped	Existing restoration/enhancement opportunities could not meet 100% of the Need

Of the swamp measures evaluated, only NF NOV 05a.1 Swamp and Mitigation Bank were retained for further analysis and comparison to determine the TSP for this habitat type. The measure selected would become the new feature for that habitat in the revised mitigation plan for all Plaquemines NFL NOV impacts. EA 543's Jesuit Bend project was not carried forward because of the anticipated extensive time required to acquire the necessary real estate interests from the large number of land owners for the site. EA 543's Lake Salvador project was not carried forward due to concerns over sustainability in relation to future salinity increases and high wave action. The Flemming Property Swamp was screened out because the restoration/enhancement opportunities on the property were not of sufficient size to meet 100% of the Plaquemines mitigation need for swamp as a stand alone measure.

Table 3: Brackish Marsh Measures Considered

Measure	Type of Bank	AAHUs	Outcome	Notes
Mitigation Bank/ILF	Bank/ILF	91.9/14.8	Retained	Current/future available credits
Big Branch Brackish Marsh	Corps Constructed	106.9	Retained	On public land, 2017 LA Master Plan Project
Fritchie Marsh Brackish Marsh	Corps Constructed	106.9	Retained	On public land, 2017 LA Master Plan Project
Coleman Brackish Marsh	Corps Constructed	106.9	Retained	In Plaquemines Parish
Defelice Brackish Marsh	Corps Constructed	106.9	Reshaped	The best measure in the area (Coleman) was selected for further evaluation

DNWR Main Pass 1 Brackish Marsh	Corps Constructed	106.9	Reshaped	The best measure in area (DNWR Main Pass 2) was selected for further evaluation
DNWR Main Pass 2 Brackish Marsh	Corps Constructed	106.9	Retained	On public land, overall best DNWR measure
DNWR Delta Bend Brackish Marsh	Corps Constructed	106.9	Reshaped	Best measure in area (DNWR Main Pass 2) was selected for further evaluation

Of the brackish marsh measures evaluated, only Big Branch, Fritchie, Coleman, DNWR Main Pass 2, and Mitigation Bank/ILF were retained for further analysis and comparison to determine the TSP for this habitat type. Some brackish marsh measures were not dropped directly, but were refined by reshaping (re-configuring) them by habitat type. Reshaping of measures occurred when multiple measures existed in a common geographical area. In such cases, these measures were reshaped into a single project by habitat type that maximized the potential returns for that area while meeting the mitigation requirement only. The brackish marsh measures that were reshaped such that the best performing measure for the area was identified were Defelice, DNWR Main Pass 1, and DNWR Delta Bend.

At the time of screening, currently available and future in-kind mitigation bank and ILF credits were found in the watersheds (Barataria for swamp, Deltaic Plain for brackish marsh) in sufficient number to mitigate the swamp and brackish marsh mitigation requirements for NFL NOV. As a result, the final array of measures for swamp includes the option to purchase mitigation bank credits (the ILF program only offers marsh credits). The final array of measures for brackish marsh includes the option to purchase mitigation bank in combination with ILF credits because the total currently available and future in-kind mitigation bank credits in the Deltaic Plain were not solely sufficient to mitigate the whole brackish marsh mitigation requirement.

Additionally, to account for the uncertainty surrounding the availability of future mitigation bank and ILF credits while maintaining the ability to satisfy as much of the mitigation need as quickly as possible, a measure consisting of the combination of credit purchase and the highest ranked Corps constructed project (see section 2.2) was developed. In this manner, if the mitigation bank or mitigation bank/ILF measure becomes the TSP for a given habitat type and, during implementation of that TSP, insufficient credits are available to mitigate the whole need, default to a combination measure could occur to ensure the most timely satisfaction of 100% of the mitigation requirement while maximizing cost efficiencies.

2.2 FINAL ARRAY OF MITIGATION PROJECTS BY HABITAT TYPE

The following are the measures that remained after screening that became the final array of projects, listed by habitat type:

Swamp Impacts

- 05a.1 Swamp Restoration
- Combination Mitigation Bank/NF NOV 05a.1 Swamp Restoration
- Mitigation Bank Credit Purchase

Brackish Marsh Impacts

- Big Branch Brackish Marsh Restoration
- Fritchie Marsh Brackish Marsh Restoration
- Delta National Wildlife Refuge Main Pass 2 Brackish Marsh Restoration
- Coleman Brackish Marsh Restoration
- Combination Mitigation Bank/ILF/Highest Ranked Corps Constructed Project
- Mitigation Bank/ILF Credit Purchase

See Appendix A for the maps of these projects. Figure A-3 presents an overall map of all project areas and Figure A-4 through A-8 presents each individual project.

All mitigation projects were designed using site specific land loss rates and the intermediate sea level rise (SLR) scenario. See Section 2.7.3 and Table B-9 in Appendix B for details. Sea level rise is measured by a tide gauge with respect to the land upon which it is situated. There are three classifications of SLR: low (historic), intermediate, and high. The intermediate and high SLR scenarios are predictions of possible future sea level change. Utilizing the intermediate SLR scenario for project design may result in a larger mitigation project than required, as the intermediate SLR rate is higher than the historic rate. However, remobilizing to construct additional marsh or swamp habitat if the mitigation requirement is not met under the historic SLR scenario would not produce additional savings (due to mobilization costs for dredge equipment). In addition, if an increase in elevation became necessary for forested habitats, borrow placement would be extremely problematic and likely result in an unacceptable increase in mortality of already established forest species, which could necessitate complete rebuild of the project. Since USACE is required to mitigate the lost habitat's functions and services due to construction of the NFL NOV improvements and since future funding for additional construction is uncertain, overbuilding of the mitigation projects (in size, not elevation) was determined to be the least risk design.

Though USACE continues to minimize impacts to wetlands during design and construction, and remain within the environmentally cleared ROW, design changes could occur to account for additional factors of safety, needs for staging, access, etc. that incur additional environmental impacts. If these occur, additional NEPA compliance documents addressing these changes would be produced and made available for public

review. However, Corps constructed mitigation project acreages have been increased by 10% to include a buffer in the event that future minor increases in impacts occur as a result of minor design changes (Table 4).

2.3 TENTATIVELY SELECTED PROJECTS

The next step in the planning process for the NFL NOV mitigation was to compare the projects in the final array to each other by habitat type.

2.3.1 Alternative Evaluation Process

The Alternative Evaluation Process (AEP) was utilized to compare projects mitigating for the same habitat type to determine the best project for that habitat type (tentatively selected project, or "TSP"). Each TSP is a feature of the overall plan to mitigate for all the NFL NOV impacts. It is only the combination of projects mitigating for each habitat type that can together fully mitigate NFL NOV impacts. During the AEP, mitigation projects within the same habitat type were compared to one another using the following weighted selection criteria:

- Risk and Reliability – This criterion considers issues such as a proposed projects' susceptibility and resiliency to stressors, long-term sustainability, uncertainty relative to CEMVN's ability to implement the project, and uncertainty relative to project success.
- Environmental – This criterion evaluates a proposed project's adverse and beneficial impacts to human and natural resources.
- Time - Time evaluates the duration to contract award and to initial ecological success or Notice of Construction Complete.
- Cost Effectiveness –This criterion evaluates the average annual cost per average annual habitat unit (AAHU).
- Other Cost Considerations – This criterion evaluates total proposed project costs including construction, real estate, operations and maintenance, total project and average annual costs over the 50-year period of analysis.
- Watershed and Ecological Site Considerations – This criterion evaluates the proposed project site characteristics such as the role that a potential project would play in terms of creating habitat linkages or wildlife corridors, whether the project is consistent with watershed plans such as Coast 2050, and its proximity to the NFL NOV impacts.

The relative scoring of each project for each criterion under each habitat type produced an overall score. A ranking was then established for the projects under each habitat type based on each project's overall score. The highest ranked project was selected as the TSP for that habitat type. The TSPs were then combined like building blocks to form the tentatively selected alternative (TSA) for mitigating the remaining NFL NOV mitigation need, see Section 2.6 for more details on the TSA. Chapter 4 provides an

impact assessment on the final array of mitigation projects by habitat type that could be utilized for the TSA. Chapter 5 looks at the environmental impacts of the NFL NOV alternatives as required by NEPA. Selection criteria matrices used during the AEPs are located in Appendix B, tables B-2 through B-8. Details on the AEP Plan Selection Criteria are located in Appendix F. The TSPs of the TSA are found in Table 4 (below) and a summary of the selection rationale for each habitat type is explained in Section 2.3.2.

2.3.2 Selection Rationale

Flood Side Swamp Impacts

The swamp projects were evaluated and compared by the PDT using the criteria defined in the above section. The criteria that contributed to the Mitigation Bank project receiving the highest overall score were Risk and Reliability, Time, and Other Cost Considerations. The second highest scoring project was the NF NOV 05a.1 project followed by the Combination Mitigation Bank/NF NOV 05a.1 project. Even though the NF NOV 05a.1 and the Combination Mitigation Bank/NF NOV 05a.1 projects were scored pretty evenly overall, scoring under the Environmental and Watershed and Ecological Site Considerations criteria gave a slight advantage to the NF NOV 05a.1 project. The NF NOV 05a.1 and Combination Mitigation Bank/NF NOV 05a.1 projects were more than twice the cost of the Mitigation Bank project. However, if the bid price per credit turns out to be higher than the estimated cost for the mitigation bank project, or if credits are not available at the time of required purchase, then the PDT would re-examine the AEP results and may move to the next ranked (or “fall back”) project.

After the AEP was complete, a sensitivity analysis was conducted based on changes to the weighting of the selection criteria. This allowed the team to revisit any of the weightings based on alternative opinions to see how it would affect the overall scoring of the projects. The sensitivity analysis did not significantly change the raw scores and the Mitigation Bank project still received the overall highest score when comparing all of the measures for Risk and Reliability, Time, Cost Effectiveness, Environmental, Watershed and Ecological Site Considerations, and Other Cost Considerations.

Flood Side Brackish Marsh Impacts

The brackish marsh projects were evaluated and compared by the PDT using the criteria defined in the above section. Several criteria contributed to the Fritchie Brackish Marsh project receiving the highest overall score, including Cost Effectiveness, Other Cost Considerations, and Risk and Reliability among other factors. The second highest scoring project was the Combination Mitigation Bank/ILF/Highest Ranked Corps Constructed project. The criteria that made the biggest impact between the first and second ranking of the projects was Cost. The Mitigation Bank project was more expensive than the highest Corps Constructed project. As such, adding the Mitigation

Bank project to the highest Corps Constructed project, only served to increase the cost for the combined project. The remaining projects scored significantly lower in Risk and Reliability and were more costly than the top two projects. If issues affecting implementation of the first ranked project arise due to cost, time, real estate space requirements, or if additional substantive information pertinent to the projects becomes available, the project delivery team may re-examine the AEP results and may move to the next ranked (or "fall back") project.

Similar to the swamp AEP, after the brackish marsh AEP was complete, a sensitivity analysis was conducted to see if the overall scoring of the projects would change with adjustments to selection criteria weighting. The sensitivity analysis did not significantly change the raw scores. The Fritchie Brackish Marsh project received the overall highest score from the project delivery team when comparing all of the projects for Risk and Reliability, Time, Cost Effectiveness, Environmental, Watershed and Ecological Site Considerations, and Other Cost Considerations.

Table 4. Summary of Final Array of Mitigation Projects

Mitigation Project	Habitat & Type of Mitigation	Acres Required / +10% buffer	**Draft Mitigation Potential (AAHUs/ac.)	Minimum AAHUs Generated
Swamp Impacts (mitigation required: 33.9 AAHUs)				
05a.1 Swamp Restoration	Swamp (restore flood side)	78.84 / 86.72	0.43	33.9
Corps Constructed Project/Mitigation Bank Combination	Swamp (restore flood side) and Credit Purchase	**TBD***	0.43/TBD*	33.9
Mitigation Bank Tentatively Selected Plan (TSP)	**Swamp Credit Purchase**	**TBD***	**TBD***	**33.9**
Brackish Marsh (includes Intermediate Marsh and Saline Marsh) Impacts (mitigation required: 106.9 AAHUs)				
Big Branch Brackish Marsh	Brackish Marsh (restore flood side)	352/387.20	0.30	106.9
Fritchie Marsh Brackish Marsh Restoration (TSP)	**Brackish Marsh (restore flood side)**	**238-330 /261-350**	**0.32-0.45**	**106.9**
Coleman Brackish Marsh	Brackish Marsh (restore flood side)	377.14 / 414.86	0.28	106.9
Delta National Wildlife Refuge Brackish Marsh Restoration	Brackish Marsh (restore flood side)	480/528	0.22	106.9

Corps Constructed Project/Mitigation Bank\ILF Combination	Brackish Marsh (restore flood side) and Credit Purchase	**TBD***	**TBD***	106.9
Mitigation Bank\ILF Combination	Credit Purchase	**TBD***	**TBD***	106.9

Note: Bold print identifies the **TSPs** combined to form the TSMP.
***Since the mitigation bank that will ultimately be selected for use is unknown at this time, the mitigation potential at that bank and the number of acres necessary to satisfy the mitigation requirement is similarly unknown.
**Final Mitigation Potentials are located in the Fish and Wildlife Service Coordination Act Report in Appendix M.

2.4 FINAL ARRAY PROJECT DESCRIPTIONS

Below are the project descriptions for the projects in the final array which have been designed, at minimum, to mitigate for the following impacts (Table 5).

Table 5. NFL NOV Mitigation Requirement

Habitat Type	AAHUs Impacted
FS Swamp	33.9 AAHUs
FS Brackish Marsh (includes open water, intermediate and saline marsh)	106.9 AAHUs

2.4.1 Common Elements in the Corps Constructed Project Descriptions

Elements common to swamp mitigation projects are:

- It is anticipated that not all plants installed at the time of the initial planting would survive through the first year; thus, it was estimated that about 30 percent of the total number of plants initially installed in each feature would need to be re-planted one year after the completion of the initial plantings. Additional activities that would occur during the project construction phase would include periodic eradication of invasive/nuisance plant species within the mitigation feature as well as mitigation monitoring and reporting conducted in accordance with the applicable guidelines contained in Appendix J (i.e. monitoring and reporting necessary prior to transfer of the project to the NFS).

- Various activities would be necessary during the Operations, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) phase of the project. At a minimum, these would include periodic eradication of invasive/nuisance plants in the mitigation feature and mitigation monitoring and reporting as prescribed in Appendix J. Additional activities may need to be performed to ensure compliance with applicable mitigation success criteria (Appendix J).

Elements common to all mitigation projects constructed from open water unless otherwise stated within the specific description are:

- Earthen retention dikes would be mechanically constructed along the perimeter of the proposed mitigation feature.
- The retention dike borrow would be obtained from within or exterior to the mitigation project footprint. Trenasses and dike borrow canals would be constructed to help maintain drainage.
- A freeboard of one foot is required on all retention dikes.
- Adjustable spill boxes would be placed in the retention dikes to drain excess water from the mitigation site during the hydraulic fill operation.
- Borrow for the mitigation feature would be obtained using a hydraulic cutter-head dredge.
- The fill material would be piped from the borrow site to the mitigation feature in slurry.
- The pipeline corridor would be 100-feet wide except when crossing some land and roadways where it would be reduced as necessary.
- Floating pipeline would be marked on 150-foot centers to prevent navigation hazards. Markers would include lighted and reflective buoys.
- Lake borrow sites would be situated a minimum 2,000 feet from the lake shoreline.
- Marsh tracked vehicles would move the discharge pipeline within the restoration sites when pumping, and maintain the retention dikes as needed for the duration of the dredge fill operation.
- Existing lake bottom elevations vary (Lakes Pontchartrain); however, in designing the projects, an existing average lake bottom elevation within the footprint of the borrow site of -8.0 feet was assumed.
- Once the dredge and fill operation required to establish the land platforms for the restoration features is complete, an idle period of approximately one year would allow hydraulically placed fill time to settle and dewater to the desired final target elevation.
- At the end of the idle period the perimeter dikes would be degraded to equal the final target elevation.
- After degrading the retention dikes, each mitigation feature (except marsh) would be planted in accordance with the applicable planting guidelines contained in Appendix J. It is anticipated that native herbaceous marsh plants would rapidly colonize the degraded marsh dikes.

2.4.2 MITIGATION FOR SWAMP IMPACTS

2.4.2.1 Mitigation Bank Project TSP

This project assumes that all of the 33.9 FS swamp AAHUs could be satisfied through the purchase of swamp mitigation bank credits and that purchase of mitigation bank credits from a bank with a perpetual conservation servitude would yield a result similar to a Corps-constructed mitigation project in mitigating the impacts but not create any new construction impacts.

Only USACE approved mitigation banks with perpetual conservation servitudes, within the Basin, currently in compliance with their mitigation banking instrument (MBI), and able to mitigate the habitat types and CZ impacts incurred by the Plaquemines NFL NOV's work would be considered to mitigate the swamp requirements. If, at the time of solicitation, there are not sufficient mitigation banking credits available to meet 100 percent of the mitigation requirement by habitat type or if USACE does not receive satisfactory bids (based on cost and/or other factors), the project delivery team would re-examine the AEP results and may move to the next ranked (or "fall back") project for that habitat type.

If purchase of mitigation bank credits became the swamp feature of the NFL NOV Mitigation Plan, all FS swamp impacts would be mitigated with the purchase of swamp credits equaling 33.9 AAHUs. Mitigation banks would be required to run the same version of the WVA model as was used to assess the impacts from constructing the NFL NOV to ensure that the assessment of the functions and services provided by the mitigation bank match the assessment of the lost functions and services at the impacted site.

2.4.2.2 NF NOV 05a.1 FS Swamp

This proposed project would involve the restoration of swamp habitat from pasture land adjacent to the NF NOV 05a.1 levee reach. The proposed NF NOV 05a.1 mitigation feature is located west of the Mississippi River between miles 63.0 and 64.0 with features west of the new levee alignment for NOV-NF 5a.1, and 4.0 miles east of the Pen. The Proposed Borrow Area is located in the Mississippi River between miles 64.0 and 65.0. The proposed site is on the flood side of the new levee alignment and all features are located in Plaquemines Parish. Access to the proposed site would be via the Mississippi River and Highway 23. Figure A-4 in Appendix A provides an illustration of the proposed FS swamp restoration features. The total area is approximately 100 acres.

The area previously supported swamp habitat, but leveeing, forced drainage and farming has converted the site to pasture land. The proposed work would consist of hydraulically dredging borrow material from an approximate 82 acre borrow site within river miles 64 and 65 of the Mississippi River to fill 100 acres of pasture land for swamp restoration.

The water bottom elevation in the Mississippi River at this location varies but a maximum dredging depth of -75 ft NAVD88, with an assumed water bottom of -32 ft NAVD88, was used to estimate available borrow. The material would be hydraulically dredged and then pumped approximately 1 mile to the swamp creation area. Approximately 5,135 LF of retention dikes would be constructed to an elevation of 4.5 ft NAVD88 with a 5-ft crown width and 1:3 side slopes. Approximately 57,000 CY of borrow material for the dike would be excavated from within the swamp creation area.

Creation of the swamp platform would be completed in one lift with a planting phase to follow. When the lift is completed, the contractor will de-mobilize from the project and mobilize one year later for the planting phase. Work for the lift will consist of the construction of retention dikes to contain the dredge slurry at the swamp platform, dredging material from the borrow site, pumping material to the swamp creation area, and the placement of dredged material into the swamp platform to the required fill elevation. Clearing of vegetation and debris from within the site may be required prior to placement of fill. Following settlement of this fill to the desired target grade (elevation +2 ft), existing levees along the old levee alignment would be gapped (degraded to mimic adjacent natural grade) to improve exchange of surface water between the restored swamp and adjacent swamp habitats. The work for the planting phase will consist of degrading the western and northern dikes to target swamp elevation, planting canopy and mid-story swamp seedlings, and installing tree and shrub predation guards for protection from wildlife. The southern dike would remain in place and connect to the existing NFL.

Once the construction of the retention dikes are complete, approximately 900,000 CY of dredged material would be pumped via pipeline from the Mississippi River and placed in the swamp creation area to a maximum elevation of 3 ft NAVD88 in an effort to meet an initial target elevation of 2 ft NAVD88. The estimated duration for the dredging lift is 9 to 10 months. Once the first lift is complete, it is anticipated that the Contactor would de-mobilize and mobilize one year later to degrade dikes and plant trees. The estimated duration for the dredging phase is 90 days.

Work for the planting phase would begin approximately one year after the dredging lift is complete. Work consists of degrading the back dikes to the target swamp elevation. Degraded dike material would be placed within the project area and adjacent to the back retention dikes by marsh buggies to a maximum elevation of 2 ft NAVD88. In conjunction with the dike degrading, approximately 53,800 canopy swamp seedlings and 10,900 midstory would be planted in accordance with the swamp planting guidelines set forth in Appendix J. Additionally each seedling would have predation guards installed to protect against wildlife herbivory. The estimated duration for the dike degrade and planting phase is 1 year 55 days.

During the OMRR&R phase of the project, prior to transfer of monitoring responsibilities to the NFS, the site would be monitored and surveyed by CEMVN to ensure the swamp creation area has met the initial success criteria. It is anticipated that not all plants installed at the time of the initial planting would survive through the first year. To account for some natural mortality, replant of approximately 30 percent of the total number of plants initially installed after one year was assumed. Additional activities that would occur following the initial planting event include periodic eradication of invasive/nuisance plant species within the mitigation feature. It is estimated that the additional planting will require a construction duration of 6 to 7 months.

2.4.2.3 Corps Constructed Swamp Project and Mitigation Bank Combination

This project assumes that all of the 33.9 FS swamp AAHUs could be satisfied through construction of a portion of the NF NOV 05a.1 FS Swamp in combination with the purchase of swamp mitigation bank credits. An assessment would be conducted to determine the most cost efficient and effective size of a Corps constructed project. Once determined, the mitigation not satisfied through construction of this project would be satisfied through the purchase of mitigation bank credits from the bank with a perpetual conservation servitude to ensure satisfaction of 100% of the mitigation need. The Corps constructed project would be the same as, but likely smaller in size, than the project described in 2.4.2.2 NF NOV 05a.1 FS Swamp.

2.4.3 MITIGATION FOR BRACKISH MARSH IMPACTS

2.4.3.1 ILF/Mitigation Bank Project

This project assumes that all of the 106.9 intermediate, brackish and saline marsh AAHUs could be satisfied through the purchase of ILF and/or brackish marsh mitigation bank credits and that purchase of mitigation credits from the Louisiana's ILF and/or banks with a perpetual conservation servitude would yield a result similar to a Corps-constructed mitigation project in mitigating the impacts but not create any new construction impacts.

Only USACE approved mitigation banks with perpetual conservation servitudes, within the Deltaic Plain, currently in compliance with their mitigation banking instrument (MBI), and able to mitigate the habitat types and CZ impacts incurred by the Plaquemines NFL NOV's work would be considered to mitigate the brackish marsh requirements. If, at the time of solicitation, there are not sufficient mitigation credits available to meet 100 percent of the mitigation requirement by habitat type or if USACE does not receive satisfactory bids (based on cost and/or other factors), then the CEMVN Commander may reevaluate the mitigation plan and decide to implement one of the next ranked projects for that habitat type. In addition, if the actual costs for purchasing the mitigation credits turn out to be more than what was estimated for the general ILF/mitigation bank

project during AEP, a re-analysis maybe conducted to verify the ranking of the projects and selection of the TSP.

If purchase of ILF/mitigation bank credits became the new brackish marsh feature of the NFL NOV Mitigation Plan, all FS intermediate, brackish, and saline marsh impacts would be mitigated with the purchase of brackish marsh credits equaling 106.9 AAHUs. ILF and mitigation banks would be required to run the same version of the WVA model as was used to assess the impacts from constructing the NFL NOV to ensure that the assessment of the functions and services provided by the ILF program/mitigation bank match the assessment of the lost functions and services at the impacted site.

2.4.3.2 Big Branch FS Brackish Marsh

This proposed project would involve the restoration of brackish marsh habitat from shallow open water within what has been identified as public land, more specifically, the Big Branch National Wildlife Refuge. The proposed project is located in St. Tammany Parish on the north shore of Lake Pontchartrain. Figure A-5 in Appendix A provides an illustration of the proposed FS brackish marsh restoration mitigation feature. The proposed features consist of four cells with areas of approximately 235 acres (Cell #1), 59 acres (Cell #2), 46 acres (Cell #3), and 30 acres (Cell #4) for a total combined area of 370 acres.

The water bottom in the Big Branch marsh creation site is approximately -1.5 ft NAVD88. Marsh restoration would require approximately 2,670,000 CY of material hydraulically dredged from within a 258 acre borrow site in Lake Pontchartrain to construct a brackish marsh platform. Access to the proposed marsh creation area and transport of hydraulically dredged borrow material would be via Bayou Lacombe and unnamed waterways. Approximately 51,398 LF retention dikes would be constructed to elevation 3.5 ft NAVD88 with a 5 ft wide crown and 1:3 side slopes using approximately 58,400 CY of borrow obtained from within the marsh creation area. Once the construction of the retention dikes is complete, dredging of material from the Lake Pontchartrain borrow area would commence. The 258 acre borrow site would be dredged to a max elevation depth of -20 ft NAVD88 with assumed water bottom of -8 ft NAVD88, the material pumped via pipeline, and placed within the marsh creation area to a maximum elevation of 2.5 ft NAVD88 in an effort to achieve an initial fill elevation of 1.5 ft NAVD88. After one year, it is estimated that the initial 2.5 ft NAVD88 fill elevation would settle to an approximate elevation of 1.5 ft NAVD88. The target marsh elevation for brackish marsh habitat would range from 1.0 ft to 1.5 ft NAVD88. The construction duration would be approximately 170 days for dredging and 2 years for settlement and degrading of retention dikes.

During the OMRR&R phase of the project, prior to transfer of monitoring responsibilities to the NFS, the site would be monitored and surveyed by CEMVN to ensure the marsh creation area has met the initial success criteria. At a minimum, these actions would

include periodic eradication of invasive/nuisance plants in the mitigation feature and mitigation monitoring and reporting as prescribed in Appendix J. Approximately one year after the construction of the marsh platform is complete, and once dewatering and settlement of the marsh platform has occurred, the retention dikes would be degraded to the target marsh elevation. Degraded dike material would be placed within the marsh creation area and adjacent to the retention dikes by marsh buggies to a maximum elevation of 1 ft NAVD88. In conjunction with the degradation of the retention dikes, trenasses may be constructed by marsh buggy within feature if additional hydraulic conveyance is necessary. Trenasse width would be the width of a marsh buggy. If the resulting depression is not adequate for minimal water flow, the marsh equipment could excavate material along the proposed trenasse alignment, not to exceed a 5-foot bottom width by 1-foot deep channel. The marsh feature is not expected to require planting, since it was assumed that native brackish marsh plants would colonize the marsh naturally. If brackish marsh species do not colonize the site on their own, brackish marsh plant species would be planted. The construction duration for degrading the dikes would be approximately 2 months. Additional duration would be necessary if trenasse construction and brackish marsh plantings are required.

2.4.3.3 Fritchie FS Brackish Marsh

The proposed Fritchie FS brackish marsh project would involve the restoration of brackish marsh habitat from shallow open water within what has been identified as public land, more specifically, the Big Branch National Wildlife Refuge. The proposed project is located in St. Tammany Parish on the north shore of Lake Pontchartrain east and north of Old Spanish Trail Road and west of Chef Menteur Highway. Figure plate A-6 in Appendix A provides an illustration of the proposed FS brackish marsh restoration mitigation feature. The proposed feature would be approximately 350 acres.

The water bottom in the Fritchie marsh creation site is approximately -1.5 ft NAVD88. Marsh restoration would require approximately 2,630,000 CY of material hydraulically dredged from within a 258 acre borrow site in Lake Pontchartrain to construct a brackish marsh platform. Access to the proposed marsh creation area and transport of hydraulically dredged borrow material would be via Salt Bayou and unnamed waterways. Three previously utilized staging areas approximately 1.3 acres in size on the east and west side of Hwy 433 at the intersection of Salt Bayou Road and Highway 433 and one access corridor (currently a board road) east of Chef Menteur Highway at the southeast corner of the Big Branch NWR [could potentially] be utilized for equipment access and staging (Figure A-6a and A-6b).. Approximately 20,938 LF retention dikes would be constructed to elevation 4 ft NAVD88 with a 5 ft wide crown and 1:3 side slopes using approximately 150,000 CY of borrow obtained from within the marsh creation area. Once the construction of the retention dikes is complete, dredging of material from the Lake Pontchartrain borrow area would commence. The 258 acre borrow site would be dredged to a max elevation depth of -20 ft NAVD88 with assumed water bottom of -8 ft NAVD88, the material pumped via pipeline, and placed within the

marsh creation area to a maximum elevation of 2.5 ft NAVD88 in an effort to achieve an initial fill elevation of 1.5 ft NAVD88. After one year, it is estimated that the initial 2.5 ft NAVD88 fill elevation would settle to an approximate elevation of 1.5 ft NAVD88. The target marsh elevation for brackish marsh habitat would range from 1.0 ft to 1.5 ft NAVD88. The construction duration would be approximately 160 days for dredging and 2 years for settlement and degrading of retention dikes.

During the OMRR&R phase of the project, prior to transfer of monitoring responsibilities to the NFS, the site would be monitored and surveyed to ensure the marsh creation area has met the initial success criteria. At a minimum, these actions would include periodic eradication of invasive/nuisance plants in the mitigation feature and mitigation monitoring and reporting as prescribed in Appendix J. Approximately one year after the construction of the marsh platform is complete, once dewatering and settlement of the marsh platform has occurred, the retention dikes would be degraded to the target marsh elevation. Degraded dike material would be placed within the marsh creation area and adjacent to the retention dikes by marsh buggies to a maximum elevation of 1.0 ft NAVD88. In conjunction with the degradation of the retention dikes, trenasses may be constructed by marsh buggy within feature if additional hydraulic conveyance is necessary. Trenasse width would be the width of a marsh buggy. If the resulting depression is not adequate for minimal water flow, the marsh equipment could excavate material along the proposed trenasse alignment, not to exceed a 5-foot bottom width by 1-foot deep channel. The marsh feature is not expected to require planting, since it was assumed that native brackish marsh plants would colonize the marsh naturally. If brackish marsh species do not colonize the site on their own, brackish marsh plant species would be planted. The construction duration for degrading the dikes would be approximately 2 months. Additional duration would be necessary if trenasse construction and brackish marsh plantings are required.

2.4.3.4 Coleman FS Brackish Marsh

This proposed project would involve the restoration of brackish marsh habitat from shallow open water adjacent to the existing levees in Plaquemines Parish. The proposed project is located in Plaquemines Parish near West Pointe a La Hache, west of LA Hwy 23 between Mississippi River mile 46 and 49. Figure A-7 in Appendix A provides an illustration of the proposed FS brackish marsh restoration mitigation feature. The proposed features consist of three cells with areas of approximately 332 acres (Cell #1), 95 acres (Cell #2), and 52 acres (Cell #3), for a total combined area of 479 acres.

The water bottom in the Coleman marsh creation site is approximate elevation -2.0 ft NAVD88. Marsh restoration would require approximately 4,600,000 CY of material hydraulically dredged from within a 348 acre borrow site in the Mississippi River to construct a brackish marsh platform. Access to the proposed marsh creation area and transport of hydraulically dredged borrow material would be via Jefferson Lake Canal,

unnamed navigable waterways and the Mississippi River. It is anticipated that the dredge pipeline/access corridor would use the existing culverts under LA Hwy 23 placed there for other Louisiana dredging projects. However, if these culverts are not available for use, the project would perform a jack and bore under the existing Hwy to provide pipeline access. Approximately 35,887 LF retention dikes would be constructed to elevation 3.5 to 4.0 ft NAVD88 with a 5 ft wide crown and 1:3 side slopes using approximately 340,000 CY of borrow obtained from within the marsh creation area. Once the construction of the retention dikes is complete, dredging of material from the Point Celeste borrow area within the Mississippi River would commence. The 348 acre borrow site would be dredged to a max elevation depth of -75 ft NAVD88, the material pumped via pipeline, and placed within the marsh creation area to a maximum elevation of 3.0 ft NAVD88 in an effort to achieve an initial fill elevation of 2.0 ft NAVD88. After one year, it is estimated that the initial 2.5 to 3 ft NAVD88 fill elevation would settle to an approximate elevation of 1 ft NAVD88. The target marsh elevation for brackish marsh habitat would range from 1.0 ft to 1.5 ft NAVD88. The construction duration would be approximately 8 months for dredging and 2 years for settlement and degrading of retention dikes.

During the OMRR&R phase of the project, prior to transfer of monitoring responsibilities to the NFS, the site would be monitored and surveyed by CEMVN to ensure the marsh creation area has met the initial success criteria. At a minimum, these actions would include periodic eradication of invasive/nuisance plants in the mitigation feature and mitigation monitoring and reporting as prescribed in Appendix J. Approximately one year after the construction of the marsh platform is complete, and once dewatering and settlement of the marsh platform has occurred, the retention dikes would be degraded to the target marsh elevation. Degraded dike material would be placed within the marsh creation area and adjacent to the retention dikes by marsh buggies to a maximum elevation of 1.0 ft NAVD88. In conjunction with the degradation the retention dikes, trenasses may be constructed by marsh buggy within feature if additional hydraulic conveyance is necessary. Trenasse width would be the width of a marsh buggy. If the resulting depression is not adequate for minimal water flow, the marsh equipment could excavate material along the proposed trenasse alignment, not to exceed a 5-foot bottom width by 1-foot deep channel. The marsh feature is not expected to require planting, since it was assumed that native brackish marsh plants would colonize the marsh naturally. If brackish marsh species do not colonize the site on their own, brackish marsh plant species would be planted. The construction duration for degrading the dikes would be approximately 2 months. Additional duration would be necessary if trenasse construction and brackish marsh plantings are required.

2.4.3.5 Delta National Wildlife Refuge (DNWR) Main Pass FS Brackish Marsh

The proposed work at the Main Pass site would be the restoration of intermediate/brackish marsh in open water areas within the Delta National Wildlife Refuge adjacent to the Mississippi River in Plaquemines Parish. The proposed Main

Pass mitigation feature is located near Cubits Gap with features south of Main Pass and east of the Mississippi River between miles 2.0 and 4.0, and approximately 4.0 miles northeast of Pilot town. Figure A-8 in Appendix A provides an illustration of the proposed FS intermediate/brackish marsh restoration mitigation feature. The total area is approximately 638 acres.

Marsh restoration would require approximately 6,040,000 CY of material hydraulically dredged from within a 366 acre borrow site in the Mississippi River to construct an intermediate/brackish marsh platform. Access to the proposed Main Pass marsh creation area and river borrow would be accomplished through the Mississippi River, Main Pass, and unnamed navigable waterways. Work would consist of the construction of retention dikes to contain the dredge slurry, dredging material from the borrow site in the river, pumping material to the marsh creation area, and the placement of dredged material into the marsh platform to the required fill elevation.

Work would consist of the construction of approximately 41,377 LF retention dikes to contain the dredge slurry. The retention dikes would be constructed to elevation 3.5 to 4 ft NAVD88, with a 5-ft crown and 1:3 side slopes of 1:3. Approximately 400,000 CY of borrow for the retention dikes would be obtained from within the marsh creation area. Once the construction of the retention dikes are complete, dredging of borrow material from the borrow area within the Mississippi River would be pumped via pipeline to the marsh creation area. The 750 acre borrow site in the river will be dredged to a max elevation depth of -75 ft NAVD88. Once dredge material was pumped to the site, the dredge slurry would be placed within the retention dikes to a maximum elevation of 2.5 to 3 ft NAVD88 and to the required fill elevation of 2 ft NAVD88. The approximate water bottom elevation site is -2.0 ft NAVD88. After one year, it is estimated that the 2 ft NAVD88 fill elevation would settle to an approximate elevation of 1 ft NAVD88. The target marsh elevation for brackish marsh habitat would be in the range of elevation 1 ft to 1.5 ft NAVD88. The estimated construction duration is estimated to be 11 months for dredging and 2 years for settlement and degrading of retention dikes.

During the OMRR&R phase of the project, prior to transfer of monitoring responsibilities to the NFS, the site would be monitored and surveyed by CEMVN to ensure the marsh creation area has met the initial success criteria. At a minimum, these would include periodic eradication of invasive/nuisance plants in the mitigation feature and mitigation monitoring and reporting as prescribed in Appendix J. Approximately one year after the construction of the marsh platform is complete, and once dewatering and settlement of the marsh platform has occurred, the retention dikes would be degraded to the target marsh elevation. Degraded dike material will be placed adjacent to, and along, the retention dikes by marsh buggies to a maximum elevation of 1.0 ft NAVD88. In conjunction with degrading the retention dikes, trenasses may be established within feature if additional hydraulic conveyance is necessary. The acceptable trenasse width, if constructed in this fashion, would be the width of a marsh buggy. If the resulting depression is not adequate for minimal water flow, the marsh equipment can excavate

material along the proposed trenasse alignment, not to exceed a 5-foot bottom width by 1-foot deep channel. The marsh feature is not expected to require planting, since the colonization of the site by native intermediate/brackish marsh plants should occur naturally. If the appropriate marsh plant species do not colonize the site on their own within 3 years, the site would be planted. The construction duration for degrading the dikes would be approximately 2 months. Additional duration would be required if trenasses and brackish marsh plantings are required. Additional activities may need to be performed to ensure compliance with applicable mitigation success criteria (see Appendix J).

2.4.3.6 Corps Constructed Project and Mitigation Bank Combination

This project assumes that all 106.9 open water, intermediate, brackish and saline marsh AAHUs could be satisfied through the construction of a portion of the highest ranked Corps constructed brackish marsh project in combination with the purchase of brackish marsh ILF/mitigation bank credits. An assessment would be conducted to determine the most efficient and effective size of a Corps constructed project. Once determined, the mitigation need that is not satisfied through construction of this project would be satisfied through the purchase of ILF/mitigation bank credits from the State of Louisiana/bank with a perpetual conservation servitude to ensure satisfaction of 100% of the mitigation need. The Corps constructed project would be the same as, but smaller in size, than one of the previously described Corps constructed project.

2.5 TENTATIVELY SELECTED ALTERNATIVE (PROPOSED ACTION)

The measure selected as the TSP for each habitat type to mitigate the remaining NFL NOV mitigation need were combined to form the tentatively selected alternative (TSA). The alternative consists of the purchase of mitigation bank credits and the construction of a Corps-constructed project (Table 6). For a project description of the Fritchie Brackish Marsh project please see Section 2.4.5.3.

Table 6. NFL NOV TSMP

Habitat Type	TSPs	AAHUs Impacted	Mitigation Project Acres
FS Swamp	Mitigation Bank	33.9 AAHUs	TBD
FS Brackish Marsh	Fritchie	106.9 AAHUs	Up to 350 acres (includes 10% buffer)

2.6 WVA MODEL AND SEA LEVEL RISE ANALYSES

2.6.1 WVA Model Certification

The WVA Swamp Community Model used for NFL NOV completed model certification in accordance with EC 1105-2-412 and were approved by USACE Headquarters for regional use November 8, 2011. Version 1.0 of the Coastal Marsh Community WVA model was also approved for use for the NFL NOV project (Appendix H).

2.7.2 WVA for Mitigation Proposed Projects

WVA models have been applied in accordance with the guidance provided in "Memorandum for CEMVN-PD, Subject: Wetlands Value Assessment (WVA) Models, Guidance for Application, dated 21 March 2011" (Staebell, 2011). Spring 2012 versions of the WVA models were used, and all WVA models are approved for use and considered certified as planning models for USACE studies in accordance with EC 1105-2-412 (https://cw-environment.erdc.dren.mil/model-library.cfm?CoP=Restore&Option=View&Id=1 and Kitch, 2012). "Plaquemines New Orleans to Venice and Non-Federal Levee Mitigation: Wetland Value Assessment Model Assumptions and Related Guidance (Revised/Updated: 31 January 2017)" in Appendix H gives a detailed description of the assumptions utilized for the WVA assessments for the Plaquemines mitigation project and was updated using lessons learned from reviews and sensitivity analysis made on the Lake Pontchartrain and Vicinity (LPV) and Westbank and Vicinity (WBV) Hurricane Storm Damage Risk Reduction System WVAs. SEA 543a and EA 543 used the same models for consistency and USACE coordinated this approach with USFWS.

WVAs

The WVA methodology operates under the assumption that optimal conditions for general fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum level to provide an index of habitat quality. Habitat quality is estimated or expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of: 1) a list of variables that are considered important in characterizing fish and wildlife habitat; 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values; and 3) a mathematical formula that combines the Suitability Index for each variable into a single value for wetland habitat quality. That single value is referred to as the Habitat Suitability Index, or HSI.

The following WVA models (version 1.0) were used for the NFL NOV mitigation effort: 1) CWPPRA, WVA Methodology, Swamp Community Model; 2) CWPPRA, WVA Methodology, Coastal Marsh Community Model for Brackish Marsh.

The WVA models assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. This standardized, multi-species, habitat-based methodology facilitates the assessment of project-induced impacts on fish and wildlife resources. The coastal marsh WVA models consists of six variables: 1) percent of wetland area covered by emergent vegetation; 2) percent of open water area covered by aquatic vegetation; 3) marsh edge and interspersion; 4) percent of open water area $\leq$ 1.5 feet deep in relation to marsh surface; 5) salinity; and 6) aquatic organism access. The swamp WVA model consists of four variables: 1) stand structure; 2) stand maturity; 3) water regime; and 4) salinity.

Values for variables used in the models are derived from existing conditions and are estimated for conditions projected into the future if no mitigation efforts are applied (i.e., no action or future without project conditions, or "FWOP"), and for conditions projected into the future if the proposed mitigation project is implemented (i.e., future with project, or "FWP"), providing an index of habitat quality, or habitat suitability, for the period of analysis. The HSI is combined with the acres of habitat to generate a number that is referred to as "habitat units." Expected project impacts/benefits are estimated as the difference in habitat units between the FWP scenario and the FWOP scenario. To allow comparison of WVA benefits to costs for overall project evaluation, total benefits are averaged over a 57-year period, with the result reported as AAHUs. Assumptions used for the NFL NOV mitigation WVAs are found in Appendix H.

2.6.3 Sea Level Rise Analysis

Wetland Acreage Predictions Under Increased Sea Level Rise (SLR) Rates

In compliance with USACE policy (Engineering Circular (EC) 1165-2-212), the performance of all projects under all three SLR (Table B-9 Appendix B) scenarios was analyzed to verify selection of the TSMPs. Potential increases in SLR could affect the performance and therefore ability of a mitigation project to achieve replacement of the services and functions of the impacted habitat types. Because all of the mitigation projects were designed based on the intermediate SLR scenario to account for potential uncertainties in future SLR impacts, the risk of the proposed projects not successfully meeting the mitigation requirement due to SLR has been minimized.

The intent of compensatory mitigation is to offset unavoidable habitat losses by replacing those impacted habitats by restoring (re-establishment or rehabilitation), establishing (creation), or enhancing a naturally-functioning system. Once the project meets its long-term success criteria, it will experience natural successional phases common to that habitat type. Once the functions and services of the affected habitat have been replaced and the mitigation project becomes a naturally-functioning, self-

sustaining system whose habitat is protected in perpetuity, the compensatory mitigation obligation is satisfied.

Using USACE-predicted future water levels under the SLR scenarios, those water levels were converted into relative sea level rise (RSLR) rates, incorporating sea level rise effects measured at the gauges and land loss experienced in the extended project area for each project. No operations and maintenance activities were planned for any of the projects in relation to future elevation changes. The WVA then utilized the RSLR rates and project design to predict FWP acres left at the end of the 50-year period of analysis. Long-term sustainability (percent land left at the end of the period of analysis) was used to analyze the impact that different SLR scenarios had on the project areas. Comparison between the long-term sustainability numbers experienced under the intermediate and high SLR scenarios for all of the mitigation projects in the final array supported the choice of the TSPs, that is, all the TSPs for all habitat types performed the best under the influence of both the intermediate and high SLR scenarios. This comparison also supported the second place ranking for the projects (Appendix B, Table B-9).

2.7 DATA GAPS AND UNCERTAINTIES

Impact Assessment

The NFL NOV mitigation requirement has been assessed through review of 35 to 95 percent design plans and specifications for 23 levee and floodwall contracts that have been awarded and constructed (Appendix A Figure A-1). However there are approximately 5 remaining levee and floodwall contracts that are undergoing design and construction that could necessitate additional adjustments to the ROW requirement. To account for the possibility of future, minor changes related to these contracts that could potentially increase the mitigation requirement, the size (acres) of the mitigation projects has been increased by 10%. If impacts beyond what could be mitigated within this 10% are identified, then a supplemental NEPA document would address both the changes in the ROW requirement and the additional mitigation required.

Tropical Storms

Tropical storm events can directly and indirectly contribute to coastal land loss through erosion from increased wave energies, removal and/or scouring of vegetation from storm surge and saltwater intrusion into estuaries and interior wetlands. Wetland loss and degradation of large areas can occur over a short period of time as a result of storms.

Approximately 56,958 acres (converted from square kilometers) of land have been permanently or temporarily converted to open water in the Deltaic Plain, which includes the Barataria Basin, following Hurricane Katrina (Barras, 2009). There is a risk that a

single storm event, or multiple storms over a short period of time, could significantly reduce or eliminate anticipated benefits of mitigation plans in areas susceptible to storm surge and shearing. All of the features of the TSA (and the associated costs and benefits) are at some risk from storm damage. The extent of potential damage is dependent upon several unknown variables, including: the track and intensity of the storm, the development stage of the project, changes in future conditions in the study area, and variability of project performance from forecast conditions due to other factors of risk and uncertainty.

Increased Sea Level Rise

Increased sea level rise could convert emergent wetlands to shallow open water, and shallow open water to deeper water habitat, reducing or eliminating the effectiveness of mitigation plans. Because the intermediate SLR scenario was utilized when designing the mitigation projects, CEMVN has worked to minimize the risk of damages from SLR during the project's period of analysis.

Climate Change

Extreme changes in climate (temperature, rain, evaporation, wind) could result in conditions that cannot support the types of habitat restored, reducing the effectiveness of the mitigation plan. Extreme climate change could essentially eliminate the benefits of vegetative plantings, if the change resulted in plant mortality. The monitoring plan for all USACE constructed projects, mitigation banks, and ILF projects would monitor the success of any vegetative plantings and includes provisions for replanting if mortalities become such that meeting the required success criteria is in jeopardy.

Errors in Analysis

Future conditions are inherently uncertain. The forecast of future conditions is limited by existing science and technology. Future conditions described in this study are based on an analysis of historic trends and the best available information. Some variation between forecast conditions and reality is certain. Mitigation features were developed in a risk-aware framework to minimize the degree to which these variations would affect planning decisions. However, errors in analysis or discrepancies between forecast and actual conditions could affect plan effectiveness.

All of the models used in this study are mathematical representations of existing and predicted future conditions. Models simulate complex systems by simplifying real processes into expressions of their most basic variables. These tools assist with finding optimal solutions to problems, testing hypothetical situations, and forecasting future conditions based on observed data. No model can account for all relevant variables in a system. The interpretation of model outputs must consider the limitations, strengths, weaknesses, and assumptions inherent in model inputs and framework. Inaccurate

assumptions or input errors could change benefits predicted by models used in this study. The potential for significant changes due to errors has been reduced through technical review, sensitivity analyses, and quality assurance procedures. However, there is inherent risk in reducing complex natural systems to mathematic expressions driven by the simplified interaction of key variables.

WVA Model Uncertainties

WVAs models were run on the entire final array of mitigation projects using site-specific data collected at all project sites. Where right of entry (ROE) was unavailable, assumptions were made based on aerial photography and field data from similar projects for the WVAs in the vicinity. Aerial inspections of all the project areas were completed and the WVAs utilized data from projects with similar existing conditions. The CEMVN has reasonable confidence that these data are representative of actual site conditions, and that the WVAs have produced results representative of what would be found if ROE to the sites had been available.

As design proceeds, final WVAs would be completed for each TSP to determine their final size. Currently, final WVAs have been run for the proposed mitigation projects; however final WVAs would be completed for all the projects and their acreages verified prior to the signing of the FONSI.

Implementation

The timing for implementation is an uncertainty that must be considered. If the plan is not implemented in the near future, the conditions in the study area could continue to degrade due to subsidence and/or other natural processes. The impact of the uncertainties associated with the future condition of the study area could increase mitigation costs, decrease mitigation benefits, or both.

If a proposed mitigation project becomes infeasible due to difficulties in implementation or changed conditions, the CEMVN will take appropriate action to ensure satisfaction of its mitigation requirement. This may involve implementing the TSP to the maximum extent practicable and then satisfying the remaining mitigation requirement with the next ranked measure for that habitat type.

If any of the TSP projects cannot be implemented or if additional substantive information pertinent to the projects becomes available, the CEMVN may either fall back to one of the other projects evaluated in the AEP in order of ranking for that habitat type or would in coordination with the resource agencies and the NFS, explore other options to mitigate these impacts. This could include the identification of other mitigation opportunities in an adjacent watershed or basin.

Mitigation for Coastal Zone Impacts

LDNR administers the Federal CZMA in Louisiana through its Louisiana Coastal Resources Program (LCRP). Depending on the projects implemented, LDNR may determine that, in its view, such projects do not mitigate for CZ impacts. If deemed necessary, additional mitigation for CZ impacts may be required and would be assessed and coordinated in a subsequent NEPA document.

2.8 ALTERNATIVES TO THE PROPOSED ACTION

NEPA requires that in analyzing alternatives to a proposed action, a Federal agency must consider an alternative of "No Action." Typically, the No Action alternative evaluates not implementing any of the proposed alternatives and represents the FWOP condition by which alternatives considered in detail are compared. Since the FWOP condition would include EA 543's approved action, the No Action alternative should consider implementation of EA 543's mitigation plan. However, since sufficient swamp mitigation bank credits have not been available in the Basin to mitigate the swamp requirement and since the size of the Coleman Brackish Marsh project was ultimately insufficient to mitigate all of the brackish marsh requirement, implementation of the swamp and brackish marsh features of EA 543's mitigation plan could not fully satisfy the remaining mitigation requirement for Plaquemines NFL NOV. As such, for this EA, the No Action alternative presents the FWOP condition (not completing mitigation) as a baseline essential for impact assessment and alternative analysis. However, because compensatory mitigation for unavoidable habitat losses is required by law (e.g. Clean Water Act, WRDAs of 1986 and 2007), the No Action alternative to the proposed action is not considered a reasonable or legally viable alternative that could be selected.

2.8.1 No Action Alternative

Under the No Action Alternative, the Barataria Basin would continue a trend of land loss caused by both natural factors such as subsidence, erosion, tropical storms and sea level rise, and human factors such as flood risk reduction, canal dredging, development, interruption of accretion processes and oil and gas exploration. The No Action alternative would not provide compensatory mitigation for the unavoidable swamp and brackish marsh impacts incurred during the construction of the NFL NOV.

The analysis for the No Action alternative considers previous, current, and reasonably foreseeable future projects, which could impact the resources evaluated in the NFL EIS, SEA 537, EA 543, and NOV SEIS. The location of these projects are shown in Appendix A Figure A-9. For the purpose of this analysis, a project is considered "reasonably foreseeable" if it meets one of the following criteria:

- USACE authorized ecosystem restoration, flood risk reduction, and/or navigation project with a Tentatively Selected Plan;
- CWPPRA project authorized at a Phase 2 – construction status;

- Coastal Impact Assistance Program (CIAP) ecosystem restoration or flood risk reduction project which is funded for construction;
- Community Development Block Grant (CDBG) ecosystem restoration or flood risk reduction project funded for construction;
- Natural Resource Damage Assessment (NRDA) ecosystem restoration or flood risk reduction project funded for construction;
- State of Louisiana Wetland Conservation and Restoration Program Act (LWCRPA) ecosystem restoration or flood risk reduction project funded for construction;
- State of Louisiana Surplus-funded ecosystem restoration or flood risk reduction project funded for construction; or
- Louisiana Levee District permitted flood risk reduction project.
- Ecosystem restoration projects funded for construction and in construction status within a Louisiana State Master Plan 2017 (SMP 2017) focus area including barrier island restoration, hydrologic restoration, marsh creation, ridge restoration, sediment diversion, and shoreline protection projects (CPRA 2017d).
- Resources and Ecosystems Sustainability Tourist Opportunities and Revived Economics of the Gulf Coast States Act of 2012 (RESTORE) ecosystem restoration project funded for construction;

Appendix B tables B-10, B-11, and B-12 includes a list of projects involving wetland or ecosystem restoration activities considered part of the no action alternative that could counter, to a degree, the current land loss trends throughout the Basin and Deltaic Plain and progression of wetlands to open water. In addition to the name, general location, and a general description of each project, the tables note whether a project directly overlaps with one of the mitigation projects evaluated in this SEA 543a or whether the extended boundary of the project's wetland value assessment overlaps with one of the mitigation projects evaluated in this SEA 543a.

In addition to these ecosystem restoration projects, a number of flood risk reduction and navigation projects are listed that have been built or would be built within the Basin and the Deltaic Plain that would continue to influence the hydrodynamics within the Basin and the Deltaic Plain. Previously constructed flood risk reduction and navigation projects include:

- Algiers Lock: The lock, constructed in 1956, provides a navigation passage between the Mississippi River and the Gulf Intracoastal Waterway via the Algiers Canal. The lock is operated and maintained by the USACE (American Canal Society 2012).
- Algiers Non-federal Levee (Donner Canal Levee): This segment of the non-federal levee was built prior to the construction of the Algiers Canal in 1956 near the southern boundary between the Orleans and Jefferson Parish line to provide flood risk reduction to the communities in the vicinity of Algiers and Cutoff in

Orleans Parish, Louisiana. The levee is owned and under the authority of the Algiers Levee District (SLFPAW 2012).

- Bayou Gauche Ring Levee (Sunset Levee): The construction of levees and pumping stations in the 1970s to prevent tidal surges from flooding developed areas in near the community of Paradis in northern St. Charles Parish (Schiltz 2011).
- Bayou Lafourche Fresh Water District – Walter S Lemann Memorial Pump Station Renovations, CBDG – (BA-84): The project replaced two of the existing pumps and motors at the Walter S Lemann Pump Station and the installation of an emergency generator to operate the pump stations during power outages. Construction was completed in 2015 (CPRA 2018; CPRA 2017a).
- Bonnet Carré Spillway: The spillway was constructed in 1931 and is designed to divert flood waters from the Mississippi River north into Lake Pontchartrain (USACE 2013).
- Coastal Protection and Restoration Authority (CPRA) and North Lafourche Conservation, Levee and Drainage District, Valentine to Larose Levee, TE-111: Construction to provide flood risk reduction improvements to the current flood risk reduction system along approximately 2,000 linear feet of levee along Bayou Lafourche, from the town of Valentine to the town of Larose. The project is part of the Lockport-to-Larose Levee Project. Project construction was completed in February 2014 (CPRA 2013; CPRA 2018; Miller 2014).
- East of Harvey Canal Interim Hurricane Protection – Phase 1 (EOH-HP) State of Louisiana-Surplus Fund 2007 project: The project was designed and constructed by the Southeast Flood Protection Authority - West as an interim non-federal flood risk reduction levee, prior to the WBV HSDRRS floodwall construction, along the east side of the Harvey Canal from the sector gate at Lapalco Boulevard to the existing WBV levee at Hero Pump Station. The interim earthen flood risk reduction levee was completed in July 2009 (McMenis 2012; CPRA 2012).
- East Plaquemines Non-Federal Levee: The non-Federal hurricane risk reduction levee was constructed by the Plaquemines Parish government and private entities to reduce flooding risk along the east bank of the Mississippi River between the communities of Caernarvon and Belair in Plaquemines Parish, LA (USACE 2013).
- Empire Lock: The lock is located on the west bank of the Mississippi River at Mississippi River mile 29.5 and was originally constructed prior to 1936 to provide navigation between the Mississippi River and the Gulf of Mexico through the Empire Canal. It is operated by the Louisiana Department of Transportation and Development (American Canal Society 2012a).
- English Turn Non-Federal Levee (Donner Canal Levee): This segment of the non-federal levee was built prior to the construction of the Algiers Canal in 1956 to provide flood risk reduction to the communities east of Algiers Canal on the west bank of Orleans Parish, Louisiana. The levee extends westerly along the southern Orleans Parish line from the west bank levee of the Mississippi River

near Caernarvon and ties into the West Bank and Vicinity –East of Algiers federal levee near Highway 407. The levee is owned and under the authority of the Algiers Levee District (SLFPAW 2012).

- Falgout Canal Road Levee CDBG (TE-63): This Terrebonne Parish project involves the construction of the Reach E levee along Falgout Canal Road. The project supports a larger effort that will provide risk reduction to the Bayou Dularge communities, encompassing over 2,300 homes within a 13,413-acre area, which suffered severe flooding from Hurricanes Gustav and Ike. Construction was completed in March 2018. (CPRA 2018).
- Forty Arpent Levee, Orleans and St Bernard Parish: A non-Federal back flood risk reduction levee built in 1948 along the Forty Arpent Canal in Orleans and St. Bernard Parishes to help protect residential and commercial areas from flooding. The State of Louisiana has elevated low lying reaches of the levee in St. Bernard Parish utilizing 2007 Louisiana State surplus funds. The project is titled Forty Arpent Canal Levee Repairs (PO-61) and construction was completed in January 2012 (USACE 2013).
- GIWW Navigation System: A continuous waterway located inland and parallel to the Gulf of Mexico coast extending approximately 1,100 miles from Brownsville, Texas to Carrabelle, Florida. The federally authorized navigation project was designed to provide interstate commerce among the Gulf Coast States (Alperin 1983; American Canal Society 2012b).
- Harvey Canal Lock: The lock was constructed in the early 1930s by the USACE to provide a navigational passage between the Mississippi River and the GIWW via the Harvey Canal. The lock is operated and maintained by the USACE (American Canal Society 2012c).
- I-10 Mile 246 to 248 Non-Federal Levee: A non-Federal levee located between Interstate 10 highway miles 246 to 248 in Orleans Parish. The levee aids in risk reduction from storms for the communities in eastern New Orleans, LA (USACE 2013).
- Kraemer Bayou Boeuf Levee Lift, LWCPRA project, BA-169: This project will improve and raise ring levees surrounding the Kraemer Community, a forced drainage area. Construction began in July 2017 and completed in 2018 (CPRA 2018; CPRA 2017c).
- Lafitte Tidal Protection, State of Louisiana-Surplus Fund 2007 project, (BA-75-3), 2007: The project is bordered by Bayou Barataria on the west, Goose Bayou to the north, The Pen to the west and Reserve Canal to the south. This project involves the uplift of existing levee segments originally constructed by the West Jefferson Levee District on the western shore of The Pen near the community of Lafitte, Louisiana to provide flood risk reduction to the community of Lafitte, Louisiana. Construction was completed. The portion of the project constructed by West Jefferson Levee District consists of earthen levees reinforced with sheet pile along the northwestern shore of The Pen from Goose Bayou to Reserve Canal to provide limited flood risk reduction to the community of Lafitte, Louisiana (Harper 2012; CPRA 2012).

- Little Woods/Maxent Non-federal Levee: The non-Federal levee constructed in 1953 extends south from Lake Pontchartrain along Paris Road then turns southeast near Lake Forest Blvd until it reaches Michoud Canal. The levee aids in provide risk reduction from storms for the communities in eastern New Orleans, LA and is under the authority of the Orleans Levee District. This levee served as the initial storm risk reduction levee for New Orleans East prior to the LPVHPP levees (USACE 2013).
- Lower Ninth Ward Non-Federal Levee: The non-Federal flood risk reduction levee extends along the Orleans/St. Bernard Parish line from the 40 Arpent Canal Levee southwest to the Mississippi River. It was constructed in 1948 to reduce the risk of flooding to the Lower Ninth Ward communities. The levee is under the authority of the Orleans Levee District (USACE 2013).
- Maxent Lagoon Non-Federal Levee: The non-Federal levee is located along the western border of the Bayou Sauvage NWR extending from Pump Station #15 at the confluence of the GIWW and Maxent Canal north to Interstate 10. The levee aids to provide risk reduction from storms for the communities in eastern New Orleans, LA and is under the authority of the Sewerage and Water Board of New Orleans (SWBNO). After Hurricane Katrina, the levee was rebuilt and raised by SWBNO and USFWS to provide additional hurricane risk reduction (USACE 2013).
- Mississippi River Gulf Outlet (MRGO): The MRGO was authorized in 1956 by the Act of Congress, Public Law 84-455, to provide a shorter navigational route between the New Orleans area and the Gulf of Mexico. The deep draft navigational channel construction was completed in 1968. After the devastating effects of Hurricane Katrina, the channel from the GIWW to the Gulf of Mexico was de-authorized in 2007 by section 7013 of WRDA 2007, Public Law 110114 (USACE 2013).
- Mississippi River Levees: Mississippi River & Tributaries (MR&T) Project: The Flood Control Act of 1928 was enacted as a response to the 1927 flood and authorized the MR&T Project as a comprehensive flood control project. The purpose of the MR&T Project is to control riverine flooding in the alluvial valley of the lower Mississippi River below Cape Girardeau, Missouri. The four major elements of the MR&T Project are: (1) levees for containing flood flows; (2) floodways for the passage of excess flows past critical reaches of the Mississippi River; (3) channel improvement and stabilization in order to provide an efficient navigation alignment, increase the flood-carrying capacity of the River, and for protection of the levee system; and (4) tributary basin improvements for major drainage and flood control, such as dams, reservoirs, pumping plants, auxiliary channels. Due to the large spatial area of the Mississippi River, implementing the MRL Program is a joint effort of USACE Vicksburg District (CEMVK), the New Orleans District (CEMVN) and the Memphis District (CEMVM). The MRL system in the CEMVN extends along the Mississippi River west bank from the vicinity of Black Hawk, LA, generally southward to the vicinity of Venice, LA and on the east

bank from Baton Rouge, LA to Bohemia, LA, encompassing over 500 miles of levee and associated infrastructure (USACE 2013; USACE 2004a).

- Mississippi River Navigation Operations and Maintenance: Operations and maintenance of the Mississippi River by the USACE for navigational purposes (USACE 2013).
- Monticello Non-Federal Levee: A non-Federal flood risk reduction levee constructed in 1913 extending north/south along Monticello Avenue from the Mississippi River levee to the 17th Street Canal pumping station in Jefferson Parish, LA (USACE 2013).
- Morgan City/St. Mary Flood Protection STATE (TV-55): Continuing the advancement of the parish master plan for improvements to the Morgan City levee system, this project is providing flood risk reduction improvements by raising or improving 2.5 miles of the current levee system from Lake End Park to Justa Street in the Morgan City area, reducing the risk of flooding from tropical storm events. Construction began in October 2016 and was completed in March 2018. (CPRA 2018).
- MRGO Closure at Bayou La Loutre (PO-38-SF): The rock closure structure was built across the MRGO channel near Bayou la Loutre as a result of the de-authorization of the MRGO. The closure was authorized by section 7013 of WRDA 2007, Public Law 110-114 and completed in 2009 (USACE 2013).
- Oakville to La Reussite NFL: The non-federal hurricane risk reduction levee located in Plaquemines Parish was built in the late 1960s, early 1970s to reduce flood risk in the vicinity of the communities of Oakville, Jesuit Bend, Ollie, Naomi and La Reussite. The levee system is under the authority of the Plaquemines Parish Government and currently varies in elevation from 2 feet to 7 feet. This is a non-federal project (USACE 2011a).
- Ormond Non-Federal Levees: A non-Federal flood risk reduction levee in St Charles Parish built to reduce the risk of flooding to the areas in the vicinity of Ormond in Destrehan, LA. The levee is bounded by Airline Highway on the north and the railroad tracks in Destrehan to the south within the Pontchartrain Levee District (USACE 2013).
- Raising of LA-1 at Golden Meadow Floodgate and Completion of Golden Meadow Lock Structure, LWCPRA (TE-135): Construction was completed in 2010 (CPRA 2017c).
- St. Charles Parish West Bank Hurricane Protection Levee – West Bank Willow Ridge Phase 2, BA-85-2: includes earthen levees, a maintenance access road, drainage canals, tidal exchange structures, concrete t-walls, and a drainage pumping station. Construction of the Willowridge earthen levee and drainage canals has been completed. The Willowridge Pump Station, tidal exchange structures, Willowdale Pump Station T-Wall, and earthen levee tie-in to the Davis Pond Freshwater Diversion West Guide Levee on the eastern terminus was completed in November 2017. (SCPG 2018; CPRA 2017e; Fonseca 2013; SCPG 2013; Schiltz 2012).

- Southeast Louisiana Urban Flood Control Project (SELA) PO-57 – Jefferson Parish: : In Jefferson Parish, SELA construction will improve 24 drainage canals, add pumping capacity to four pump stations and the construct two new pump stations. Jefferson Parish will have the capacity to pump an additional 21,500 gallons per minute on the east bank and 28,000 gallons per minute on the west bank. In regards to funding that has been received, 59 of 59 contracts have been completed. The final contract in Jefferson Parish was completed in September 2017. Two 533(d) Reports, Hoey's Basin Plan and West of Segnette Plan, remain to be funded. Currently waiting on construction appropriations to complete these two 533(d) Reports (Urban 2018).
- Waterline Booster Pump Station, East Bank CIAP (PO-71): The project, constructed in 2011, includes the installation of a waterline booster pump station in Convent, LA along LA Highway 44 in St. James Parish (USACE 2013).
- West Plaquemines NFL: The non-federal hurricane risk reduction levee was largely constructed in the late 1960s, early 1970s by the Plaquemines Parish government and private entities to reduce flooding risk to the communities between La Reussite and Point Celeste, Louisiana. The levee system is under the authority of the Plaquemines Parish Government and currently varies in elevation from 2 feet to 7 feet. This is a non-federal project (USACE 2011a).

Flood risk reduction and navigation projects currently under construction or reasonably foreseeable include:

- Cut-Off/Pointe aux Chene, CBDG: (TE-78): This project will fill in the missing gap that is currently in the existing levee system. The 2.5 miles levee will be constructed along Grand Bayou and tie into the existing levee systems on each end. Construction began in August 2017 and is anticipated for completion in January 2020 (CPRA 2018).
- Hurricane and Storm Damage Risk Reduction System (HSDRRS), Lake Pontchartrain and Vicinity (LPV): The project is currently under construction by the USACE and provides flood damage risk reduction against a storm which has a 1 percent chance of occurring in a given year (100-year level of risk reduction). The 126-mile risk reduction system includes the construction and/or enhancement to existing levees, floodwalls, pumps, canal closures, floodgates and a storm barrier and would provide storm damage risk reduction to the New Orleans Metropolitan Area on the east bank of the Mississippi River including portions of Jefferson, Orleans, St. Bernard, and St. Charles Parishes. The project was authorized as the Lake Pontchartrain and Vicinity, Louisiana Project (LPV) by the Flood Control Act of 1965 and the Water Resources Development Acts of 1974, 1986, 1990, 1992, 1996, 1999, and 2000. Additional emergency supplemental appropriations aimed at completing, restoring, and improving the project were authorized by Congress following Hurricane Katrina and include 3rd Supplemental (PL 109-148, Title 1,Chapter 3, [119 STAT. 2761-2763]), 4th Supplemental (PL 109-234, Title II, Chapter 3, [120 STAT. 454-455]), 5th

Supplemental (PL 110-28, Title IV, Chapter3, [121 STAT. 153-154]), 6th Supplemental (PL 110-252, Title III, Chapter 3, [122 STAT. 2349-2350]), and 7th Supplemental (PL 110-329 Title I, Chapter 3 [122 STAT. 3589-3590]). Construction of the 100 year features began in July 2007 and is over 80 percent complete. Anticipated completion date for the entire LPV HSDRRS system is June 2020 (Erwin 2018b).

- HSDRRS, West Bank and Vicinity (WBV): The Federal HSDRRS is currently under construction by the USACE to provide risk reduction against a storm which has a 1% chance of occurring in a given year (100-year level of risk reduction). The 91-mile risk reduction system includes the construction, enhancement and/or replacement of levees, floodwalls, floodgates, closure structures, and pumping stations to provide hurricane and storm damage risk reduction to the New Orleans Metropolitan Area on the west bank of the Mississippi River including portions of Jefferson, Orleans, Plaquemines, and St. Charles parishes. The project was originally authorized and modified by the Water Resources Development Acts of 1986, 1996, 1999 and became known as the West Bank and Vicinity, Louisiana Project (WBV). Additional emergency supplemental appropriations aimed at completing the system were authorized by Congress following Hurricane Katrina and include 3rd Supplemental-2006 (PL 109-148, Title 1,Chapter 3, [119 STAT. 2761-2763]), 4th Supplemental-2006 (PL 109-234, Title II, Chapter 3, [120 STAT. 454-455]), 5th Supplemental-2007 (PL 110-28, Title IV, Chapter3, [121 STAT. 153-154]), 6th Supplemental-2008 (PL 110-252, Title III, Chapter 3, [122 STAT. 2349-2350]), and 7th Supplemental-2009 (PL 110-329 Title I, Chapter 3 [122 STAT. 3589-3590]). Construction began in March 2007 and is approximately 95% complete. Anticipated completion date for the construction of the WBV HSDRRS (excluding armoring) is June 2020 (Soraghan 2018; USACE 2017b; USACE 2012a).
- IHNC Lock Replacement: The lock, completed in 1923, allows for navigational passage between Lake Pontchartrain and the Mississippi River via the IHNC/GIWW in Orleans Parish, LA. The lock was originally authorized for replacement by the River and Harbors Act of 1956 to allow for the expansion of the navigational lock passage to accommodate larger vessels and alleviate traffic congestion. The IHNC Replacement was authorized by Public Law 455, Chapter 112, 84th Congress, 2nd Session, approved March 29, 1956 and modified by Section 844 of the Water Resources Development Acts (WRDA) of 1986 and then amended by Section 326 of the WRDA of 1996. The supplemental EIS has been prepared and is presently on hold (USACE 2018a; USACE 2013).
- Jean Lafitte Tidal Protection/Fisher School Basin State of Louisiana-Surplus Fund 2007 project, (BA-75-1): This project involves the enhancement of existing levees originally constructed by the West Jefferson Levee District on the eastern and southern side of the community of Jean Lafitte, Louisiana. It also includes new levee construction and installation of floodwalls and floodgates along the eastern bank of Bayou Barataria and in gaps in the levee system on the eastern and southern side of Jean Lafitte, Louisiana to provide flood risk reduction to the

community within the Fischer School Basin. The project will be implemented by Jefferson Parish and the Lafitte Area Independent Levee District. Construction began in February 2014 and is anticipated for completion by November 2019. Funding for construction is also provided through Surplus Fund 2009 project, BA-75-4, Lafitte Levee Protection (CPRA 2018; CPRA 2017f; CPRA 2012; Harper 2012).

- Jean Lafitte Tidal Protection/Rosethorne Basin, State of Louisiana-Surplus Fund 2007 project, (BA-75-2): This project will provide flood risk reduction improvements consisting of new earthen levees, reinforced concrete floodwall and flood gates to 8.0 NAVD. This project is being led by the Lafitte Area Independent Levee District. Construction began in Oct 2018 and is anticipated for completion by August 2020 (CPRA 2018; CPRA 2017f; CPRA 2017c).
- Lafitte Area Levee Repair, CDBG funded project (BA-82): This project will repair damages to the existing levees in the Fisher Basin Area. This damage was caused by heavy equipment and vehicles used on the levee for flood fighting activities during Ike and Gustav. This project will provide for a 4 inch lift on approximately a 5 mile stretch of levee. Construction began in April 2018 is anticipated for completion by February 2019 (CPRA 2017f; CPRA 2018).
- Larose to Golden Meadow, Louisiana, Project (LGM): The project, originally authorized by the Flood Control Act of 1965 (PL-89-298), consists of approximately 48 miles of levees and floodwalls including two floodgates across Bayou Lafourche at the project's northern and southern ends. Eight (8) pumping stations were constructed in place of the authorized gravity drainage structures at the request and additional expense of the South Lafourche Levee District. The project is designed to provide risk reduction to the communities along the east and west banks of Bayou Lafourche, extending from Larose to just south of Golden Meadow in Lafourche Parish, Louisiana from tidal and hurricane surge flooding. The majority of the original 1965 project has been constructed as authorized, however due to subsidence and datum changes the project is not currently at the 1965 authorized elevations. The remaining unconstructed features are expected to be completed no later than 2017. A Post-Authorization Change, Limited Reevaluation Report, (Level 3 Economic Update) was submitted to CEMVD on 3 June 2015. This report provided the total BCR, the remaining BCR, and an initial assessment of potential Federal interest in modifying the 1965 authorized project should the non-Federal sponsor decide to cost share a new General Reevaluation Report (USACE 2017a; Wilson-Prater 2013; USGPO 2011; USACE 1985).
- Morganza to the Gulf: This project was authorized by the WRDA 2007 and subsequently re-authorized by the Water Resources Reform and Development Act (WRRDA) of 2014 due to revised post-Katrina requirements. The project is currently being designed to provide risk reduction to Terrebonne and portions of Lafourche parishes to provide risk reduction against the project storm event. When complete, the project will consist of construction of 66 miles of levees and t-walls, navigation structures, water control structures and floodgates. Some

portions of the project have begun construction in November 2005, however federal funds have not yet been appropriated for to complete construction (CPRA 2018; USACE 2018b).

- New Orleans to Venice (NOV) Project, St Jude to Venice: The Federal hurricane and storm damage risk reduction project, originally authorized by the Flood Control Act of 1962, was designed to provide risk reduction to the communities between St. Jude to Venice, Louisiana located on the west bank of the Mississippi River including the back levee in Plaquemines Parish. The project was approximately 85 percent complete prior to Hurricane Katrina. Following Hurricane Katrina, Congress authorized repair, restore, armor, and accelerate the completion of the project through additional emergency supplemental appropriations: 3rd Supplemental-2006 (PL 109-148, Title 1,Chapter 3, [119 STAT. 2761-2763]), 4th Supplemental-2006 (PL 109-234, Title II, Chapter 3, [120 STAT. 454-455]), 6th Supplemental-2008 (PL 110-252, Title III, Chapter 3, [122 STAT. 2349-2350]), and 7th Supplemental-2009 (PL 110-329 Title I, Chapter 3 [122 STAT. 3589-3590]). Post-Hurricane Katrina construction began in October 2012 and construction is anticipated for completion by 2023 (USACE 2017a; USACE 2011b).
- NOV, Incorporation of non-Federal Levees (NFL) into NOV: The NFL provides approximately 34 miles of risk reduction for the communities between Oakville and St. Jude, Louisiana, including evacuation routes, located on the west bank of the Mississippi River in upper Plaquemines Parish. The NFL connects to the WBV HSDRRS levees at the Eastern Tie-In near Oakville, Louisiana. Construction will improve and incorporate the NFL, into the Federal NOV project. The incorporation of certain levee components into NOV was authorized by Congress following Hurricane Katrina through additional emergency supplemental appropriations: 4th Supplemental-2006 (PL 109-234, Title II, Chapter 3, [120 STAT. 454-455]), 5th Supplemental-2007 (PL 110-28, Title IV, Chapter3, [121 STAT. 153-154]), and 6th Supplemental-2008 (PL 110-252, Title III, Chapter 3, [122 STAT. 2349-2350])). Construction began in September 2012 and is anticipated for completion by 2023 (USACE 2017a; USACE 2011a; USACE 2009).
- St. Charles Parish West Bank Hurricane Protection Levee – West Bank Magnolia Ridge Phase 1, BA-85-1: Uplift of the existing non-federal earthen levee on the west bank of Magnolia Ridge in St. Charles Parish to reduce the risk of flooding to communities near Boutte and Paradis, Louisiana. Other structures to be built include pumping stations and other freshwater interchange features including the closure of Paradis Canal. Construction began in December 2013 and phase 1 currently has a partially constructed earthen levee, including a first lift. A second lift, tidal interchange structures, concrete t-walls, maintenance access road, a canal gate are in final design phase approval. The Magnolia Ridge Pump Station construction notice to proceed was issued in December 2017 and is anticipated for completion in April 2019 (SCPG 2018; CPRA 2017e; CPRA 2017f; Fonseca 2013; Schiltz, 2012).

- St. Charles Parish West Bank Hurricane Protection Levee – West Bank Ellington Phase 3, BA-85-3: Construction of a non-federal levee with estimated crown elevation of seven feet to reduce the risk of flooding in the vicinity of Ellington in St. Charles Parish. Phase 1 was completed in March 2018. Phase 2 construction bid was awarded in the first quarter of 2018. As of February 2018, the Ellington Pump Station 90% final design documents have been submitted to the Parish for review and DOTD Statewide Flood Control Program has recommended the inclusion of the pump station within the FY2017/2018 construction program. (SCPG 2018; CPRA 2017e; Fonseca 2013; SCPG 2013; Schiltz 2012).
- St. Mary Backwater Flooding, LWCPRA (TE-116): As part of the parish master plan to improve the Morgan City levee system to 100-year level of flood risk reduction, the St. Mary Parish Consolidated Gravity Drainage District No. 2 is adding elevation to a half-mile stretch of land beneath the road bed of Highway 70, an important evacuation route that serves as a levee near Lake End Park, and replacing the capacity of two older pump stations with a new one on the bank of Lake Palourde. Construction began in May 2017 and anticipated for completion in January 2020 (CPRA 2018).
- Southeast Louisiana Urban Flood Control Project (SELA) PO-57 – Orleans Parish: In Orleans Parish, SELA construction will improve 16 major drainage canals, add pumping capacity to two pump stations and construct two new pump stations. Orleans Parish will have the capacity to pump an extra 9,300 gallons of storm water runoff per minute based on SELA improvements. In regards to funding that has been received, 16 of 21 contracts have been completed. Estimated completion date of the final funded contract is estimated for the end of calendar year 2021. One 533(d) Report for the Orleans Outfall Canal Plan remains to be funded. Currently waiting on construction appropriations for this 533(d) Report and remaining Algiers Sub-basin contracts (Urban 2018).
- Southeast Louisiana Urban Flood Control Project (SELA) PO-57– St. Tammany Parish: Work in St. Tammany Parish is unfunded. Planned improvements include channel enlargements, bridge replacement, a pump station, detention ponds, levees, T-walls and the elevation of flood-prone structures. The W-14 Canal Improvements 533(d) study in Slidell (St. Tammany Parish) was completed and approved in July 2012. Currently awaiting construction appropriations to construct the W-14 Canal Improvements. In addition, also awaiting construction appropriations to complete six 533(d) Reports for Mandeville Hurricane Risk Reduction, Mile Branch Channel Improvements, Bayou Chinchuba Improvement Plan/Structure Raising Plan, Abita Springs Structure Raising Plan, Lacombe Structure Raising Plan, Schneider Canal Hurricane Risk Reduction (Urban 2018).
- Violet Canal North Levee Alignment, LWCPRA (BA-170). The construction of a levee/floodwall in the vicinity of the Violet Canal, to maintain flood risk reduction for the public and provide mutual benefit to the citizens within the territorial jurisdiction of OLD and LBBLD. The floodwall is required for the certification of

the Forty Arpent and Florida Avenue levee system located in Orleans Parish and St. Bernard Parish. Construction began in November 2017 and is anticipated for completion in 2019 (CPRA 2018).

3.0 AFFECTED ENVIRONMENT

This section describes the natural and human environment as well as the relevant resources of the project area. A description of the affected environment of the complete NFL project area is presented in the FEIS, the NOV project area is presented in the SEIS, and both projects are discussed in EA 537, as well as EA 543 and all documents are incorporated herein by reference.

3.1 ENVIRONMENTAL SETTING

Description of the Watershed

The Barataria Basin Watershed is bounded to the north and east by the Mississippi River, to the south by a chain of barrier islands that separates the Basin from the Gulf of Mexico and to the west by Bayou Lafourche (figure 1). The southern half of the Basin consists of tidally influenced marshes connected to a large bay system behind the barrier islands. Major features in the Basin include: Lac des Allemands and adjacent wetlands in St. John the Baptist Parish, Lake Cataouatche, Lake Salvador and adjacent wetlands in St. Charles Parish, the Pen, Barataria Bay and adjacent wetlands in Jefferson Parish, Lake Judge Perez, Bay Batiste, and Bastian Bay as well as adjacent wetlands and small lakes and water bodies in Plaquemines Parish, Louisiana (Appendix A figure A-2).

The deltaic plain is bounded to the west by the Vermilion/Iberia Parish line to the east by the Pearl River in St. Tammany Parish. Though the northern limits of the deltaic plain proceed farther north than indicated on Appendix A figure A-2, since the outstanding brackish marsh and swamp impacts occurred within the Louisiana Coastal Zone, the northern boundary of LA CZ was used to limit the investigations of additional mitigation options for this EA. Major estuaries within the deltaic plain include the same as the Basin, but also include Vermilion Bay, West Cote Blanche Bay, Lake Maurepas, Lake Pontchartrain, and Lake Borgne (see Appendix A figure A-2).

Geomorphic and Physiographic Setting

Most of the present landmass of southeast LA was formed by deltaic processes of the Mississippi River. The predominant soil types within the deltaic plain and the Barataria Basin come from Holocene deposits and consist of fat clays (CH) and lean clays (CL) with some interbedded strata of organic clays (OH), silts (ML) and sands. The physiography of the area includes natural levees, manmade levees, fresh, intermediate, brackish, saline marshes, swamps, lakes and bays, barrier islands, and estuaries.

Subsidence rates are high and marshes and barrier islands regularly degrade as result of storm events and saltwater intrusion

Climate

The deltaic plain and the Basin are located within a subtropical latitude. The climate is influenced by the many water surfaces of the nearby wetlands, rivers, lakes, streams, and the Gulf of Mexico. Throughout the year, these water areas modify relative humidity and temperature conditions, decreasing the range between the extremes. Summers are long and hot, with an average daily temperature of 82° Fahrenheit (°F), average daily maximum of 91°F, and high average humidity. Winters are influenced by cold, dry polar air masses moving southward from Canada, with an average daily temperature of 54°F and an average daily minimum of 44°F. Annual precipitation averages 54 inches.

3.2 RELEVANT RESOURCES

Table 7 of this section contains a list of the relevant resources located in the study area and those located within the vicinity of the proposed mitigation projects and describes those resources that would be impacted, directly or indirectly, by construction of the project. There would be no impacts to prime and unique farmlands or visual aesthetics as neither have been identified in any of the project areas. Therefore, these resources will not be discussed further aside from the description in Table 7.

The resources described in this section are those recognized as significant by laws, executive orders (EOs), regulations, and other standards of Federal, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public. See Appendix A Figure A-10, for the vegetative habitats found in the Barataria Basin and the deltaic plain. See Appendix B tables B-13, B-14, B-15 and B-16, for scientific names of species identified throughout the document.

Table 7. Relevant Resources.

Resource	Institutionally Important	Technically Important	Publicly Important
Wetlands	Clean Water Act of 1977, as amended; Executive Order 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968., EO 11988, and Fish and Wildlife Coordination Act.	They provide necessary habitat for various species of plants, fish, and wildlife; they serve as ground water recharge areas; they provide storage areas for storm and flood waters; they serve as natural water filtration areas; they provide protection from wave action, erosion, and storm damage; and they provide various consumptive and non-consumptive recreational opportunities.	The high value the public places on the functions and values that wetlands provide. Environmental organizations and the public support the preservation of marshes.
Essential Fish Habitat (EFH)	Magnuson-Stevens Fishery Conservation and Management Act of 1996, Public Law 104-297	Federal and state agencies recognize the value of EFH. The Act states, EFH is “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity."	Public places a high value on seafood and the recreational and commercial opportunities EFH provides.
Bottomland Hardwood Forest	Section 906 of the Water Resources Development Act of 1986 and the Fish and Wildlife Coordination Act of 1958, as amended.	Provides necessary habitat for a variety of plant, fish, and wildlife species; it often provides a variety of wetland functions and values; it is an important source of lumber and other commercial forest products; and it provides various consumptive and non-consumptive recreational opportunities.	The high priority that the public places on its esthetic, recreational, and commercial value.
Wildlife	Fish and Wildlife Coordination Act of 1958, as amended.	They are a critical element of many valuable aquatic and terrestrial habitats; they are an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources.	The high priority that the public places on their aesthetic, recreational, and commercial value.
Threatened and Endangered Species	The Endangered Species Act of 1973, as amended; the Marine Mammal Protection Act of 1972; and the Bald Eagle Protection Act of 1940, and the Migratory Bird Treaty Act of 1918.	USACE, USFWS, NMFS, Natural Resource Conservation Service (NRCS), USEPA, LDWF, and LDNR cooperate to protect these species. The status of such species provides an indication of the overall health of an ecosystem.	The public supports the preservation of rare or declining species and their habitats.

Resource	Institutionally Important	Technically Important	Publicly Important
Aquatic Resources and Fisheries	Fish and Wildlife Coordination Act of 1958, as amended; Clean Water Act of 1977, as amended; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968.	They are a critical element of many valuable freshwater and marine habitats; they are an indicator of the health of the various freshwater and marine habitats; and many species are important commercial resources.	The high priority that the public places on their esthetic, recreational, and commercial value.
Cultural Resources	National Historic Preservation Act of 1966, as amended; the Native American Graves Protection and Repatriation Act of 1990; and the Archeological Resources Protection Act of 1979	Cultural resources are finite and non-renewable resources that include, but are not limited to both prehistoric and historic archaeological sites, historic standing structures, landscapes, and other culturally valued aspects of the environment, as well as sociocultural attributes, such as social cohesion, social institutions, life ways, religious practices, and other cultural institutions. Historic properties include districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places, and federal agencies are required to consider the effects of their actions on such properties.	Humans relate to their environment through their culture, and historic and cultural resources provide insights into ways of life, both past and present. The protection and enhancement of historic and cultural resources is in the best interest of the public, and federal agencies also have trust and treaty responsibilities to tribes, which are partially fulfilled through the preservation and protection of trust resources and the consideration of potential effects on natural and cultural resources.
Recreation Resources	Federal Water Project Recreation Act of 1965 as amended and Land and Water Conservation Fund Act of 1965 as amended	Provide high economic value to local, state, and national economies.	Public makes high demands on recreational areas. There is a high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana; and the large per-capita number of recreational boat registrations in Louisiana.
Navigation	Rivers and Harbors Act of 1899 and River and Harbor Flood Control Act of 1970 (PL 91-611).	The Corps provides safe, reliable, efficient, and environmentally sustainable waterborne transportation systems (channels, harbors, and waterways) for movement of commerce, national security needs, and recreation.	Navigation concerns affect area economy and are of significant interest to community.
Noise	Noise Control Act of 1972 (P.L. 92-574)	The Noise Control Act of 1972 (P.L. 92-574) directs Federal agencies to comply with applicable Federal, state, interstate, and local noise control regulations.	Continuous and long-term noise levels in excess of DNL 65 dBA are normally unacceptable for noise-sensitive land uses such as residences, schools, churches, and hospitals.

Resource	Institutionally Important	Technically Important	Publicly Important
Socio-Economic	River and Harbor Flood Control Act of 1970 (PL 91-611), USACE ER 1105-2-100, and National Environmental Policy Act of 1969.	When an environmental document is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental document will discuss all of these effects on the human environment.	Government programs, policies and projects can cause potentially significant changes in many features of the socioeconomic environment. Social concerns and items affecting area economy are of significant interest to community.
Environmental Justice	Executive Order 12898 and the Department of Defense's Strategy on Environmental Justice of 1995,	The tentatively selected plans may have positive or disproportionately adverse impacts on the social and economic welfare of minority and/or low-income populations.	Public concerns about the fair and equitable treatment (fair treatment and meaningful involvement) of all people with respect to environmental and human health consequences of federal laws, regulations, policies, and actions.
Air Quality	Clean Air Act of 1970, Louisiana Environmental Quality Act of 1983.	State and Federal agencies recognize the status of ambient air quality in relation to the NAAQS.	Virtually all citizens express a desire for clean air.
Water Quality	Clean Water Act of 1977, Fish and Wildlife Coordination Act, Coastal Zone Mgt Act of 1972, and La State & Local Coastal Resources Act of 1978.	USACE, USFWS, NMFS, NRCS, USEPA, and State DNR and wildlife/fishery offices recognize value of fisheries and good water quality. National and state standards have been established to assess water quality.	Environmental organizations and the public support the preservation of water quality and fishery resources and the desire for clean drinking water.

3.2.1 Study Area

Wetlands and Other Surface Waters

Wetlands and other surface waters originally described in the NFL EIS, NOV SEIS, EA 537, and EA 543 are incorporated herein by reference. Wetlands include ditches, drainage canals, wet bottomland hardwoods (BLH-Wet), cypress tupelo swamp, wet pasture, freshwater marsh, intermediate marsh, brackish marsh, and saline marsh habitats.

Wetlands are semiaquatic lands that are flooded or saturated by water for varying periods of time. For an area to be delineated as a wetland it must exhibit appropriate hydrology, contain hydric soils, and support hydrophytic vegetation (USACE 1987). Palustrine habitats consist of freshwater wetlands that support natural vegetation that is either primarily woody or herbaceous. Palustrine wetlands are dominated by woody vegetation such as BLH-Wet, swamp, wet subsided ridge, wet scrub shrub, and batture forest. BLH-Wet forests are dominated by *Quercus nigra* (water oak), nuttall oak, green ash, red maple, and *Carya glabra* (pignut hickory) which have seasonal flooding. Swamps are flooded forests dominated by bald cypress and water tupelo gum trees. Wet pasture and freshwater marsh are dominated by herbaceous or non woody vegetation. Fresh marsh species include *Typha latifola* (cattail), *Nymphaea odorata* (water lily), iris (*Iris* sp.), *Lemna* sp. (duckweed), *Zizaniopsis miliaceae* (cutgrass), *Zizania aquatic* (wild rice), and bulltongue. Intermediate marsh, brackish marsh, saline marsh exist in estuarine habitats. Submerged aquatic vegetation (SAV)/open water habitat are also prevalent within the Basin. Intermediate marsh can have fresh and brackish marsh species present. Brackish marsh species include *Carex* sp. (sedges), *Juncus* sp. (rushes), *Phragmites* sp. (reeds), and are mostly dominated by salt meadow cordgrass. Saline marshes are dominated by *Spartina alterniflora* (smooth cordgrass) and *Juncus roemerianus* (black needle rush); however, brackish species can also be present. See Appendix A Figure A-10 for the habitats within the Basin and Deltaic Plain and Appendix B Table B-13 for a list of plant species referenced in this document and their scientific names.

Various mitigation banks exist within the Basin and the deltaic plain that have restored wetland habitat. These banks may be capable of supplying credits to meet the swamp and brackish marsh mitigation requirements. Since the bank(s) that may ultimately be selected to provide the necessary mitigation credits is unknown, the existing conditions present at the bank site(s) are also unknown. Existing bank habitat quality varies depending on the success criteria met, as specified in the bank's MBI. Typically, as mitigation success criteria are met and the quality of the habitat increases within the bank, more credits are released for purchase.

Wildlife

Louisiana's coastal wetlands support numerous Neotropical and other migratory avian species, such as rails, gallinules, shorebirds, wading birds, and numerous songbirds.

The rigors of long distance flight require most Neotropical migratory birds to rest and refuel several times before they reach their final destination. Louisiana coastal wetlands provide Neotropical migratory birds with essential stopover habitat on their annual migration routes. Passerine birds common to the project areas include sparrows, vireos, warblers, northern mockingbirds (*Mimis polygottos*), common grackles (*Quiscalus quiscula*), red-winged blackbirds (*Agelaius phoeniceus*), marsh wrens (*Cistothorus palustris*), blue jays (*Cyanocitta cristata*), northern cardinals (*Cardinalis cardinalis*), and American crows (*Corvus brachyrhynchos*). The coastal wetlands in the Basin and the Deltaic Plain provide important fish and wildlife habitats, especially transitional habitat between estuarine and marine environments, used for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements.

Emergent and submerged aquatic vegetation (SAV) and fresh, intermediate, brackish, and saline marsh wetlands are typically used by many different wildlife species, including: nutria (*Myocaster coypus*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), river otter (*Lutra canadensis*), white-tailed deer (*Odocoileus virginianus*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), swamp rabbit (*Sylvilagus aquaticus*), eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), nine-banded armadillo (*Dasypus novemcinctus*), coyote (*Canis latrans*), and a variety of smaller mammals. The Basin and the deltaic plain also provide habitat for the American alligator (*Alligator mississippiensis*), various species of salamanders, frogs, toads, turtles, as well as several species of venomous and non-venomous snakes.

Open water habitats within the Mississippi Delta provide wintering and multiple use functions for American white pelican (*Pelecanus erythrorhynchos*) and brown pelicans (*P. occidentalis*), seabirds, and other open water residents and migrants. Open water habitats provide wintering and multiple use functions for brown pelicans, seabirds, dabbling and diving ducks, coots, and gallinules as well as other open water residents and migrants (LCWCRTF & WCRA, 1999). Various raptors such as the great horned owl (*Bubo virginianus*), barred owl (*Strix varia*), red-shouldered hawk (*Buteo lineatus*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), red-tailed hawk (*Buteo jamaicensis*), and bald eagle (*Haliaeetus leucocephalus*) may be present.

Bottlenose dolphins are protected under the Marine Mammal Protection Act of 1972, and are found in temperate and tropical waters around the world including Lake Pontchartrain and Lake Borgne. There are coastal populations that migrate into bays, estuaries and river mouths as well as offshore populations that inhabit waters along the continental shelf. Their coloration ranges from light gray to black with lighter coloration on the belly. Inshore (coastal) and offshore individuals vary in color and size. Inshore animals are smaller and lighter in color, while offshore animals are larger, darker in coloration and have smaller flippers. Coastal animals prey on benthic invertebrates and fish, and offshore animals feed on squid and fish.

A list of common wildlife species found in the Basin and the deltaic plain as well as their scientific names is provided in Appendix B, Table B-14.

Threatened, Endangered, and Protected Species

Within the state of Louisiana, there are 30 animal and three plant species (some with critical habitat) under the jurisdiction of the USFWS and/or the NMFS, presently classified as endangered or threatened. Of those 30 species, Table B-15 of Appendix B identifies 17 species that are known to occur in the Deltaic Plain and parishes where projects in the final array are situated. Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is listed in Plaquemines Parish, however, its range doesn't extend west of the Mississippi River; it is also listed in St. Tammany where the Big Branch and Fritchie brackish marsh projects are located. The USFWS and the NMFS share jurisdictional responsibility for sea turtles. CEMVN has made a 'no effect' determination for piping plover (*Charadrius melodus*), red knot (*Calidris canutus*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretomchelys imbricata*), Kemp's Ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*) species, and a 'not likely to adversely affect' determination for pallid sturgeon (*Scaphirhynchus albus*) and the West Indian manatee (*Trichechus manatus*). Currently, the West Indian manatee has been reclassified from endangered to threatened as a result of improvements to its population and the habitat necessary for its survival (https://www.fws.gov/news/ShowNews.cfm?ref=u.s.-fish-and-wildlife-service-to-reclassify-west-indian-manatee-from-&_ID=35428).

Other species that were listed on the Endangered Species List, but have since been de-listed because population levels have improved are the bald eagle and the brown pelican. The bald eagle is protected under the Bald and Golden Eagle Protection Act (BGEPA), and the Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.). In southeastern Louisiana parishes, eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water.

Currently, American alligators and shovelnose sturgeon are listed as threatened under the Similarity of Appearance clause in the Endangered Species Act (ESA) of 1973, as amended, but are not subject to ESA Section 7 consultation.

Colonial nesting wading/water birds and shorebirds are protected under the Migratory Bird Treaty Act ((MBTA) 40 Stat. 755, as amended; 16 U.S.C. 703 et seq.). Colonial nesting wading/water birds are generally considered all species of herons, egrets, night herons, ibis, roseate spoonbill, pelicans, anhinga and cormorants. These birds typically nest and forage in wetlands and open water areas so they could be present in the project area. Shorebirds are considered all species of gulls, terns and skimmers. These species typically forage and nest on sandy shorelines and mudflats so have the potential to be in the project area but it is unlikely.

The Louisiana Natural Heritage Program (LNHP) of Louisiana Department of Wildlife and Fisheries (LDWF) has developed its own lists and monitors the status of rare, threatened and endangered species, and natural communities for each parish of the

state. This information includes the state and global rank and state and Federal status for species, and the state and global rank for rare habitats. The species and habitats listed by the State of Louisiana may be found at http://www.wlf.louisiana.gov/wildlife/species-parish-list.

Fisheries, Aquatic Resources, and Water Quality

The NMFS oversees and manages our Nation's domestic fisheries through development and implementation of fishery management plans and actions. The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), first enacted in 1976, amended in 1996, and reauthorized in 2006, is the primary law governing marine fisheries management in United States Federal waters to end overfishing, promote market-based management approaches, improve science, serve a larger role in decision-making, and enhance international cooperation.

Major water bodies within the Basin and the Deltaic Plain that may be impacted include Lake Maurepas, Lake Pontchartrain, Lake Borgne, Lake Judge Perez, Breton Sound, Chandeleur Sound, and the Mississippi River. These water bodies and adjacent wetlands provide nursery and foraging habitats which support varieties of economically, recreationally, and ecologically important marine species including striped mullet, Atlantic croaker, Gulf menhaden, spotted and sand sea trout, southern flounder, black drum, and blue crab as well as freshwater fish species such as trout, perch, catfish, sunfish, carp, minnows, and shiner, and crustaceans (shrimp, crabs), and mollusk species (oysters, mussels, and clams). Specific species and common names are listed in Appendix B-16. Some of these species also serve as prey for other fish species managed under the MSFCMA by the Gulf of Mexico Fishery Management Council (e.g., mackerel, snapper, and grouper) and highly migratory species managed by NMFS (e.g., billfish and shark).

The existing emergent wetlands and shallow open water within the project areas provide important habitat and Essential Fish Habitat (EFH), including transitional habitat between estuarine and marine environments used by migratory and resident fish, as well as other aquatic organisms for nursery, foraging, spawning, and other life requirements. Historically and currently, the area provides valuable recreational and commercial fishing habitat, oyster culture, and nursery areas for a wide variety of finfish and shellfish (Rounsefell, 1964; Penland et al., 2002).

The project area encompasses all or part of five U.S. Geological Survey (USGS) Cataloging Units: 08090202 – Lake Pontchartrain, 08090203 – Eastern Louisiana Coastal Watershed, 08090201 – Liberty Bayou-Tchefuncta Watershed, 08070205 – Tangipahoa Watershed, and 08070204 – Lake Maurepas Watershed. Within each of these Cataloging Units, the state has delineated hydrologic units, or subsegments, within the state.

Section 305(b) of the Clean Water Act requires each state to monitor and report on surface and groundwater quality, which USEPA synthesizes into a report to Congress. The Louisiana Department of Environmental Quality (LDEQ) produces a Section 305(b) Water Quality Report that provides monitoring data and water quality summaries for hydrologic units (sub-segments) throughout the state.

Water quality criteria are elements of state water quality standards that represent the quality of water that will support a particular designated use. These criteria are expressed as constituent concentrations, levels, or narrative statements. There are currently eight designated uses adopted for Louisiana's surface waters: Primary Contact Recreation, Secondary Contact Recreation, Fish and Wildlife Propagation ("subcategory" for Limited Aquatic life and Wildlife), Drinking Water Supply, Oyster Propagation, Agriculture, and Outstanding Natural Resource Waters. Appendix A Figure A-11 shows those hydrologic units or sub-segments which include both water bodies which are considered "impaired" according to the 2010 Integrated Report and NOV mitigation project footprints.

Essential Fish Habitat

The public places a high value on seafood and recreational and commercial opportunities provided by EFH. Specific categories of EFH include all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities), sub-tidal vegetation (sea grasses and algae), and adjacent intertidal vegetation (marshes and mangroves). Much of the existing emergent wetlands and shallow open water within the study area provide important habitat that is classified as EFH, including transitional habitat between estuarine and marine environments used by migratory and resident fish, as well as other aquatic organisms for nursery, foraging, spawning, and other life requirements. Historically and currently, the area provides valuable recreational and commercial fishing habitat, oyster culture, and nursery areas for a wide variety of finfish and shellfish.

Wetlands and water bottoms provide nursery and foraging habitats for a variety of economically important marine species such as blue crab (*Callinectes sapidus*), Gulf menhaden (*Brevoortia patronus*), spotted seatrout (*Cynoscion nebulosus*), sand sea trout (*Cynoscion arenarius*), southern flounder (*Paralichthys lethostigma*), and striped mullet (*Mugil cephalus*). Some of these species serve as prey for other fish species managed under the MSFCMA (Magnuson-Stevens Act; P.L. 104-297) by the Gulf of Mexico Fishery Management Council (GMFMC) (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks). Wetlands also produce nutrients and detritus which are important components of the aquatic food web and contribute to the overall productivity of the Barataria Bay and Lake Pontchartrain estuaries.

Shrimp species - Shrimp species include the brown shrimp (*Farfantepenaeus aztecus*), white shrimp (*Litopenaeus setiferus*), and pink shrimp (*Farfantepenaeus duorarum*). Adult penaeids generally occupy offshore areas of higher salinity where

spawning occurs. After hatching, larvae enter estuaries and remain there throughout the juvenile stage. Estuarine habitat serves as a nursery area offering a suitable substrate, an abundant food supply, and protection from predators. Sub adult shrimp consume organic matter, including marsh grasses and microorganisms found in estuarine sediments. Adult shrimp are omnivorous. The EFH includes shallow inshore waters, marsh edge, SAV, tidal creeks, inner marsh, mud bottoms, and sand/shell substrate. The Habitat Areas of Particular Concern (HAPC) includes tidal inlets and state nursery and overwintering habitats. These areas contain a high abundance of juvenile specimens and are critical for early growth and development. No designated HAPC for the assemblage occurs within the project area.

Red drum - Red drum (*Sciaenops ocellatus*) is an important recreational game fish found in coastal waters throughout the Gulf of Mexico. Adults inhabit near-shore waters, particularly areas within the surf zone or in the vicinity of inlets. Spawning occurs in near-shore areas, and eggs and larvae are transported by tides and wind currents into estuaries. Larvae and juveniles occupy estuarine environments until maturation. Red drum are predatory in all stages of life; however, the type of prey consumed varies with life stage. Subadult red drum primarily consume small marine invertebrates including mysids and copepods, while adult specimens feed on large marine invertebrates, including shrimp and crabs, and small fishes. The EFH for red drum includes tidal inlets, mud bottoms, SAV, the marsh-water interface, mangrove communities, oyster reefs, and near-shore waters with depths of less than 164 feet. The HAPC for red drum includes tidal inlets, state nursery areas, spawning sites, and SAV. No designated HAPC for the assemblage occurs within the project area.

Gray snapper - Gray snapper (*Lutjanus griseus*) is an important recreational game fish found in coastal waters throughout the Gulf of Mexico. Adults inhabit estuarine, near shore, and offshore areas of gulf waters, and tend to stay in the same area for long periods once established. Spawning typically occurs around near shore and offshore reefs, and near shore shoals and banks. Larvae remain in areas of near shore and offshore reefs until maturation. Juveniles and young adults occupy estuarine and near shore areas such as mangroves and emergent marshes. Gray snapper are opportunistic predators. Larvae feed on zooplankton including copepods and amphipods. Juvenile gray snappers feed by day among seagrass beds, mainly on crustaceans and fish and to a lesser degree polychaete worms and mollusks. Foraging nocturnally, adult gray snapper prey upon small fishes, shrimps, crabs, gastropods, and cephalopods. The EFH for gray snapper includes near shore and offshore reefs, SAV, mangrove communities, emergent marshes, seagrass beds, and sand/shell/soft bottoms. The HAPC for gray snapper includes near shore and offshore reefs, near shore sand/shell/soft bottoms, estuarine emergent marshes and mangroves, seagrass, spawning areas, state designated nursery areas, and SAV. No designated HAPC for the gray snapper occurs within the project area.

Lane snapper. Lane snapper (*Lutjanus synagris*) is an important recreational game fish in coastal waters throughout the Gulf of Mexico. Adults typically inhabit reefs, sand/shell bottoms, and offshore shoals/banks. Spawning generally occurs in offshore

waters around the shelf edge/slope. Larvae remain in offshore pelagic waters until maturation. Juveniles and young adults occupy mangroves, near shore reefs, sand/shell bottoms, SAV, and soft bottoms. The lane snapper lives in a wide range of habitats and are opportunistic predators, feeding on a variety of prey that is available. Adult lane snappers feed nocturnally on smaller fishes, shrimp, cephalopods, gastropods, and crabs. The EFH for lane snappers includes offshore/pelagic, near shore and offshore reefs, mangroves, near shore and offshore sand/shell/soft bottoms, shoals/banks, offshore shelf edge/slope, and SAV. The HAPC for lane snapper includes near shore and offshore reefs, near shore sand/shell/soft bottoms, mangroves, seagrass, spawning areas, state designated nursery areas, and SAV. No designated HAPC for the lane snapper occurs within the project area.

Table 8 lists the expected salinity zones in the Basin and the Deltaic Plain and the abundance of the managed species expected (National Oceanic and Atmospheric (NOAA) Administration Mapper): http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html or download of datasets at http://www.habitat.noaa.gov/protection/efh/newInv/index.html. Table 9 shows the EFH for the managed species expected in those areas.

Table 8. Salinity Zones and Abundance for Federally-managed Species in Barataria Basin and the Deltaic Plain

Salinity Zone	Life Stage	Brown Shrimp	Pink Shrimp	White Shrimp	Red Drum	Gray Snapper*	Lane Snapper*
0 – 0.5 ppt.	Adults		R	R	R		
	Eggs						
	Juveniles	C to HA	R to C	R to C	R		
	Larvae						
	Spawners						
0.5 – 5 ppt.	Adults	R	R	R	R to C		
	Eggs						
	Juveniles	C to HA	C to A	C to A	C	R to C	R to C
	Larvae						
	Spawners						
5 – 15 ppt.	Adults	R	C	C	R to C		
	Eggs						
	Juveniles	C to HA	C to A	C to A	C	R to C	R to C
	Larvae						
	Spawners						
	Relative Abundance: Blank - Not Present; A – Abundant; R – Rare; HA - Highly Abundant; C – Common						

	(Variation in abundance due to seasonality) (NMFS, 1998) *Indicate reef fish

Table 9. Essential Fish Habitat for Life Stages

Species	Life Stage	Essential Fish Habitat
Brown Shrimp	Adults	Gulf of Mexico <110 m, silt sand, muddy sand
	Juvenile	Marsh edge, SAV, tidal creeks, inner marsh
	Larvae/Post larvae	Planktonic sand/shell/soft bottoms, SAV, emergent marsh, oyster reef
Pink Shrimp	Adults	Gulf of Mexico 11 to 110 m, calcareous mud, sand shell
	Juvenile	Marsh edge, SAV, marsh ponds, inner marsh, oyster Reefs, sand-shell substrate
White Shrimp	Adults	Gulf of Mexico <33 m, silt, soft mud
	Juvenile	Marsh edge, SAV, marsh ponds, inner marsh, oyster reefs
	Larvae/Post larvae	Planktonic, soft bottom, emergent marsh
Red Drum	Adults	Gulf of Mexico & estuarine mud bottoms, oyster reef
	Juvenile	SAV, estuarine mud bottoms, marsh/water interface
	Larvae/Post Larvae	All estuaries planktonic, SAV, sand/shell/soft bottom, emergent marsh
Gray Snapper*	Adult	Emergent marshes, hard bottoms, reefs, sand/bottoms, soft bottoms
	Juvenile	Mangroves, emergent marshes, seagrass, SAV
Lane Snapper*	Adult	Offshore, sand bottom, natural channels, banks, and man-made reefs and structures
	Juvenile	grass flats, reefs, and soft bottom, GOM <20 m

* indicates reef fish

Cultural Resources

Historic and prehistoric sites in the Basin and the deltaic plain are often located along the natural levees of waterways that were used as transportation routes. The Mississippi River was the main means of transportation and its natural levees were the choice location for settlement. Prehistoric mound sites are still being discovered, like 16PL186 which was first recorded in 2009 as a three mound complex spanning from the Marksville through Mississippian periods (100 B.C. – 1700 A.D.) with a historic component as well. The surrounding coastal lakes and areas were gradually explored for natural resources and utilized as well. As the population along the Mississippi River increased, land along its natural levees became scarce. Settlers began to move further outward following waterways such as Bayou Lafourche, Bayou Segnette, Bayou Verret, Bayou des Allemands, and other bayous and rivers in the coastal area. The Bayou Grand Cheniere Mounds (16PL159) are a collection of 12 prehistoric mounds with

burials located just a short distance west of the Mississippi River on a natural ridge and bayou that probably invited exploration and exploitation, and have occupations dating from the Coles Creek period though Plaquemine periods (ca. A.D. 400 - 1200). These sites are among the more than 200 recorded archaeological sites within the Basin, and demonstrate the continuous use of the region and its resources from the earliest prehistory to modern times.

Borrow sources located in the Basin and the deltaic plain such as Lakes Salvador and Cataouatche also have the potential to contain submerged cultural resources. The eastern shore of Lake Salvador today contains numerous shell middens that are preserved but gradually being swallowed by rising waters. 16JE46, for instance, has reports of cultural material from the Coles Creek (A.D. 400) through the Historic period. 16JE46 is part of the National Register qualification of the Barataria Unit of Jean Lafitte Park.

Prehistoric sites include hunting and food processing camps, hamlets, and village sites. Native Americans relied on hunting, fishing, and gathering of plants. Discovered archeological sites in the Basin represent the continuous span of human occupation in Louisiana's Mississippi River Delta region, beginning approximately with the Tchefuncte period (600-200 B.C.) through the Plaquemine period (A.D. 1000-1200), and in fact carrying over through European arrival to the region and into the Historic period.

Types of historic sites include domestic buildings, plantation sites, farmsteads, military sites, commercial sites, industrial sites, boat landings, and hunting and fishing camps along the coast. In addition to terrestrial historic sites, the project area has the potential to contain historic shipwrecks. Bayou Lafourche, Bayou Segnette, Bayou des Allemands, as well as the other bayous in the area, have been a major means of transportation in the Louisiana "bayou country" since prehistoric times. The smaller bayous that fill the Basin connecting larger bayous and lakes were also used by the local Native Americans as well as by trappers, hunters, and fishermen. The intersection of Bayou Cutler and Bayou Maurice is one area that represents the diversity of resources and activities supported by the Basin. Within 1 mile of this intersection are 11 sites recorded and revisited for the past 50 or more years. These sites are typically reported to include components of shell midden, often with an overlay of historic activity from the Civil War and later. Also, these sites have typically been destroyed by natural and artificial activities, and often the artifacts found during site update visits have been redeposited by dredge and spoil activities.

Watercraft from all time periods could be present in the area. Most of the vessels used historically in this area were vernacular watercraft that are common to the cultural uses and environments of coastal Louisiana. Few studies have been done of the vernacular watercraft of Louisiana, but a 1997 study of Bayou DuLarge in Terrebonne Parish commented on the prevalence of this form still plying the waters of coastal Louisiana and its bayous.

In the early 1900s, various subsistence activities in the Basin and the deltaic plain that were initially developed prior to the 20th century became more commercial in nature. Moss, first gathered for the making of beds and as filler in the construction of houses, was commercially processed and sold to the upholstery business as stuffing for furniture and car seats. Following World War II, the moss industry declined as the result of the wide availability of foam rubber and the increased cost of gathering moss. The lumber industry that had flourished in the late 1800s continued to grow with the harvesting of cypress throughout south Louisiana. Lumber towns and sawmills dotted the landscape until most of the virgin cypress forests were cut and the lumber companies moved westward.

The trapping of animals for furs or other economic reasons in south Louisiana began with Native Americans and continued on into the 1900s. Otter, muskrat, and nutria were trapped in the marshes and provided furs for the garment industry all over the world. Hunting camps and processing stations were located throughout the marsh. The demand for furs has declined over the years. Nutria are trapped today for food and bounties, to keep the population from expanding and destroying the marsh, or from causing problems in municipal canals.

Seafood, one of the most important natural resources in south Louisiana, has continued to become more important to the economy of Louisiana. In the middle of the 19th century, methods of preservation (such as the drying of shrimp and canning of oysters) made it possible to export seafood. The introduction of the gasoline motor and refrigeration allowed fishermen greater access to markets in New Orleans and the larger towns inland from the coast. Seafood processing camps that had been established all over the coast in the 1800s, including Manila Village, Bayou St. Malo, and the Isle de Caminada, were abandoned after being hit by numerous tropical storms and hurricanes. In the 1900s, many of these fishermen established new settlement and seafood processing businesses along the major waterways leading away from the coast. Fishing remains a major economic activity in south Louisiana.

Rice and sugar remained major cash crops across the coastal parishes. By the eve of World War II, bad weather, plant diseases, and economic policies had almost destroyed sugar production in south Louisiana. Truck farming of vegetables and citrus to towns and cities provided fresh vegetables at local markets. Other industries developed in south Louisiana in the 1900s that have shaped the economy of the state. The oil industry began in the early 1900s and continues to be a major industry. Large oil fields are located in the marshy areas of south Louisiana and offshore. Pockets of sulfur and salt are located across south Louisiana. The extraction of these natural resources became major industrial activities. Accompanying the economic benefits that these extraction activities have brought to coastal Louisiana, are the destruction of fragile coastal ecosystems and land areas that wither as they are cut by canals and weighted by platforms and other items of extraction infrastructure. Along with the land and other facets of the natural environment, cultural resources that have been known or unknown during the age of archaeological exploration and survey have weathered damages to

the lands that contained them and some have eroded into the waters before they are fully understood or studied.

All of these economic activities have contributed to the constructed environment of south Louisiana. In addition to the residential homes, public buildings, and commercial buildings, these industries have contributed to the south Louisiana landscape and to the heritage of the area. Historic standing structures, archaeological sites, and landscape features associated with human activities in the coastal area may be significant cultural resources.

Recreational Resources

Recreation areas in the Basin and the deltaic plain include Salvador WMA, Timken WMA, JLNHPP, Bayou Segnette State Park, Bayou Sauvage NWR, Big Branch NWR and Delta NWR. Other recreational features are provided by parishes and historic communities that attract visitors to a variety of heritage and cultural festivals, historical sites, parks offering opportunities for passive and active recreation that include tennis courts, soccer and softball fields, swimming pools, and golf courses. There are 37 boat launches throughout the Basin.

The Louisiana Statewide Comprehensive Outdoor Recreation Plan (SCORP) provides a statewide inventory of recreation resources and identifies recreational needs. While regions defined in the SCORP do not fit perfectly within the Basin, SCORP Regions 1 and 3 include the Basin. The state- and Federally-managed areas described in the paragraph above represent just a portion of the more than 282,000 acres of recreational facilities inventoried for SCORP Region 1. Federal, state, parish, and municipal public recreational facilities within Region 1 provide more than 196,000 acres for hunting, 123 boat ramps, 1,833 picnic tables, 10 beaches, and 320-acres for camping with 263 tent sites and 1,739 trailer sites. Region 3 includes more than 107,000 acres for hunting; 194 boat lanes at 105 boat ramps; 131 acres with 365 tables for picnicking; 1 beach of 37 acres; and 71 acres for camping, 34 tent-sites and 422 trailer-sites. In a 2008 Residents Survey, the most important activities for residents in Region 1 are visiting natural places, fishing, and visiting botanic gardens. Residents in Region 3 identified fishing, visiting natural places, and public access to state waters as most important. Within the same survey, Region 1 residents had the highest participation rates in the following activities: driving for pleasure, fishing, and camping. Region 3 residents participated most in driving for pleasure, fishing, swimming, and camping.

Funds from the Land and Water Conservation Fund (L&WCF) have supported 65 different recreational projects within the same parishes as the Basin since 1964. L&WCF provides funding for numerous boat ramps, other facilities or lands that enhance opportunities for recreation.

The following is a description of some of the major federal and state recreation areas within the study area:

Salvador Wildlife Management Area

Salvador WMA is 31,520 acres and is located in St. Charles Parish, along the northwestern shore of Lake Salvador about 12 miles southwest of New Orleans. Access is limited to boat travel via three major routes: Bayou Segnette from Westwego into Lake Cataouatche, then west to area; Sellers Canal to Bayou Verrett into Lake Cataouatche, then west to area; or via Bayou Des Allemands. Accessibility into the interior marshes is excellent via the many canals, bayous, and ditches on the area. Game species include waterfowl, deer, rabbits, squirrels, rails, gallinules, and snipe. Furbearing animals present are mink, nutria, muskrat, raccoon, opossum, and otter. Salvador supports a large population of alligators and provides nesting habitat for the endangered bald eagle. Excellent freshwater fishing is available on Lake Salvador. Bass, bream, crappie, catfish, drum, and garfish are abundant. Commercial fishing is prohibited. Non-consumptive forms of recreation available are boating, nature study, and picnicking.

Timken Wildlife Management Area

The Timken WMA is a 3,000 acre marsh island that is leased by the City Park Commission of New Orleans. The area is identified as Couba Island on maps; however, it has been named the Timken WMA after the former landowner who donated it to the City Park Commission of New Orleans. The area is located immediately east of the Salvador WMA and can be accessed by Lake Cataouatche. Like the Salvador WMA, Timken WMA consists of fresh to intermediate marsh and provides excellent habitat for waterfowl, furbearers, and alligators. Game species include waterfowl, deer, rabbits, squirrels, rails, gallinules, and snipe. Furbearing animals present are mink, nutria, muskrat raccoon, opossum, and otter.

Jean Lafitte National Historical Park (JLNHPP)

The JLNHPP consists of six physically separated sites, including Acadian Cultural Center; Prairie Acadian Cultural Center; Wetlands Acadian Cultural Center; Barataria Preserve; Chalmette Battlefield and National Cemetery; and French Quarter Visitor Center. Only one of which (Barataria Preserve Unit) is within the project area. The Barataria Preserve is a 23,000 acre wetland with trails and canoe tours through bottomland hardwood forests, swamps, and marsh. Additionally, there is an education center providing curriculum-based programming for school groups and a visitor center providing a film and exhibits.

Bayou Segnette State Park

Bayou Segnette State Park offers approximately 676 acres of recreational opportunities including, boating, fishing, canoeing, picnicking, playgrounds, a one-mile nature trail, boat launches and a wave pool. Bass, catfish, bream, perch, redfish and trout are common in the area. Twenty waterfront cabins are available for overnight rental, as well as 98 locations for recreational vehicle (RV) and tent camping. The park also includes comfort stations with showers and laundry, an RV dump station, and a group camp with kitchen and dormitories for up to 120 people.

Bayou Sauvage NWR

Bayou Sauvage NWR was established in 1986. The refuge is one of the last remaining tracts of contiguous marsh located adjacent to Lake Pontchartrain and encompasses approximately 25,000 acres. The refuge contains a wide variety of habitat, including BLH, fresh and brackish water marshes, lagoons, canals, borrow pits, cheniers, and natural bayous. Most of the refuge is located within levees built to reduce the risk of damage to New Orleans East from storm surges and flooding. A network of pumps and flap-gated structures regulate water levels seasonally to encourage summer growth of emergent plants that, in turn, provide waterfowl food supplies in winter (https://www.fws.gov/southeast/pdf/brochure/southwest-louisiana-national-wildlife-refuges.pdf).

Big Branch NWR

Big Branch was established in 1994. The refuge has over 18,000 acres of offshore grass beds, marshes, bottomland hardwoods, and pine ridges. The refuge has a variety of habitat for shorebirds, wading birds, Neotropical migrants, as well as deer, rabbit, mink, otter, raccoon, and muskrat, and a population of endangered red cockaded woodpeckers can be found on the refuge (https://www.fws.gov/southeast/pdf/brochure/southwest-louisiana-national-wildlife-refuges.pdf).

Delta NWR

Delta NWR is part of the Mississippi River delta and this 45,000 acre refuge was established in 1935. The refuge is only accessible by boat but it provides some of the best fishing and waterfowl hunting opportunities in the world. It is within the Mississippi Flyway and the marshes are dominated by migratory birds, ducks, geese, wading birds, shore birds, and migratory song birds. Fish and shellfish present in this rich aquatic habitat include trout, drum, mullet, crab, and shrimp. Deer, otter, raccoons, and alligators also inhabit the refuge. (https://www.fws.gov/southeast/pdf/brochure/southwest-louisiana-national-wildlife-refuges.pdf)

Air Quality

The EPA, under the requirements of the Clean Air Act of 1970 (CAA), has established National Ambient Air Quality Standards (NAAQS) for contaminants, referred to as criteria pollutants (40 CFR 50). These are carbon monoxide, nitrogen dioxide, ozone, particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), lead, and sulfur dioxide. The NAAQS standards include primary and secondary standards. The primary standards were established at levels sufficient to protect public health with an adequate margin of safety. The secondary standards were established to protect the public welfare from the adverse effects associated with pollutants in the ambient air. The primary and secondary standards are presented in table 10.

Table 10. National Ambient Air Quality Standards (NAAQS)

Pollutant and Averaging Time	Primary Standard		Secondary Standard	
	μg/m³	parts per million (ppm)	μg/m³	ppm
Carbon Monoxide				
8-hour concentration	10,000[1]	9[1]	-	
1-hour concentration	40,000[1]	35[1]	-	
Nitrogen Dioxide				
Annual Arithmetic Mean	100	0.053	Same as primary	
Ozone				
8-hour concentration	157	0.08[2]	Same as primary	
Particulate Matter				
$PM_{2.5}$:				
Annual Arithmetic Mean	15[3]	-		
24-hour Maximum	35[4]	-	Same as primary	
PM_{10}:				
24-hour concentration	150[1]	-		
Lead				
Quarterly Arithmetic Mean	1.5	-	Same as primary	
Sulfur Dioxide				
Annual Arithmetic Mean	80	0.03	-	-
24-hour concentration	365[1]	0.14[1]	-	-
3-hour concentration	-	-	1300[1]	0.50[1]

Notes:
[1] Not to be exceeded more than once per year.
[2] 3-year average of the 4th highest daily maximum 8-hour concentration may not exceed 0.08 ppm.
[3] Based on 3-year average of annual averages.
[4] Based on 3-year average of annual 98th percentile values.
Source: *40 CFR 50*.

National Ambient Air Quality Standard Attainment Status

Areas that meet the NAAQS for a criteria pollutant are designated as being “in attainment;” areas where a criteria pollutant level exceeds the NAAQS are designated as being “in nonattainment.” The project areas are located within parishes currently designated as being in attainment.

Noise

The Noise Control Act of 1972 both regulates and promotes an environment for the public free from noise that jeopardizes their health or welfare. The Occupational Safety and Health Standards (29 CFR, part 1910) set standards regarding protection against the effects of noise exposure. Noise levels exceeding sound pressure levels are technically significant because noise can negatively affect the physiological or psychological well-being of an individual (Kryter, 1994). These effects can range from annoyance to adverse physiological responses, including permanent or temporary loss of hearing, and other types of disturbance to humans and animals, including disruption of colonial nesting birds. Noise is publicly significant because of the public's concern for the potential annoyance and adverse effects of noise on humans and wildlife.

Noise is generally described as unwanted sound, which can be based either on objective effects (hearing loss, damage to structures, etc.) or subjective judgments (such as community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as sound level. The threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

Noise levels are computed over a 24-hour period and adjusted for nighttime annoyances to produce the day-night average sound level (DNL). DNL is the community noise metric recommended by USEPA and has been adopted by most Federal agencies (USEPA 1974). A DNL of 65 weighted decibels (dBA) is the level most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like construction. The A-weighted sound level, used extensively in this country for the measurement of community and transportation noise, represents the approximate frequency response characteristic of the average young human ear. Areas exposed to a DNL above 65 dBA are generally not considered suitable for residential use. A DNL of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974).

Most parishes in the Basin and the Deltaic Plain have noise ordinances addressing loud machinery. Noise is typically associated with human activities and habitations, such as operation of commercial and recreational boats, water vessels, air boats, and other recreational vehicles; operation of machinery and motors; and human residential-related noise (air conditioner, lawn mower, etc.).

Hazardous, Toxic, and Radioactive Waste

In accordance with Engineering Regulation (ER) 1165-2-132 identification and evaluation of all HTRW contamination within the vicinity of the proposed project is required. USACE policy is to avoid the use of project funds for HTRW removal and remediation activities. Costs for necessary special handling or remediation of wastes (e.g., those regulated by the Resource Conservation and Recovery Act), pollutants and other contaminants, which are not regulated under the Comprehensive Environmental

Response, Compensation, and Liability Act, would be treated as project costs if the requirement is the result of a validly promulgated Federal, state, or local regulation.

The mitigation projects were surveyed via aerial photographs and database searches in the Zone Improvement Plan (ZIP) code areas where they would be located. Although there were numerous small incidents recorded in the database searches, none of the recorded incidents, either individually or cumulatively, are likely to have adverse effects on the mitigation site areas. Other than petroleum pipelines and oil and gas wells, and some agricultural use, the sites are all on property that has not been developed within historic times. The probability of encountering HTRW on any of the sites is low. Prior to use of any site, a Phase 1 Environmental Site Assessment would be completed for the individual project area.

Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries

The mitigation project construction impacts would be mitigated in the Basin and the Deltaic Plain. Fifteen Parishes, in part or in their entirety, comprise the Deltaic Plain and include Vermilion, Iberia, St. Mary, St. Martin, Assumption, Terrebonne, Lafourche, Plaquemines, Orleans, Jefferson, St. Bernard, St. Tammany, St. James, St. John the Baptist and Livingston Parishes. The total population of these parishes in 2017 is approximately 1.8 million. The largest, Orleans and Jefferson, account for just under 50 percent of the total deltaic plain population. There are approximately 800,000 housing units in the Deltaic Plain, with the largest share being in Orleans. Environmental Justice communities are spread throughout the Basin parishes with three having a majority non-white population while four parishes have 20 percent or more of households living below poverty.

Waterways are an important component of economic activity in the Barataria Basin and the Deltaic Plain. A few of the major waterways in this study area are the Gulf Intracoastal Waterway (GIWW), the Atchafalaya River (lower and upper), and Bayou Lafourche. The Gulf Intracoastal Waterway is a navigable inland waterway from Carrabelle, FL, to Brownsville, TX, that runs approximately 1,050 miles. Designed primarily for barge transportation, the waterway provides a channel with a depth of 12 feet. The Louisiana section of this waterway runs from Pearl River, LA, to Sabine, TX, and passes through the Barataria Basin. For the years 2013 - 2017, traffic for the Louisiana portion of the GIWW has averaged about 78 million short tons with the largest component being petroleum and petroleum products. Chemicals and related products and crude materials are also significant commodities. The Atchafalaya River (lower) has averaged about 750,000 short tons with the largest component being petroleum and petroleum products. The Atchafalaya River (upper) has averaged about 11 million short tons with the largest component being petroleum and petroleum products. Crude materials (limestone and sand and gravel) are also significant commodities. The section of Bayou Lafourche that runs from Lockport, LA, to the Gulf of Mexico has averaged about 7.6 million short tons over the same period. Manufactured equipment dominates the commodities transported on this waterway.

The transportation network for the Barataria Basin includes shallow-draft waterways, and highways, as well as the streets and bridges supporting the local and regional communities. Regional transportation in the Basin includes air traffic systems, railroads, public transit, navigation channels, and roadway networks. The Louis Armstrong New Orleans International Airport is the primary commercial airport for the New Orleans area and most of the Greater New Orleans Metropolitan Area. The I-10 corridor serves as an expressway for commuter traffic, as well as a regional interstate roadway serving east-west traffic from Florida to California.

The USACE maintains major navigation channels in the Barataria Basin. These include the Barataria Bay Waterway, which runs from Barataria Pass at Grand Isle to the GIWW south of Lake Salvador; the GIWW, which runs east-west through the central reaches of the basin; and the Empire-Gulf Waterway, which runs from the gulf to the Mississippi River in southeast Barataria. All are major navigation routes for the oil and gas industry, the sulphur industry, and commercial and recreational fishing. The Barataria Basin is one of the nation's most productive estuaries and vital ecosystems that provide a storm surge buffer for communities on the west bank of the river and in Plaquemines Parish. The basin supports many commercial activities ranging from sugarcane production and aquaculture to commercial fishing, trapping, logging, and oil and gas production.

3.2.2 Mitigation For Swamp Impacts

Mitigation Banks

In an effort to draft a clear and concise NEPA document, the affected environment as it relates to the purchase of mitigation bank credits for the swamp feature of the TSMP is condensed to this section.

The purchase of mitigation bank credits would occur at an existing approved bank and permitted banks exist as reasonably foreseeable projects in the FWOP conditions. As such, existing wetlands and other surface waters, wildlife, threatened and endangered species, fisheries, aquatic resources, water quality, EFH, cultural resources, aesthethics, prime and unique farmland, recreational resources, air quality, noise, HTRW, socioeconomics/land use, environmental justice, transportation, navigation, and commercial fisheries are unknown for the specific mitigation bank location, but the affected environment for the study area is described in Section 3.2.1. Therefore, mitigation banks alone will not be discussed in the following sections.

3.2.2.1 Wetlands and Other Surface Waters

3.2.2.1.1 NF NOV 05a.1 FS Swamp

The NOV-NF-W-05a.1 contains cattle pasture with topographical depressions that are wet and as such, are classified as wet pasture which is a wetland (Appendix A figure A-4). Dominant herbaceous species include Bermuda grass (*Cynodon dactylon*) and smartweed species (*Polygonum* sp.), and wet pasture species include arrowhead or

bulltongue (*Sagittaria lancifolia*), cordgrass species (S*partina* sp.), and rush species (*Juncus* sp.). Woody vegetation can be present if the area is not regularly maintained and can grow into scrub shrub layer of Eastern baccharis (*Baccharis halimifolia*) and rattlebox (*Sesbania drummondii*), but this area is for the most part maintained. The low plant species diversity of these wet pasture areas limits their value to wildlife.

3.2.2.1.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The wetlands and other surface water resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.1.1 NF NOV 05a.1 FS Swamp.

3.2.2.2 Wildlife

3.2.2.2.1 NF NOV 05a.1 FS Swamp

A variety of mammals, birds, reptiles, and amphibians are found in the NOV-NF-W-05a.1. Birds inhabiting the area include brown pelicans, seabirds, dabbling and diving ducks, American coots (*Fulica americana*), and gallinules. Mammals in the area include nutria, muskrat, *Mustela vison* (mink), river otter, northern raccoon (*Procyon lotor*), swamp rabbit, and white-tailed deer. American alligator as well as other open water residents and migrants can be found utilizing the habitat within and around the area. Amphibians include green tree frogs (*Hyla cinerea*), toads, and salamanders. See Appendix B, Table B-14 for a full species list.

3.2.2.2.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The wildlife resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.2.1 NF NOV 05a.1 FS Swamp.

3.2.2.3 Threatened, Endangered and Protected Species

3.2.2.3.1 NF NOV 05a.1 FS Swamp

None of the animals under USFWS and/or NMFS jurisdiction are expected to be found in the swamp creation area of NOV-NF-W-05a.1. However the surrounding area of swamp and marsh on the flood side of the levee is known to support various species of shore birds, colonial nesting wading/water birds and seabirds as well as bald eagles. There are existing bald eagle nests north of the project area and potential for more nests to occur closer to the project site. The Mississippi River would be dredged as part of the project, and the pallid sturgeon *(Scaphirynchus albus)* is an endangered fish found in Louisiana, and in the Mississippi River (however, known concentrations of pallid sturgeon are in the vicinity of the Old River Control Structure Complex near river mile 315 which is approximately 250 river miles north of the project area and far removed from where dredging would occur for the project). There is also a chance for the West Indian manatee to be found in the Mississippi River near the proposed borrow area or nearby in the canals on the flood side of the project area.

Pallid sturgeon

The pallid sturgeon was listed as Endangered (55 Federal Register 36641) on September 6, 1990. Pallid sturgeons are known to inhabit the Mississippi River. Pallid

sturgeons live close to the bottom of large, silty rivers with a natural hydrograph. Their preferred habitat has a diversity of depths and velocities formed by braided channels, sand bars, sand flats and gravel bars (https://ecos.fws.gov/ecp0/profile/speciesProfile.action?spcode=E06X accessed April 24, 2017). Current information indicates that the pallid sturgeon is widely distributed throughout the lower Mississippi River, however for the areas proposed to be dredged south of River Mile 66, entrainment during dredging is reduced because of the large channel size, depth and complexity. Additionally, there have been no reported captures of pallid sturgeon south of River Mile 95. A "Conservation Plan for the Interior Least Tern, Pallid Sturgeon, and Fat Pocketbook Mussel in the Lower Mississippi River" (Endangered Species Act (ESA), Section 7(a)(1)), dated July 23, 2013 (https://www.fws.gov/mississippiES/pdf/LMR%20Conservation%20Plan%20Final%20USACE%20CIP%2023%20July%202013.pdf) and the biological opinion titled "Biological Opinion Channel Improvement Program Mississippi River and Tributaries Project Lower Mississippi River" (https://www.fws.gov/mississippies/_pdf/LMRBiologicalOpinion.pdf) document the existing research and population assessment for the pallid sturgeon.

The pallid sturgeon may be found within the proposed borrow site for this project which is located within the Mississippi River. The pallid sturgeon is adapted to large, free-flowing, turbid rivers with a diverse assemblage of physical characteristics that are in a constant state of change. Detailed habitat requirements of this fish are not known, but it is believed to spawn in Louisiana.

Destruction and alteration of habitats by human modification of the river system is believed to be the primary cause of decline in reproduction, growth, and survival of the pallid sturgeon. The curtailment of range and habitat destruction/modification were primarily attributed to the construction and operation of dams on the upper Missouri River and modification of riverine habitat by channelization of the lower main stem Missouri River and Mississippi Rivers.

To ensure protection of the pallid sturgeon, all contract personnel associated with the project would be informed of the potential presence of pallid sturgeon. When lowering the ladder, the pumping rate should be reduced to the slowest speed feasible while the cutterhead is being lowered to the channel bottom. The cutterhead should remain completely buried in the channel bottom during dredging operations. If pumping water through the cutterhead is deemed necessary to dislodge material, or to clean the pumps, the pumping rate should be reduced to the lowest rate feasible while raising the ladder until the cutterhead is at least at mid-depth at which point the pumping rate can then be increased Dredging for borrow would occur via hydraulic cutterhead dredge. Entrainment of pallid sturgeon is not expected since hydraulic dredges are slow moving and use of them is not known to impact this species. As such, no direct impacts to pallid sturgeon are anticipated (USFWS 2011).

The MVN has determined, that by implementing the protection measures discussed above, the proposed action is "not likely to adversely affect" the endangered pallid sturgeon.

West Indian Manatee

The West Indian manatee is Federally-listed as threatened and also is protected under the Marine Mammal Protection Act of 1972, under which it is considered depleted. Critical habitat for the manatee has not been designated in Louisiana. The manatee is a large gray or brown aquatic mammal that may reach a length of 13 ft and a weight of over 2,200 pounds. It occurs in both freshwater and saltwater habitats within tropical and subtropical regions. The primary human-related threats to the manatee include watercraft-related strikes (impacts and/or propeller strikes), crushing and/or entrapment in water control structures (flood gates, navigation locks), and entanglement in fishing gear, such as discarded fishing line or crab traps (USFWS 2007). The manatee is not a year-round resident in Louisiana, but it may migrate there during warmer months. Manatees prefer access to natural springs or manmade warm water, and waters with dense beds of submerged aquatic or floating vegetation. Manatees prefer to forage in shallow grass beds that are adjacent to deeper channels. They seek out quiet areas in canals, creeks, lagoons, or rivers and use deeper channels as migratory routes (USFWS 1999). https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A007.

There have been 110 reported sightings of manatees in Louisiana since 1975 (LDWF 2005). Sightings in Louisiana, which have been uncommon and sporadic, have included occurrences in Lake Pontchartrain as well as the Amite, Blind, Tchefuncte, and Tickfaw Rivers. Between 1997 and 2000, there were approximately 16 sightings in the Lake Pontchartrain area and a general increase in the number of manatees per sighting (Abadie et al. 2000). Sightings of the manatee in the Lake Pontchartrain Basin have increased in recent years, and in late July 2005, 20 to 30 manatees were observed in the lake from the air (Powell and Taylor 2005). Approximately 31 manatee sightings have been reported to the LDWF Natural Heritage Program from 2005 to present in and around Orleans, Jefferson, Plaquemines and St. Bernard parishes (personal communication with Keri Landry LDWLF).

In order to minimize the potential for construction activities to cause adverse impacts to manatees, the following standard manatee protection measures would be implemented when activities are proposed that would impact habitat where manatees could occur:

> All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel would be responsible for observing water-related activities for the presence of manatees. Temporary signs would be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., the work area), and at least one sign would be placed where it is visible to the vessel operator. Siltation barriers, if used, would be made of material in which manatees could not become entangled and would be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions would be implemented, including: moving equipment would not operate within 50 ft of a manatee; all vessels would operate

at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions would no longer be necessary, but careful observations would be resumed. Any manatee sighting would be immediately reported to the U.S. Fish and Wildlife Service (337/291-3100) and the Louisiana Department of Wildlife and Fisheries (LDWF), Natural Heritage Program (225/765-2821).

The MVN has determined, that by implementing the protection measures discussed above, the proposed action is "not likely to adversely affect" the threatened West Indian manatee.

3.2.2.3.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The threatened and endangered species resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.3.1 NF NOV 05a.1 FS Swamp.

3.2.2.4 Fisheries, Aquatic Resources, and Water Quality

3.2.2.4.1 NF NOV 05a.1 FS Swamp

No fisheries or aquatic resources are in the project area except for the borrow area of the Mississippi River. The Mississippi River supports one of the most diverse fisheries in the world with at least 183 species of freshwater fish in the Mississippi River Delta and the DNWR. There are three species of mussels, and 13 species of crawfish found within the Mississippi Basin in Louisiana. Minnows (*Cyprinidae*), darters (*Etheostoma* and *Pecina*), perch (*Perca spp.*), sturgeon (*Acipenseridae*), and paddlefish (*Polyodon spathula*) are the most common fish species in the river. No fisheries or aquatic resources are in the project area of NF NOV 05a.1 which is pastureland. However, there is a drainage ditch on the protected side of the non-Federal Levee and adjacent to the project area on the flood side of the non-Federal levee. In this area adjacent to the site the marsh and swamp is tidally influenced and fish species present could include: Atlantic croaker (*Micropogonias udulatus*), bay anchovy (*Anchoa mitchilli*), bighead carp (*Hypophthalmichthys nobilis*), black drum (*Pogonias cromis*), blue catfish (*Ictalurus furcatus*), bluegill (*Lipomis macrochirus*), bowfin (*Amia calva*), smallmouth buffalo (*Ictiobus bubalus*), channel catfish (*Ictalurus punctatus*), carp (*Cyprinus carpio*), Gulf menhaden (*Brevoortia patronus*), inland silverside (*Menidia beryllina*), largemouth bass (*Micropterus salmoides*), mosquitofish (*Gamubusia affinis*), rainwater killifish (*Lucania parva*), redear sunfish (*Lepomis microlophus*), redfish (*Sciaenops ocellatus*), sheepshead (*Archosargus probatocephalus*), sheepshead minnow (*Cyprinodon variegatus*), southern flounder (*Paralichthys lethostigma*), spotted gar (*Lepisosteus oculatus*), spotted seatrout (*Cynoscion nebulosus*), striped mullet (*Mugil cephalus*), and warmouth (*Lepomis gulosus*) (https://www.nps.gov/jela/learn/nature/upload/Fish%20list.pdf). None of the water bodies in the project area of NOV-NF-W-05a.1 are currently listed on the Section 303(d) list of impaired water bodies by the State of Louisiana.

3.2.2.4.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The fisheries, aquatic and water quality resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.4.1 NF NOV 05a.1 FS Swamp.

3.2.2.5 Essential Fish Habitat

3.2.2.5.1 NF NOV 05a.1 FS Swamp

No EFH resources exist within the project area.

3.2.2.5.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The EFH resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.5.1 NF NOV 05a.1 FS Swamp.

3.2.2.6 Cultural Resources

3.2.2.6.1 NF NOV 05a.1 FS Swamp

Phase I cultural resources investigations were conducted for the NFL NOV system by New South Associates and United Research Services (URS) from August, 2008 through September, 2009. Similarly, Phase I cultural resource investigations were conducted for the NOV system by Gulf South Research Corporation from April to November 2010 (Somers et al. 2011). Results of these investigations were coordinated with State Historic Preservation Officer (SHPO) and Federally-recognized Indian tribes, and have been discussed in several NEPA coordination documents. In November and December 2014 and June 2015, additional cultural resources studies specifically for the PPG drainage canal relocation were conducted. This study overlaps with NOV-NF-W-05a.1 presented in this SEA 543a. A report detailing the findings of the cultural resources studies was submitted to the SHPO in January 2015 with an addendum to the report provided in May 2015.

The NOV-NF-W-05a.1 has a low probability of undiscovered cultural resources. Valk et al. (2010) surveyed across the project footprint. A site visit was conducted of the project areas and a letter of coordination was sent to the SHPO on January 15, 2016, and the SHPO concurred with a determination of no historic properties affected. Another site visit was made and a coordination letter sent to SHPO in October 2018, and the SHPO concurred with a determination of no historic properties affected.

3.2.2.6.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The cultural resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.6.1 NF NOV 05a.1 FS Swamp.

3.2.2.7 Recreational Resources

3.2.2.7.1 NF NOV 05a.1 FS Swamp

The NOV-NF-W-05a.1 project area does not offer recreational opportunities as most of the land is remote, cattle pasture, often wet and for the most part maintained. The low

plant species diversity of these wet pasture areas limits their value to recreational hunting or wildlife viewing.

3.2.2.7.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The recreational resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.7.2 NF NOV 05a.1 FS Swamp.

3.2.2.8 Air Quality

3.2.2.8.1 NF NOV 05a.1 FS Swamp

The NOV-NF-W-05a.1 project area is located in Plaquemines Parish which is currently in attainment of NAAQS.

3.2.2.8.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The air quality resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.8.2 NF NOV 05a.1 FS Swamp.

3.2.2.9 Noise

3.2.2.9.1 NF NOV 05a.1 FS Swamp

The NOV-NF-W-05a.1 project area is rural pasture land with no commercial or residential housing units or roads or highways within a 1000 ft. The nearest major navigable waterway is the Mississippi River. Sporadic boat traffic along the river may produce noise levels that exceed 55 dBA within the area. A DNL of 65 dBA is the impact threshold most commonly used for noise planning purposes and represents a compromise between community impact and the need for activities like construction. A DNL of 55 dBA was identified by USEPA as a level below which there is no adverse impact (USEPA 1974). No noise exemptions exist in Plaquemines parish and the Maximum Permissible Sound Levels by Receiving Land Use Category for Residential areas is 60 dBA between 7 am and 10 pm and 55 dBA between 10 pm and 7 am and for Commercial areas is 65 dBA and 60 dBA for those same times respectively (www.municode.com). None of the equipment proposed to be utilized for construction of this project (backhoe, dump truck, excavator, front-end loader, etc.) would exceed the maximum permissible sound level of 55 dBA.

3.2.2.9.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The noise resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.9.1 NF NOV 05a.1 FS Swamp.

3.2.2.10 Hazardous, Toxic, and Radioactive Waste

3.2.2.10.1 NF NOV 05a.1 FS Swamp

The NOV-NF-W-05a.1 project area was surveyed via aerial photographs and database searches in the ZIP code areas where they would be located. Previous database searches that included the area were also reviewed. Although there were numerous small incidents recorded in the database searches, none of the recorded incidents,

either individually or cumulatively, would have any adverse effects on the proposed site. Several dry and plugged oil and gas wells and petroleum pipelines are in the vicinity of the site. No Recognized Environmental Conditions (REC) were identified and the probability of encountering HTRW within the project limits is low. If this alternative were selected as the TSP a full HTRW Phase I environmental site assessement would be completed prior to construction.

3.2.2.10.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The HTRW resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.10.1 NF NOV 05a.1 FS Swamp.

3.2.2.11 Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries

3.2.2.11.1 NF NOV 05a.1 FS Swamp

Population and Housing

There is no population or housing within the boundary of the project area. The project area is within Plaquemines Parish which has an estimated population of 23,599 (US Census Bureau, 2017). Plaquemines Parish suffered significant damage from Hurricane Katrina. The population of Plaquemines Parish declined by nearly 4,000 people, or 14%, between the years 2000 and 2010. The Parish is still making efforts to rebuild (Plaquemines Parish, 2017). The population has recovered, but it is not yet back to its levels prior to Katrina.

Business and Industry

The Conoco Phillips Alliance Refinery (Alliance Refinery), an oil and natural gas exploration and production company, is located just west of the NOV-NF-W-05a.1 project area. The refinery processes mainly light, low-sulfur crude oil. The refinery's facilities produce transportation fuels, such as gasoline, diesel fuel and jet fuel. The NOLA Oil terminal is proposed for construction just down river of the Alliance refinery. NOLA Oil is the first fully permitted major petrochemical facility in lower Plaquemines Parish since Alliance Refinery in 1971. Finally, a coal export terminal is also proposed along the Mississippi River just south of the Alliance refinery and the proposed NOLA Oil terminal.

Otherwise, seafood harvesting and exporting are one of the top industries for Plaquemines Parish residents, outside of oil and gas, healthcare, and education. The Parish produces millions of pounds of shrimp, oysters, crabs, and fish every year (Plaquemines Parish, 2017).

Ports

The Plaquemines Harbor and Terminal District port, located in Plaquemines Parish, plays an important role in interstate and international commerce. The port sits 20 miles south of the Port of New Orleans, on the Gulf of Mexico, and connects to 33 states via waterways, highways and rail. More than 53 million tons of cargo passed through the port in 2013 (Plaquemines Parish, 2017).

Land Use
According to the USDA Census of Agriculture (2012), 18% of land in Plaquemines Parish was classified as farmland.

Commercial Fisheries
There are no commercial fisheries associated with the project area.

Environmental Justice
To characterize the environmental justice (EJ) environment for the NOV-NF-W-05a.1 project area, demographic data was collected from the 2013 American Community Survey (ACS) for Census Tract (CT) 504 and, more specifically, Census Tract 504, Block Group 1 (CT 504 BG 1). CT 504 extends geographically along the west bank of the Mississippi River from Belle Chasse to the Grand Terre Islands. BG 1 within CT 504 does not include the populated areas of Belle Chasse. CT 504 BG 1 does include Myrtle Grove and several smaller neighborhoods between the NFL NOV new ROW project areas. Table 11 compares the racial and ethnic characteristics of the populations in the vicinity of the proposed NOV-NF-W-05a.1 with those of the parish and state.

Table 11. Comparison of Racial and Ethnic Characteristics.

			Louisiana	Plaquemines Parish	Census Tract 504	Block Group 1, Census Tract 504
Total Population			4,567,968	23,385	3,943	896
Hispanic or Latino		**Total**	202,145	1,239	14	-
		Percent	4.4%	5.3%	0.4%	0.0%
Not Hispanic or Latino	**White**	**Total**	2,742,184	15,744	2,067	173
		Percent	60.0%	67.3%	52.4%	19.3%
	Black or African American	**Total**	1,454,343	4,923	1,649	723
		Percent	31.8%	21.1%	41.8%	80.7%
	American Indian and Alaska Native	**Total**	25,018	303	58	-
		Percent	0.5%	1.3%	1.5%	0.0%
	Asian	**Total**	72,834	767	155	-
		Percent	1.6%	3.3%	3.9%	0.0%
	Native Hawaiian and Other Pacific Islander	**Total**	1,939	-	-	-
		Percent	0.0%	0.0%	0.0%	0.0%
	Some other race	**Total**	6,891	20	-	-
		Percent	0.2%	0.1%	0.0%	0.0%
	Two or more races	**Total**	62,614	389	-	-
		Percent	1.4%	1.7%	0.0%	0.0%

Source: American Community Survey 5-Year Estimates (2009-2013), Table B02001.

The populations within CT 504 BG 1 are estimated to be 80 percent minority, approximately twice the rate of the entire CT, and four times greater than the entire parish. As shown on Table 12, rates of poverty in Plaquemines Parish, CT 504, and CT 504 BG1 are much lower than the rate of poverty for the entire state.

Table 2. Rates of Poverty Compared.

	Louisiana	Plaquemines Parish	Census Tract 504	Block Group 1, Census Tract 504
Total Households	1,717,852	8,615	1,363	240
Income in the past 12 months below the poverty level	313,990	1,243	135	12
Percent Below the poverty level	18.3%	14.4%	9.9%	5.0%

Source: American Community Survey 5-Year Estimates (2009-2013), Tables B17001, B17017.

Transportation and Navigation

Transportation within the area includes the deep-draft channel of the Mississippi River and ferry service between Pointe a la Hache (on the east bank) to West Pointe a la Hache (on the west bank), as well as several canals located along the project back levees leading to canals, lakes, and bays approaching the Gulf of Mexico. Many canals have been created for the exploration, production, and transportion of oil and gas resources important for regional, national, and international economic development. Surrounding waterways have also been used in the commercial and recreational harvest of fish and shellfish. The west bank of the Mississippi River parallels LA Hwy 23 which connects New Orleans to the NOV and the communities of Port Sulphur, Empire, Buras, and Venice south of the project area. Additionally, the highway is critically important in the transport of residents for hurricane evacuation, as well as the transport of goods and services. The Union-Pacific Rail Company which operates a short spur as far south as the Conoco-Philips refinery, also provides important rail access to area industries.

3.2.2.11.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same as 3.2.2.11.1 NF NOV 05a.1 FS Swamp.

3.2.3 Mitigation For Brackish Marsh Impacts

Mitigation Banks/ILF

In an effort to draft a clear and concise NEPA document, the affected environment as it relates to the purchase of mitigation bank credits for the swamp feature of the TSMP is condensed to this section.

The purchase of mitigation bank credits and/or ILF credits would occur at an existing approved bank/ILF program and permitted banks/ILF programs exist as reasonably foreseeable projects in the FWOP conditions. As such, existing wetlands and other surface waters, wildlife, threatened and endangered species, fisheries, aquatic resources, water quality, EFH, cultural resources, aesthethics, prime and unique farmland,recreational resources, air quality, noise, HTRW, socioeconomics/land use,

environmental justice, transportation, navigation, and commercial fisheries are unknown for the specific mitigation bank/ILF location, but the affected environment for the study area is described in this Section 3.2.1. Therefore, mitigation banks/ILF alone will not be discussed in the following sections.

3.2.3.1 Wetlands and Other Surface Waters

3.2.3.1.1 Big Branch FS Brackish Marsh

This project area is primarily shallow (less than 3 ft deep) open water surrounded by brackish marsh. Sasser et al. (2008) classified the area as brackish marsh. The adjacent marsh vegetation is consistent with intermediate and brackish marsh communities. The long term water salinities in the area, as documented in CRMS surveys (http://www.lacoast.gov/crms_viewer), indicate a wide range of salinity movement throughout the year and among years resulting in conditions appropriate for brackish marsh species survival. SAV has been found in the project area, but is not prevalent. The proposed 258 acre borrow site in Lake Pontchartrain is part of a brackish estuary in water deeper than SAV would be present.

3.2.3.1.2 Fritchie FS Brackish Marsh

The project area is shallow open water (less than 3 ft deep) surrounded by brackish marsh. Sasser et al. (2008) classified the area as brackish marsh. The adjacent marsh vegetation is consistent with intermediate and brackish marsh plant communities. The long term water salinities in the area, as documented in CRMS surveys (http://www.lacoast.gov/crms_viewer), indicates a wide range of salinity movement throughout the year and among years resulting in conditions appropriate for brackish marsh plant species survival. SAV is prevalent. The proposed staging areas are shallow open water and previously impacted marsh adjacent to roadways that were used by LADOTD when constructing the Highway 433/Rigoletts Road Bridge. The proposed access corridor (currently a board road) is being used for construction of the New Zydeco mitigation site adjacent to Chef Menteur Highway. The proposed 258 acre borrow site in Lake Pontchartrain is part of a brackish estuary in water deeper than SAV would be present.

3.2.3.1.3 Coleman FS Brackish Marsh

This area is primarily shallow (less than 3 ft deep) open water and eroded brackish marsh, and depending on time of year floating aquatic salvinia and submerged aquatic vegetation could be present. The proposed 479 acre project site is surrounded by open water, eroded brackish marsh, pipeline canals and to the north east is brackish marsh and scrub shrub along LA Hwy 23. Marsh species present include smooth cordgrass, salt meadow cordgrass, saltgrass, yellow cowpea, and Olney's three square bulrush (*Schoenoplectus americanus*). Salinities in the area range from 5 to 18 ppt, with an average of 9 ppt. The 348 acre borrow site is within the regularly dredged and maintained Mississippi River upstream of the project site near mile markers 50 and 51. Existing water depths in the borrow area are -44 to -62 ft NAVD88.

3.2.3.1.4 DNWR Main Pass FS Brackish Marsh

This area is primarily shallow (less than 3 ft deep) open water and eroded intermediate marsh dominated by rosseau cane (*Phragmites australis*), and water hyacinth (*Eichhornia crasipes*). Submerged aquatic vegetation could also be present. The proposed 638 acre project site is surrounded by open water, eroded intermediate marsh, and remnant pipeline canals. Marsh species present include floating primrose (*Ludwigia peploides*), Taro (*Colocasia sculenta*), cattail (*Typha domingensis*), and delta duck potato (*Sagitarria platyphylla*). Salinities in the area range from 0.7 to 29.5 ppt, with an average of 9 ppt. The 366 acre borrow site is within the regularly dredged and maintained Mississippi River upstream of the project site near mile markers 1 and 3. Existing water depths in the borrow area are -32 ft NAVD88.

3.2.3.1.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The wetlands and other surface water resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.1.1-3.2.3.1.4.

3.2.3.2 Wildlife

3.2.3.2.1 Big Branch FS Brackish Marsh

Open water in the project areas provide valuable habitat for many wildlife species for wintering and multiple use functions, including forage on SAV. A variety of mammals, birds, reptiles, and amphibians are found in the Big Branch FS Brackish Marsh site. Birds inhabiting the area include *Pelecanus occidentalis* (brown pelicans), seabirds, dabbling and diving ducks, *Fulica americana* (American coots), and gallinules. Mammals in the area include *Myocaster coypus* (nutria), muskrat, *Mustela vison* (mink), river otter, *Procyon lotor* (northern raccoon), *Sylvilagus aquaticus* (swamp rabbit), and (white-tailed deer). *Alligator mississippiensis* (American alligator), *Agkistrodon piscivorus* (western cottonmouth), *Nerodia sipedon* (water snakes), *Lampropeltis holbrooki* (speckled kingsnake), *Elaphe obsoleta lindheimeri* (Texas rat snake), and *Kinosternon subrubrum* (eastern mud turtle), as well as other open water residents and migrants can be found utilizing the habitat within and around the area. Amphibians include green treefrogs (*Hyla cinerea*), toads, and salamanders. See Appendix B, Table B-14 for a full species list.

The project area is known to support various species of shore birds, colonial nesting wading/water birds and seabirds as well as bald eagles. There is potential for nesting of wading/water birds as suitable habitat exists within the project area.

3.2.3.2.2 Fritchie FS Brackish Marsh

Since the Fritchie site is in the vicinity of the Big Branch site and adjacent to Lake Pontchartrain, existing conditions at Fritchie for wildlife would be similar to Big Branch as described in 3.2.3.2.1.

3.2.3.2.3 Coleman FS Brackish Marsh

A variety of non-game wading birds, shore birds, and sea birds are found in the project vicinity. Common wading birds and shore birds include herons, egrets, white ibis (*Eudocimus albus*), black-necked stilt (*Himantopus mexicanus*), killdeer (*Chardrius vociferous*), and willet (*Tringa semipalmata*). American white and brown pelicans are also found in the project vicinity. Common waterfowl include blue-winged teal (*Anas discors*), mottled duck (*Anas fulvigula*), wood duck (*Aix sponsa*), grebes (*Podilymbus sp.*), mallards (*Anas platyrhyncos*), ring-necked duck (*Aythya collaris*), and red-breasted merganser (*Mergus serrator*). Mammals utilizing the brackish marsh include nutria, raccoons, white-tailed deer, opossums, eastern cottontail, and coyotes. American alligators, and an assortment of frogs, turtles, and venomous and nonvenomous snake species are also present. See Appendix B Table B-14 for a full species list.

3.2.3.2.4 DNWR Main Pass FS Brackish Marsh

Mammals using the marsh habitat include numerous furbearers, such as nutria (*Myocaster coypus*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethicus*), swamp rabbit (*Sylvilagus aquaticus*), and white-tailed deer (*Odocoileus virginianus*) and river otter (*Lontra canadensis*). Marsh also provides habitat for frogs, turtles, several species of poisonous and nonpoisonous snakes. The American alligator (Alligator mississippiensis) is abundant in fresh to intermediate marsh and is caught commercially for its hide and meat.

Invertebrates such as mosquitoes (*Aedes sollicitans* and *Culex salinarius*) are the most important of the vectors in the area, although other groups, such as deer flies, horseflies, and biting midges are also considered vectors. Both migratory and resident birds occur in or near the project area. The mottled duck, highly sought by sportsmen, is the only species of waterfowl nesting and wintering in the area. Grebes and loons are non-game migratory waterfowl wintering in the area, and the common snipe is the only game species of shorebird wintering in the area. Numerous other shorebirds use the area as a resting and staging area during migration. See Appendix B Table B-14 for a full species list.

3.2.3.2.5 Corps Constructed/Mitigation Bank/or ILF Combination

The wildlife resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.2.1-3.2.3.2.4.

3.2.3.3 Threatened, Endangered and Protected Species

3.2.3.3.1 Big Branch FS Brackish Marsh

Of the animals and plants under USFWS and/or NMFS jurisdiction, only the West Indian manatee (*Trichechus manatus*), Gulf sturgeon (*Acipenser oxyrhynchus desotoi*), Kemp's Ridley (*Lepidochelys kempii*), loggerhead (*Caretta caretta*), and green sea turtles (*Chelonia mydas*) could potentially occur within the project area. The Lake Pontchartrain borrow site for this project includes 295 square miles of Gulf sturgeon

critical habitat. The designated critical habitat follows the shorelines around the perimeters of each included lake.

West Indian Manatee

The West Indian manatee is Federally-listed as threatened and also is protected under the Marine Mammal Protection Act of 1972, under which it is considered depleted. Critical habitat for the manatee has not been designated in Louisiana. The manatee is a large gray or brown aquatic mammal that may reach a length of 13 ft and a weight of over 2,200 pounds. It occurs in both freshwater and saltwater habitats within tropical and subtropical regions. The primary human-related threats to the manatee include watercraft-related strikes (impacts and/or propeller strikes), crushing and/or entrapment in water control structures (flood gates, navigation locks), and entanglement in fishing gear, such as discarded fishing line or crab traps (USFWS 2007). The manatee is not a year-round resident in Louisiana, but it may migrate there during warmer months. Manatees prefer access to natural springs or manmade warm water, and waters with dense beds of submerged aquatic or floating vegetation. Manatees prefer to forage in shallow grass beds that are adjacent to deeper channels. They seek out quiet areas in canals, creeks, lagoons, or rivers and use deeper channels as migratory routes (USFWS 1999). https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A007.

There have been 110 reported sightings of manatees in Louisiana since 1975 (LDWF 2005). Sightings in Louisiana, which have been uncommon and sporadic, have included occurrences in Lake Pontchartrain as well as the Amite, Blind, Tchefuncte, and Tickfaw Rivers. Between 1997 and 2000, there were approximately 16 sightings in the Lake Pontchartrain area and a general increase in the number of manatees per sighting (Abadie et al. 2000). Sightings of the manatee in the Lake Pontchartrain Basin have increased in recent years, and in late July 2005, 20 to 30 manatees were observed in the lake from the air (Powell and Taylor 2005). Approximately 31 manatee sightings have been reported to the LDWF Natural Heritage Program from 2005 to present in and around Orleans, Jefferson, Plaquemines and St. Bernard parishes (personal communication with Keri Landry LDWLF).

In order to minimize the potential for construction activities to cause adverse impacts to manatees, the following standard manatee protection measures would be implemented when activities are proposed that would impact habitat where manatees could occur:

> All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel would be responsible for observing water-related activities for the presence of manatees. Temporary signs would be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., the work area), and at least one sign would be placed where it is visible to the vessel operator. Siltation barriers, if used, would be made of material in which manatees could not become entangled and would be properly secured and monitored. If a manatee is sighted within 100 yards of the active work

zone, special operating conditions would be implemented, including: moving equipment would not operate within 50 ft of a manatee; all vessels would operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions would no longer be necessary, but careful observations would be resumed. Any manatee sighting would be immediately reported to the U.S. Fish and Wildlife Service (337/291-3100) and the Louisiana Department of Wildlife and Fisheries (LDWF), Natural Heritage Program (225/765-2821).

The MVN has determined, that by implementing the protection measures discussed above, the proposed action is "not likely to adversely affect" the threatened West Indian manatee.

Gulf Sturgeon

The Gulf sturgeon is Federally-listed as threatened. The Gulf sturgeon is an anadromous fish that migrates from salt water into coastal rivers to spawn and spend the warm summer months. Subadults and adults typically spend the three to four coolest months of the year in estuaries or Gulf waters foraging before migrating into the rivers. This migration typically occurs from mid-February through April. Most adults arrive in the rivers when temperatures reach 21 degrees Celsius and would spend eight to nine months each year in the rivers before returning to estuaries or the Gulf of Mexico by the beginning of October. Thus, the Gulf sturgeon spends the majority of its life in fresh water (USFWS and Gulf States Marine Fisheries Commission [GSMFC] 1995). Spawning takes place in upper river reaches and appears to be river-specific. After spawning, most adults move downstream to summer holding or resting areas. Eggs are demersal and adhesive, tending to sink and adhere to the bottom of rivers (USFWS and GSMFC 1995). Spawning areas require clean cobble substrate or gravel to which eggs can adhere and in which developing larvae can find shelter (USFWS and NMFS 2003).

Subadult and adult Gulf sturgeon do not feed significantly in freshwater; instead, they rely almost entirely on estuarine and marine areas for feeding. Young-of-the-year and juveniles feed mostly in the riverine environment (USFWS and NMFS 2003). The diet of the Gulf sturgeon consists predominantly of invertebrates; the types and sizes consumed vary with life history stage and annual migration. Juveniles consume amphipods, isopods, annelid worms, aquatic insects, small bivalves, and small shrimp. Subadults also consume mud or ghost shrimp. Adults in estuaries and coastal waters consume mainly amphipods, isopods, gastropods, brachiopods, polychaete worms, lancelets, and shrimp (USACE 2006a).

Critical habitat identifies specific areas that have been designated as essential to the conservation of a listed species. Critical habitat units (areas) designated for the Gulf sturgeon in Louisiana include the eastern half of Lake Pontchartrain east of the Causeway bridge, Lake Catherine, Lake Borgne, and out into the Mississippi Sound (USACE 2006a). Studies conducted by the LDWF have shown the presence of Gulf sturgeon in Lake Pontchartrain during the winter and during periods of migration

between marine and riverine environments. Most records of Gulf sturgeon from Lake Pontchartrain have been located east of the causeway, particularly on the eastern north shore. Gulf sturgeon have also been documented west of the causeway, typically near the mouths of small rivers (USFWS and NMFS 2003).

Kemp's Ridley, Loggerhead, and Green Sea Turtles

Sea turtles are air-breathing reptiles with large flippers and streamlined bodies. They inhabit tropical and subtropical marine and estuarine waters around the world. Of the seven species in the world, six occur in waters of the U.S., and all are listed as threatened or endangered. The three species with the potential to occur in Lake Pontchartrain in the vicinity of the Big Branch and Fritchie mitigation projects have a similar appearance, though they differ in maximum size and coloration.

The most seriously endangered of the sea turtles, Kemp's Ridley turtles, occur mainly in bays and coastal waters of the Atlantic Ocean and Gulf of Mexico (NMFS/USFWS 1992a). It is the smallest sea turtle – adults average about 100 pounds with a carapace length of 24 to 28 inches and a shell color that varies from gray in young individuals to olive green in adults. The Kemp's Ridley has a carnivorous diet that includes fish, jellyfish, and mollusks. Nesting occurs on the northeastern coast of Mexico and occasionally on Texas Gulf Coast beaches from April to July. Along the Louisiana coast, turtles are generally found in shallow near shore and inshore areas, and especially in salt marsh habitats, from May through October. No Kemp's Ridley sea turtle nesting habitat occurs near the project site, and nesting is not known to occur in the area.

Loggerhead sea turtles nest within the coastal United States from Louisiana to Virginia, with major nesting concentrations occurring on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida (NMFS/USFWS 2009). The loggerhead sea turtle is the second largest of these three species – adults average about 250 pounds with a carapace length of 36 inches and a reddish brown shell color. The loggerhead has an omnivorous diet that includes fish, jellyfish, mollusks, crustaceans, and aquatic plants. In Louisiana, loggerhead sea turtles are known to nest on the Chandeleur Island (LDWF 2011). Nesting and hatching for loggerheads in the Gulf of Mexico occur from May through November.

Green sea turtles are more tropical in their distribution, and are rarely seen in Louisiana coastal waters (LDWF 2011). The green sea turtle is the largest of these three species – adults average 300 to 350 pounds with a length of more than 3 feet and a brown coloration (its name comes from its greenish colored fat). The green sea turtle has an herbivorous diet of aquatic plants, mainly sea grasses and algae, which is unique among sea turtles. Nesting in the southeastern U.S. occurs roughly from June through September (NMFS/USFWS 1991). Nesting within the project area is highly unlikely, as green sea turtles prefer to nest on high-energy beaches with deep sand and little organic content. Furthermore, the Minerals Management Service (1997) indicated that reports of green sea turtle nesting in the northern Gulf are "isolated and infrequent."

All three turtle species nest on sandy beaches, which are not present near Lake Pontchartrain or any of the other project sites. As a result, the life stages that may occur in Lake Pontchartrain range from older juveniles to adults.

Other Protected Species

Bottlenose dolphins (*Tursiops truncatus*) are protected under the Marine Mammal Protection Act of 1972, and are found in temperate and tropical waters around the world including Lake Pontchartrain. The lake appears to have a semi-resident population of dolphins that generally are found in the eastern side of the lake which has the higher salinity level. They likely feed on various estuarine fish and shellfish. It is highly unlikely that dolphins venture into the area proposed for wetland mitigation due to existing very shallow water and submerged aquatic vegetation.

Both wading bird nesting colonies and bald eagle nests could occur in or near the project area. Numerous other shorebirds use the area as a resting and staging area during migration. To avoid adverse impacts to wading bird nesting colonies and bald eagle nesting locations, a qualified biologist would inspect the proposed project area for the presence of wading bird nesting colonies and bald eagle nests within 1,000 feet and 660 feet, respectively, of the work during the nesting seasons (i.e., February 16 through October 31 for wading bird colonies, and October through mid-May for bald eagles). In addition, USACE will carefully design project features, time construction, and implement best management practices to avoid adverse impacts to protected birds and their nests. During nesting season the no-work distances would be implemented and coordinated with USFWS and LDWF.

3.2.3.3.2 Fritchie FS Brackish Marsh

Of the animals and plants under USFWS and/or NMFS jurisdiction, only the West Indian manatee; Gulf sturgeon; and Kemp's Ridley, loggerhead, and green sea turtles could potentially be found in the project borrow area and protected species such as wading birds could be found in the disposal area. See section 3.2.3.3.1 for detailed species descriptions. The borrow site for this project is in Gulf sturgeon critical habitat.

3.2.3.3.3 Coleman FS Brackish Marsh

Of the animals and plants under USFWS and/or NMFS jurisdiction, only the West Indian manatee and pallid sturgeon are expected to potentially occur within the project area and protected species such as wading birds could be found in the disposal area. See Section 3.2.3.3.1 for additional species information on the West Indian manatee and Section 3.2.2.3.1 for additional species information on the pallid sturgeon.

3.2.3.3.4 DNWR Main Pass FS Brackish Marsh

Protected species that may occur in the project vicinity include wading bird nesting colonies, the piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufia),* West Indian manatee, Gulf sturgeon, and pallid sturgeon. See Section 3.2.3.3.1 for additional information on the West Indian manatee and Gulf sturgeon and Section 3.2.2.3.1 for additional species information on pallid sturgeon. No critical habitat for any threatened

or endangered species has been designated within the proposed project area, and none of these species are known to breed within the project vicinity.

National Marine Fisheries Services (NMFS) is responsible for aquatic marine endangered and threatened sea turtles. High levels of sediment in the water column and low prey availability likely preclude any high use by sea turtles in the lower Mississippi River Delta. Furthermore, hydraulic cutterhead pipeline dredging operations have not been identified as a source of sea turtle mortality. Three species of sea turtles that may also be found within the proposed project area are the Kemp's Ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and loggerhead sea (*Caretta caretta*).

The piping plover, as well as its designated critical habitat, occurs along the Louisiana coast (http://criticalhabitat.fws.gov/crithab). Piping plovers winter in Louisiana and may be present 8 to 10 months of the year (LDWF 2011). They depart for the wintering grounds from mid-July through late October and remain until late March or April. Piping plovers forage on intertidal beaches, mudflats, sand flats, algal flats, and wash-over passes with no or very sparse vegetation. They roost in unvegetated or sparsely vegetated areas, which may have debris, detritus, or micro-topographic relief offering refuge from high winds and cold weather. They also forage and roost in wrack deposited on beaches. Piping plovers could occur along the shoreline and in the intertidal of the project vicinity during winter migration, but are not permanent residents of the area. Critical habitat has been designated south of Pass-a-Loutre mainly near the mouth of South Pass and in portions of East Bay between South and Southwest passes. Dredging areas associated with the proposed mitigation do not lie within these critical habitat areas.

The red knot is a medium-sized shorebird that has been listed as a threatened species. The red knot breeds in the central Canadian arctic but is found in Louisiana during spring and fall migrations and the winter months (generally September through March). During migration and on their wintering grounds, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Observations along the Texas coast indicate that red knots forage on beaches, oyster reefs, and exposed bay bottoms, and they roost on high sand flats, reefs, and other sites protected from high tides. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. Coquina clams (*Donax variabilis*), a frequent and often important food resource for red knots, are common along many Gulf beaches. Dredging may cause red knots occurring near the project area to be temporarily displaced to nearby areas containing foraging and loafing habitat.

3.2.3.3.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The T&E resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.3.1-3.2.3.3.4.

3.2.3.4 Fisheries, Aquatic Resources, and Water Quality

3.2.3.4.1 Big Branch FS Brackish Marsh

The project area supports a diverse assemblage of estuarine-dependent fishes and shellfishes, and species presence is largely dictated by salinity levels and season. During low-salinity periods, species such as Gulf menhaden, blue crab, white shrimp, blue catfish, largemouth bass and striped mullet are present in the project area. During high-salinity periods, more salt-tolerant species such as sand seatrout, spotted seatrout, black drum, red drum, Atlantic croaker, sheepshead, southern flounder, Spanish mackerel, and brown shrimp may move into the project area. Wetlands throughout the project area also support small resident fishes and shellfish such as least killifish, sheepshead minnow, sailfin molly, grass shrimp and others. Those species are typically found along marsh edges or among submerged aquatic vegetation, and provide forage for a variety of fish and wildlife.

The water quality of the hydrologic unit which this project is in does not fully support one of its designated uses: Fish and Wildlife Propagation. The suspected sources of this impairment, low dissolved oxygen, includes on-site treatment systems such as septic systems and similar decentralized systems, and permitted discharges in the area. Lake Pontchartrain, the project's borrow source, is considered to fully support it designated uses.

3.2.3.4.2 Fritchie FS Brackish Marsh

Since the Fritchie site is in the vicinity of the Big Branch site and adjacent to Lake Pontchartrain, existing conditions at Fritchie for fisheries and aquatic resources should be similar to those for described in Section 3.2.3.4.1 Big Branch FS Brackish Marsh.

The water quality of the hydrologic unit which this project is in does not fully support one of its designated uses: Primary Contact Recreation. The suspected source of this impairment, fecal coliform, is from on-site treatment systems, such as septic systems and similar decentralized systems. Lake Pontchartrain, the project's borrow source, is considered to fully support these designated uses.

3.2.3.4.3 Coleman FS Brackish Marsh

The Coleman FS project area, is adjacent and on the flood side of the NOV. It is primarily shallow brackish open water. However there is remnant fringe brackish marsh partially surrounding the site, and the site used to be completely vegetated with brackish marsh but through storms, subsidence, and erosion is now open water. The water and residual brackish marsh at the site has an average salinity of approximately 8 ppt. This community is tidally influenced, and because of this fringe brackish marsh, it is productive and provides habitat to a wide variety of economically important fish and invertebrates, such as those described in Section 3.2. The water quality of the hydrologic units encompassing this project area fully supports its designated uses.

3.2.3.4.4 DNWR Main Pass FS Brackish Marsh

The Mississippi River supports one of the most diverse fisheries in the world with at least 183 species of freshwater fish in the Mississippi River Delta and the DNWR. There are three species of mussels, and 13 species of crawfish found within the

Mississippi Basin in Louisiana. Minnow (*Cyprinidae*), darter (*Etheostoma* and *Pecina*), perch (*Perca spp.*), sturgeon (*Acipenseridae*), and paddlefish (*Polyodon spathula*) are the most common fish species in the river.

The Main Pass is fed by the Lower Mississippi River. The water bottom is composed of firm silty, sandy clay mainly deposited by the river. These submerged lands are typically soft and almost fluid, but some areas are firm where heavier silts and sands have deposited. The DNWR Main Pass brackish marsh site has water depths that measure approximately 1 to 5 feet with submerged aquatic vegetation (SAV) occurring in some portions of the shallow open-water areas, with the most common species including pondweed (*Potamogen spp.)*, coontail (*Ceratophyllum demersum*), and water millfoil (*Myriophyllum spp*.). These submerged plants provide a source of food for the large numbers of waterfowl frequently during winter. Shellfish species including oysters, shrimp, and crabs are found in the brackish marshes near the project area. Many juveniles of these species use fringe marsh, interspersed shallow ponds, and SAV for grazing.

Fishing is a major recreational and commercial activity. The estuarine nature of the area provides a dynamic aquatic environment where freshwater and saltwater meet, providing a transitional zone between the two aquatic ecosystems. The DNWR marshes and waterways provide important spawning and nursery habitat and a food source for a wide variety of fresh and saltwater fish species. Vegetation and marsh loss degrades the utility of the area as a nursery habitat and food source.

The influx of freshwater from the Mississippi River, particularly during floods and other high water flow periods, potentially allows for riverine fisheries species to migrate downriver to the delta region. Potential species that could occur during high water/low salinity periods are listed in Table 11 below. During low water periods, storm surges, and seasonally strong tidal influences, the increased saltwater intrusion from the Gulf restricts the abundance and diversity of freshwater fisheries, and provides opportunities for estuarine (brackish) species. Many of these species are economically and recreationally important, including black drum, spot, Spanish mackerel, etc. (See Appendix B, Table 16 for full species list). Commercially important shellfish found include, blue crab, brown shrimp, pink shrimp, white shrimp, Gulf stone crab, and oysters. Other commercially less important species include grass shrimp, mysid shrimp, roughneck shrimp, and mud crab.

The area also supports populations of phytoplankton and zooplankton (e.g., copepods, rotifers, fish larvae, and molluscan and crustacean larvae). Benthic invertebrate populations are comprised of both epifaunal and infaunal species (e.g., polychaete and oligochaete worms, crustaceans, bivalves and gastropod mollusks). These organisms constitute vital components of the aquatic food chain and may comprise the diets of numerous finfish and shellfish species. The water quality of the hydrologic units encompassing this project footprint fully supports its designated uses.

Table 11. Fish and crustacean species found near the HDDA project area.

Common Name (*Species name*)	Table cont.
Atlantic croaker (*Micropogonias undulatus*)**	Oysters (*Crassostrea virginica*)
Black crappie (*Pomoxis nigromaculatus*)*	Pink shrimp (*Farfantepenaeus duorarum*)
Black drum (*Pogonias cromis)***	Red drum (*Sciaenops ocellatus*)**
Blue catfish (*Ictalurus furcatus*)*	Roughneck shrimp (*Trachypenaeus constrictis*)
Blue crab (*Callinectes sapidus*)	Sand seatrout (*Cynoscion arenarius*)**
Brown shrimp (*Farfantepenaeus aztecus*)	Sheepshead (*Archosargus probatocephalus*)**
Buffalo (*Ictiobus bubalus)**	Smallmouth bass (*Micropterus dolomieu*)*
Channel catfish (*Ictalurus punctatus*)*	Southern flounder (*Paralichthys lethostigma*)**
Flathead catfish *(Pylodictis olivaris)*	Southern kingfish (*Menticirrhus americanus*)**
Gizzard shad (*Dorosoma cepedianum*)*	Spanish mackerel (*Scomberomorus maculates*)**
Grass shrimp (*Palaemonetes pugio*)	Spot (*Leiostomus xanthurus*)**
Gulf menhaden (*Brevoortia patronus*)**	Spotted sea trout (*Cynoscion nebulosus*)**
Gulf stone crab (*Menippe adina*)	Striped mullet (*Mugil cephalus*)**
Largemouth bass (*Micropterus salmoides*)*	Sunfish (*Lepomis spp.*)*
Mud crab (*Eurypanopeus depressus)*	White shrimp (*Litopenaeus setiferus*)
Mysid shrimp (*Mysidopsis bahia*)	

* Found during high water/low salinity periods
** Economically important fish

3.2.3.4.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The fisheries, aquatic, and water quality resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.4.1-3.2.3.4.4.

3.2.3.5 Essential Fish Habitat

3.2.3.5.1 Big Branch FS Brackish Marsh

The project and borrow areas are located within an area identified as EFH post larval/juvenile brown shrimp; post larval/juvenile white shrimp; and post larval/juvenile and adult red drum. The 2005 generic amendment of the Fishery Management Plan (FMP) for the Gulf of Mexico, prepared by the Gulf of Mexico Fisheries Management Council (FMC), identifies EFH in the project area to be estuarine emergent wetlands, SAV (estimated to be found within 25 percent of project area), estuarine water column, and mud substrates. Each of these species, their life stages, the aquatic systems where they live, and EFH are described in Table 9.

3.2.3.5.2 Fritchie FS Brackish Marsh

The project and borrow areas are located within an area identified as EFH for post larval/juvenile brown shrimp; post larval/juvenile white shrimp; and post larval/juvenile and adult red drum. The 2005 generic amendment of the FMP for the Gulf of Mexico, prepared by the Gulf of Mexico FMC, identifies EFH in the project area to be estuarine emergent wetlands, SAV (estimated to be found within 41 percent of the site), estuarine water column, and mud substrates. Each of these species, their life stages, the aquatic systems where they live, and EFH are described in Table 9.

3.2.3.5.3 Coleman FS Brackish Marsh

The project and borrow areas are located within an area identified as EFH for coastal migratory pelagic, red drum, reef fish, and shrimp. Additionally, several tributaries are located within the project area and designated as EFH by GMFMC. Each of these species, their life stages, the aquatic systems where they live, and EFH are described in Table 9.

3.2.3.5.4 DNWR Main Pass FS Brackish Marsh

The project and borrow areas are located within an area identified as EFH for coastal migratory pelagic, red drum, reef fish, and shrimp. Adult red drum is the only EFH species expected to be found within the proposed borrow area because it is the only EFH species and life stage within that area that can withstand the Mississippi River currents. EFH species associated with the marsh creation area include all red drum life stages, brown shrimp, white shrimp, and reef fish such as lane snapper and gray snapper. These species use the area for foraging and nursery habitat, as well as a migration route to other areas considered to be EFH. Each of these species, their life stages, the aquatic systems where they live, and EFH are described in Table 9.

3.2.3.5.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The EFH resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.5.1-3.2.3.5.4.

3.2.3.6 Cultural Resources

3.2.3.6.1 Big Branch FS Brackish Marsh

Several surveys for cultural resources have been carried out within close proximity to the project area. A preliminary survey for cultural resources was conducted along Bayou Bonfouca in 1988 and several sites were identified. Cultural resource sites are most common along bank line locations and tend to be concentrated in areas where the natural environment offers the maximum range of subsistence potential with a high probability of finding cultural resources in the ecological interface between the uplands and the bayous and marsh. There are identified cultural resources along the shoreline of Lake Pontchartrain, and it is possible that unidentified cultural resources could exist in areas not yet surveyed. The proposed marsh restoration area is predominately open water, so there is a low probability that cultural resources are present. There is a

possibility that cultural resources could exist in dry areas along natural levees and bayous within the project area and proposed access corridor. Cultural resources could be impacted by the construction of retention dikes, use of staging and access areas, and other activities associated with the project. There is also the possibility that submerged resources could exist within the proposed borrow areas.

3.2.3.6.2 Fritchie FS Brackish Marsh

There is a low probability that cultural resources exist within the open water portion of the project area that is proposed for marsh restoration. There is a high probability for sites along bayous, natural levees, and shorelines. Cultural resources previously identified along the Lake Pontchartrain shoreline and within approximately one mile of the project area include a historic ferry landing and prehistoric village site (16ST5), the remains of a historic lighthouse of undetermined eligibility (16OR60), and the foundation of a historic hospital facility (16OR34). The Fort Pike State Historic Site (SHS) (16OR57) is located within a mile of the project area. These sites do not appear to be in locations that would be affected by the proposed boundaries for the mitigation, although deposits within these sites are thought to be submerged in Lake Pontchartrain, and given the close proximity to Fort Pike and other known cultural resources, there is a moderate to high probability that submerged cultural resources could exist near the proposed borrow areas and sediment pipeline corridor in Lake Pontchartrain.

3.2.3.6.3 Coleman FS Brackish Marsh Project

This project has not been surveyed for cultural resources. The project appears to be a sunken agricultural field, and there is a low potential for the presence of cultural resources.

A cultural resources survey may be required for ancillary project features such as retention dikes, borrow pits, access corridors and staging areas. The proposed borrow source in the Mississippi River is not likely to require cultural resources surveys because the river has been regularly dredged to maintain navigation. The decision to conduct a cultural resources survey and the results would be coordinated with the SHPO and Federally-recognized Indian tribes as required by Section 106 of the NHPA. Cultural resources that are eligible for inclusion in the NRHP and those that are unevaluated for National Register eligibility would be avoided.

3.2.3.6.4 DNWR Main Pass FS Brackish Marsh

The project area is located in unoccupied marsh lands between passes of the Mississippi River. The long natural history of the delta region has given much opportunity for land to be created and destroyed by the movement of water. Prior to modern development and settlement in Plaquemines Parish and the subsequent attempts at flood control and navigation improvement, the channels and Head of Passes passed through Spanish, French, Spanish again, and then American exploration and rule. Various existing passes were predominant over that time, with various small attempts at fortifications and dredging and deepening of channels for use. All the while, settlement and trade within Plaquemines Parish was increasing ship traffic down the river, and events such as the Civil War led to increased shipwrecks and

attempts to fortify or block the river. In the more recent era, several cultural resources surveys have been conducted both for terrestrial resources and for underwater resources such as shipwrecks. No cultural resources have been recorded within the currently proposed marsh creation area.

The numerous studies that reference prehistoric activity in the vicinity of the project area describe that use would have been temporary and disturbed by the flooding and deposition that has occurred since earliest times. No prehistoric resources are known to be adjacent to the project area. The only recorded cultural resources in the vicinity are remains of historic buildings. No historic buildings exist within the project boundaries or are immediately adjacent.

3.2.3.6.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The cultural resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.6.1-3.2.3.6.4.

3.2.3.7 Recreational Resources

3.2.3.7.1 Big Branch FS Brackish Marsh

The site, approximately 370 acres of open water, is located in the Big Branch (BB) NWR in St. Tammany Parish. The BBNWR, located in St. Tammany Parish, encompasses about 18,000 acres offering diverse habitats supporting a wide variety of wildlife species, attracting concentrations of waterfowl, wading birds, shorebirds, and neotropical migrants. In addition to providing habitat for a natural diversity of wildlife, the refuge seeks to provide a variety of opportunities for public outdoor recreation and education. Environmental education, birding, fishing, hunting, biking, hiking, wildlife observation, photography and canoeing takes place within the refuge, although these activities mainly take place at the Boy Scout Road boardwalk and trail area just northwest of the Big Branch mitigation site. Fishing and hunting does occur at the project site. Most of these BBNWR recreation opportunities are located on refuge lands west of Highway 11.

3.2.3.7.2 Fritchie FS Brackish Marsh

The site, approximately 350 acres of open water is located in the Big Branch NWR in St. Tammany Parish. Land in the refuge is used for fishing and hunting; however, most of the day use occurring in Big Branch NWR takes place further north and west of the Fritchie site, across Highway 11 west of Eden Isle, as stated in section 3.2.3.7.1.

Waterfowl hunting is the most popular activity taking place near the Fritchie site. According to the BBNWR Manager, about 5-10 hunters use the site per day during the waterfowl season. Hunters launch pirogues from the Salt Bayou parking lot and paddle to nearby ponds to hunt.

3.2.3.7.3 Coleman FS Brackish Marsh Project

The 479 acre Coleman Brackish Marsh site is currently privately-owned. Recreational opportunities include mainly boating, fishing and hunting. Dredge material needed for

the restoration will come from the Mississippi River where there is little recreation taking place. Material will be delivered via unnamed waterways that may be used by fisherman. A staging area will also be set up between LA Hwy 23 and the river. No recreation taking place in the vicinity of the staging area.

3.2.3.7.4 DNWR Main Pass FS Brackish Marsh

The 638 acre DNWR Main Pass Brackish Marsh site is part of the DNWR. Recreational opportunities include boating, fishing, and hunting. The DNWR was established in 1935 to serve as a breeding ground for migratory birds and other wildlife, and to serve as a migratory waterfowl refuge. The refuge lands are accessible only by boat. Despite this limitation, the area has a long record of public use. The majority of this public use has been in the form of consumptive uses such as hunting and fishing (fresh and saltwater). Other public use includes wildlife observation, bird watching, boating, canoeing and kayaking and photography. Camping is not allowed on the refuge.

Dredge material needed for the project will come from the Mississippi River where there is little recreation taking place. Material will be delivered via Main Pass and unnamed waterways that may be used by fisherman, boaters, and other recreators.

3.2.3.7.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The recreational resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.7.1- 3.2.3.7.4.

3.2.3.8 Air Quality

3.2.3.8.1 Big Branch FS Brackish Marsh

The Big Branch FS Brackish Marsh site is located in St. Tammany Parish which is currently in attainment of NAAQS.

3.2.3.8.2 Fritchie FS Brackish Marsh

The Fritchie FS Brackish Marsh site is located in St. Tammany Parish which is currently in attainment of NAAQS.

3.2.3.8.3 Coleman FS Brackish Marsh

The Coleman FS Brackish Marsh site is located in Plaquemines Parish which is currently in attainment of NAAQS.

3.2.6.8.2 DNWR Main Pass FS Brackish Marsh

The DNWR Main Pass FS Brackish Marsh site is located in Plaquemines Parish which is currently in attainment of NAAQS.

3.2.3.8.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The Air Quality resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.8.1-3.2.3.8.4.

3.2.3.9 Noise

3.2.3.9.1 Big Branch FS Brackish Marsh
This project is located in a remote portion of the Big Branch NWR in St. Tammany Parish, Louisiana. Sporadic boat traffic may produce noise levels that exceed 55 dBA within the project area.

3.2.3.9.2 Fritchie FS Brackish Marsh
This project disposal area is located in a remote portion of the Big Branch NWR in St. Tammany Parish, Louisiana. The pipeline to place the dredged material is proposed to follow Salt Bayou Road and Highway 433 where there area approximately 39 camps, residences and/or businesses. Sporadic boat traffic may produce noise levels that exceed 55 dBA.

3.2.3.9.3 Coleman FS Brackish Marsh
There are commercial and residential housing units located along LA Hwy 23, which is located approximately 3,000 ft east of the project area. Noise is produced by consistent and sporadically heavy traffic on this road. The nearest major navigable waterway to the Coleman project is the Mississippi River and some unnamed pipeline canals. Sporadic boat traffic along the river or boats on the canals may produce noise levels that exceed 55 dBA.

3.2.3.9.4 DNWR Main Pass FS Brackish Marsh
This project is located in a remote portion of the DNWR in Plaquemines Parish, Louisiana. Sporadic boat traffic may produce noise levels that exceed 55 dBA.

3.2.3.9.5 Corps Constructed/Mitigation Bank and/or ILF Combination
The Noise resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.9.1-3.2.3.9.4.

3.2.3.10 Hazardous, Toxic, and Radioactive Waste

3.2.3.10.1 Big Branch FS Brackish Marsh
No recognized environmental conditions (RECs) were found within or near the proposed Big Branch Marsh project area. There are no pipelines crossing the area. No wells or waste pits have been identified within the area. There would be a low probability of encountering HTRW or petroleum products in the proposed Big Branch Marsh project area. If this alternative were selected as the TSP a full HTRW Phase I environmental site assessement would be completed prior to construction.

3.2.3.10.2 Fritchie FS Brackish Marsh
No RECs were found within or near the proposed Fritchie Marsh project area. There are no pipelines crossing the area. No wells or waste pits have been identified within the area. There would be a low probability of encountering HTRW or petroleum

products in the proposed Fritchie Marsh project area. If this alternative were selected as the TSP a full HTRW Phase I environmental site assessement would be completed prior to construction.

3.2.3.10.1 Coleman FS Brackish Marsh

Three dry and plugged wells exist within the proposed Coleman Marsh project area. One dry and plugged well exists adjacent to the area. There would be a low probability of encountering HTRW or petroleum products in the proposed Coleman Marsh project area. If this alternative were selected as the TSP a full HTRW Phase I environmental site assessement would be completed prior to construction.

3.2.3.10.2 DNWR Main Pass FS Brackish Marsh

No RECs were identified within or near the proposed DNWR Main Pass project area. There would be a very low probability of encountering HTRW or petroleum products in the proposed DNWR Main Pass project area. If this alternative were selected as the TSP a full HTRW Phase I environmental site assessement would be completed prior to construction.

3.2.3.10.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The HTRW resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.10.1-3.2.3.10.4.

3.2.3.11 Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries

3.2.3.11.1 Big Branch FS Brackish Marsh

According to 2010 U.S. Census data, there are no residents located within the boundaries of the Big Branch project area, and therefore no EJ communities exist. There are no commercial/industrial properties, public facilities, or transportation infrastructure within the project boundaries. The proposed project does not require any acres of agricultural or forestry land to be converted. The nearest navigable waterway to the project is Lake Pontchartrain. The Big Branch project area provides a valuable estuary supporting a diverse assemblage of estuarine-dependent fishes important to commercial fisherman in nearby Lake Pontchartrain.

3.2.3.11.2 Fritchie FS Brackish Marsh

The existing conditions as they relate to Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries resources at the Fritchie site are similar to those at the Big Branch project site. See section 3.2.3.11.1, Big Branch, for more information.

3.2.3.11.3 Coleman FS Brackish Marsh

There are no residents, and therefore no EJ communities, living within nor in the vicinity of the brackish marsh restoration site, according to the 2010 U.S. Census. Additionally, there are no commercial/industrial properties, public facilities, or transportation

infrastructure within the project boundaries. The nearest major thoroughfare is LA Hwy 23. The nearest major navigable waterways to the project are the Mississippi River and Lake Judge Perez. There are many bayous and canals that intersect the vicinity of the project area. There is no commercial fishing taking place at the Coleman project site.

3.2.3.11.4 DNWR Main Pass FS Brackish Marsh

There are no residents, and therefore no EJ communities, living within nor in the vicinity of the brackish marsh restoration site, according to the 2010 U.S. Census. Additionally, there are no commercial/industrial properties, public facilities, or transportation infrastructure within the project boundaries. There are no near major thoroughfares, and the nearest major navigable waterways to the project is the Mississippi River. There are many bayous and canals that intersect the vicinity of the project area. There is no commercial fishing taking place at the DNWR Main Pass project site.

3.2.3.11.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The Socioeconomics/Land Use, EJ, Transportation, Navigation, and Commercial Fisheries resources for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be the same as the Corps Constructed projects described in 3.2.3.11.1-3.2.3.11.4.

4.0 ENVIRONMENTAL CONSEQUENCES OF THE FINAL ARRAY

This section describes the direct, indirect and cumulative effects of mitigation projects. Appendix A Figure A-10 shows the significant vegetative resources found within the deltaic plain. The period of impact analysis begins when project construction is completed and generally extends 50 years for USACE projects.

Direct impacts are those that are caused by the action taken and occur at the same time and place (40 CFR §1508.8(a)). Indirect impacts are those that are caused by the action and occur later in time or are further removed in distance, but are still reasonably foreseeable (40 CFR §1508.8(b)). Cumulative impacts are the effects on the environment that results from the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future action, regardless of what agency or person undertakes such actions.

4.1 MITIGATION PROJECTS BY HABITAT TYPES

4.1.1 MITIGATION FOR SWAMP IMPACTS

Mitigation Bank

Direct, Indirect, and Cumulative Impacts

The TSP mitigating the swamp features of the TSMP includes the purchase of sufficient swamp credits from a permitted bank within the Basin to mitigate a total of 33.9 AAHUs. See Table 1 for a breakdown of AAHUs impacted by the NFL NOV construction. The particular bank to be utilized is unknown at this time. Since permitted banks exist as

reasonably foreseeable projects in the FWOP conditions, no new direct, indirect or cumulative impacts to wetlands and other surface waters, wildlife, threatened and endangered species, fisheries, aquatic resources, water quality, EFH, cultural resources, recreational resources, air quality, noise, aesthetics, prime and unique farmland, HTRW, socioeconomics/land use, environmental justice, transportation, navigation, and commercial fisheries would be incurred from the purchase of these credits for the NFL NOV mitigation.

4.1.1.1 Wetlands and Other Surface Waters

4.1.1.1.1 NF NOV 05a.1 FS Swamp

Direct and Indirect Impacts
There would be a beneficial impact to wetlands with the conversion of approximately 32 acres of low quality impounded wet pasture and 68 acres of cattle pasture to high quality tidally connected swamp habitat. Once hydrologically reconnected, the restored wetlands and created wetlands would indirectly benefit adjacent wetlands by providing nutrients and detritus which are important for the health and persistence of other wetlands in the Barataria Bay estuary. See the Fisheries, Aquatic Resources, and Water Quality section 4.2.1.4.1 for analysis of borrow pit impacts.

Cumulative Impacts
Implementation of this project would prevent an overall loss of swamp habitat in the Basin over a long term period due to hydrological reconnection of higher quality, restored wetlands. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the Basin, would help retard or slow the loss of wetlands.

4.1.1.1.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The wetlands and other surface water resources impacts for the NF NOV 05a.1 and Mitigation Bank Combination project would be of the same type, but less than, those stated in section as 4.1.1.1.1 for the NF NOV 05a.1 FS Swamp project.

4.1.1.2 Wildlife

4.1.1.2.1 NF NOV 05a.1 FS Swamp

Direct and Indirect Impacts
Wildlife species present at the time of construction would be displaced. The common inhabitants of this area are avian species which are fully equipped to relocate to similar adjacent habitat. Approximately 100 acres of cattle pasture and wet pasture would be converted to swamp habitat, however, impacts to cattle pasture would be minimal because this habitat is prevalent throughout the Basin. This conversion would increase habitat for white-tailed deer, skunks, rabbits, squirrels, and armadillos; various raptors such as barred owls, red-shouldered hawks, northern harriers (marsh hawks), American

kestrel, and red-tailed hawks; passerine birds such as sparrows, vireos, warblers, Northern mockingbirds, grackles, red-winged blackbirds, wrens, blue jays, northern cardinals, and crows. The swamp habitat would offer new shelter, nesting, breeding, and foraging grounds for these species. Other wildlife outside the project may indirectly benefit from having this area as an additional territory for foraging and breeding opportunities. This habitat could also serve as a temporary stopover habitat for migratory birds.

Cumulative Impacts
This project would prevent an overall loss in the Basin of swamp habitat necessary for many wildlife species. This project, when added to other past, present, and reasonably foreseeable future ecosystem restoration and mitigation projects in the Basin, would help reduce the loss of wetlands and overall decline of wildlife species within the Basin and would be beneficial to preserving species biodiversity.

4.1.1.2.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The impacts to wildlife resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same, but less than, those stated in section 4.1.1.2.1 for the NF NOV 05a.1 FS Swamp project.

4.1.1.3 Threatened, Endangered and Protected Species

4.1.1.3.1 NF NOV 05a.1 FS Swamp

Direct and Indirect Impacts
Of the animals and plants under USFWS and/or NMFS jurisdiction, only the pallid sturgeon are expected to potentially occur within the project's borrow area (Mississippi River) and manatees and protected birds in the entire project area. The presence of construction-related activities, machinery, and noise would be expected to cause this species to relocate or avoid the project area during the construction period. However, in order to minimize the potential for construction activities to cause adverse impacts to manatees or pallid sturgeon during the construction period, the standard pallid sturgeon and manatee protection measures found in Sections 3.2.2.3.1 and 3.2.3.3.1 would be implemented.

A survey would be performed prior to construction to identify the presence of colonial nesting water birds or nesting bald eagles. If colonial nesting water birds are present, best management practices (BMPs) developed in coordination with USFWS would be implemented to avoid potential direct impacts. See Section 5.3.3.2 and Section 8.2. If nesting bald eagles are present, the National Bald Eagle Management Guidelines would be followed. Other wildlife outside the project may indirectly benefit from having this area as an additional territory for nesting (e.g. rookeries), foraging, and mating opportunities. This habitat could also serve as a temporary stopover habitat for migratory birds.

Potential indirect impacts from the proposed action would primarily consist of effects from dredging operations, increased turbidity, and benthic species removal. However, although the rise in turbidity could immediately reduce water quality in the project area, those effects would be temporary and would be reduced by movement of the river. Any pallid sturgeon in the borrow area would be free to relocate during construction since the project area encompasses only a small section of the Mississippi River, the same goes for any manatee in the river or the disposal area. Additional similar foraging areas are available for pallid sturgeon to utilize throughout the river as well as for manatee in the areas surrounding placement site in the interim. As such, this project is not likely to adversely affect any pallid sturgeon or manatee that may be present in the area.

Cumulative Impacts
Due to the size of the Mississippi River, the relatively small size of the borrow area, the temporary nature of the borrow activities, the use of a (slow moving) cutterhead dredge for borrow procurement, the duration of dredging, and the ability of these species to avoid the project area during the construction period, the NF NOV 05a.1 FS Swamp project would add very little and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the Basin. These impacts would not contribute significantly to cumulative impacts to threatened and endangered species in the Basin.

4.1.1.3.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination
The threatened and endangered species resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be the same, but less than, those stated in section 4.1.1.3.1 NF NOV 05a.1 FS Swamp project.

4.1.1.4 Fisheries, Aquatic Resources, and Water Quality

4.1.1.4.1 NF NOV 05a.1 FS Swamp

Direct and Indirect Impacts
With implementation of this project, there would be some direct and indirect impacts to fisheries in the form of physically altered water bottom habitat and temporary increases in turbidity during construction dredging activities in the Mississippi River. Approximately 82 acres of Mississippi River bottom would be deepened to approximately -75 feet NAVD88. According to recent surveys in this area, the Mississippi River depth in this area ranges from -40 to -60 ft NAVD88. The fish species and benthic animals living on, adjacent to, or in the dredged material would most likely be killed during either the mining or the placement of the dredge material. Due to flow of the river it is anticipated that the pits would re-fill overtime and no anoxic conditions would develop. Sediment particles suspended due to construction activities may impact filter feeding benthic invertebrates adjacent to the borrow area by fouling feeding apparatus if the concentration of such particles is excessively high, resulting in short-term direct impacts to the benthic community. As the Mississippi River is a highly dynamic environment, frequently experiencing disturbances that change the river bottom and produce high turbidity levels, little impact to fisheries or benthic resources is

expected from dredging operations. The dredged material disposal area does not contain any fisheries or aquatic resources.

The restoration of tidal swamp habitat in areas that are currently pasture would provide indirect benefits to fisheries in the future by providing nutrients to the system in the form of detritus. As a result of borrow placement and the type of containment utilized for this project, land adjacent to the mitigation project may receive material suspended in the dredge effluent. This would nourish adjacent marsh habitat and may cause adjacent shallow open water to become shallower or be filled; encouraging the colonization of these areas by emergent marsh species.

Cumulative Impacts
Though construction of this project would result in the loss of some fisheries habitat, aquatic resources, and temporary impacts to water quality and benthic habitat; this habitat is abundant throughout the Basin, impacts to existing fisheries are minimal, and water quality and benthic species would rebound once project construction is complete. This project restores 32 acres and creates an additional 68 acres of wetland swamp habitat, as such, construction of this project would result in an overall reduction in cumulative loss to fisheries, aquatic resources, and water quality in the Basin in light of past, present and reasonably foreseeable projects in the Basin.

Temporary impacts to water quality from construction would add incrementally to similar cumulative impacts throughout the Basin as other projects listed in the FWOP are constructed, causing temporary decreases in water quality in the Basin. The temporary impacts to the Mississippi River from borrow excavation are not anticipated to be substantial enough to cause water quality impairment under the standards of Louisiana Administrative Code, Title 33, Part IX, Chapter 11.

4.1.1.4.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination
The impacts to fisheries, aquatic, and water quality resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be of the same type, but less than, those stated in section 4.1.1.4.1 NF NOV 05a.1 FS Swamp project.

4.1.1.5 Essential Fish Habitat

4.1.1.5.1 NF NOV 05a.1 FS Swamp
Direct Impacts, Indirect and Cumulative Impacts
There would be no direct, indirect or cumulative impacts to EFH since the project area does not currently contain EFH.

4.1.1.5.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination
The impacts to EFH resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be of the same type as, but less than, those stated in section 3.2.1.5.1 NF NOV 05a.1 FS Swamp project.

4.1.1.6 Cultural Resources

4.1.1.6.1 NF NOV 05a.1 FS Swamp

Direct and Indirect Impacts
There are no recorded or suspected intact cultural resources within the NF NOV 05a.1 swamp project. The erosion and land loss caused by natural forces and human activity would continue to impact potential cultural resources in the project area. The NF NOV 05a.1 has a low probability of undiscovered cultural resources. Valk et al. (2010) surveyed across the project footprint. A site visit was conducted of the project areas and a letter of coordination was sent to the SHPO on January 15, 2016, and the SHPO concurred with a determination of no historic properties affected. Another site visit was made and a coordination letter sent to SHPO in October 2018, and the SHPO concurred with a determination of no historic properties affected.

Cumulative Impacts
Implementation of this project would work synergistically with other storm damage and flood risk reduction, and ecosystem restoration projects in coastal Louisiana to reduce impacts to significant cultural resources. Cumulative impacts to cultural resources would be the additive combination of impacts by this and other Federal, state, local, and private restoration efforts. The NF NOV 05a.1 project area has been intensively studied to detect any cultural resources, and none have been found. The area has no known cultural resources that would be impacted, and so no cumulative impacts exist for this project area.

4.1.1.6.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The impacts to cultural resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be of the same type as, but less than, those stated in section 4.1.1.6.1 NF NOV 05a.1 FS Swamp project.

4.1.1.7 Recreational Resources

4.1.1.7.1 NF NOV 05a.1 FS Swamp

Direct, Indirect and Cumulative Impacts
There are no impacts to recreational resources with the NOV-NF-W-05a.1 project because the area does not offer recreational opportunities as most of the land is remote, cattle pasture, often wet, and for the most part maintained. The low plant species diversity of these wet pasture areas limits their value to recreational hunting or wildlife viewing. After the creation of the swamp habitat, there could be the potential for public recreation opportunities such as hunting, hiking, and wildlife viewing if there is a change of land status from private to public. Borrow material necessary for construction of this project would be obtained from the Mississippi River. Dredging of the river could cause an increase in turbidity and localized impacts to river bank fishing in the immediate vicinity, but overall there would be minimal direct recreational resource impacts.

Recreational fish species in the areas around the mitigation site may reap benefits of the new swamp habitat by offering additional foraging habitat for juveniles and spawning habitat for adults. Construction noise may temporarily limit recreational fishing and hunting in areas close to construction work. Once the area has matured, recreational opportunities could be enhanced in surrounding areas because of the new habitat created.

Cumulative Impacts
Restoration/enhancement of fish and wildlife habitat would increase use of the project sites by desirable species which would consequently provide a better recreational experience. Recreational impacts could be considered cumulatively beneficial when added to the recreational opportunities provided at adjacent refuges and other existing recreational areas in the Basin. However, since this is mitigation, which replaces impacted habitats, recreational resources dependent on these habitats would merely shift from the area of impact to the area of mitigation, preventing the loss of recreational resources in the Basin. The impacts associated with utilization of the borrow sites for construction of the mitigation projects would be short-term and not result in a significant increase in cumulative impacts to recreational resources in the Basin.

4.1.1.7.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination
The impacts to recreational resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be of the same type as, but less than, those stated in section 4.1.1.7.1 NF NOV 05a.1 FS Swamp project.

4.1.1.8 Air Quality

4.1.1.8.1 NF NOV 05a.1 FS Swamp
Direct and Indirect Impacts
During construction of this project, an increase in air emissions could be expected. These emissions could include exhaust emissions from operations of various types of non-road construction equipment such as a cutterhead dredge, backhoes, tractors, etc. and from vehicles used to access the project area. Fugitive dust emissions are not anticipated during construction.

Any site-specific construction effects to air quality would be temporary, and air quality would return to pre-construction conditions shortly after the completion of construction activities. Because the project area is in a parish in attainment of NAAQS, a conformity analysis is not required.

There would be no adverse indirect impacts to air quality in the parish with construction of the proposed action.

Cumulative Impacts
Cumulative impacts to air quality in the project area due to construction of this project in addition to the other construction activities within the Basin that may be occurring

concurrently would be temporary and would be very minimal, especially considering that placement of dredged material would not create fugitive dust. After the construction period, there would be no incremental contribution to cumulative air quality impacts due to the proposed action.

4.1.1.8.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The impacts to air quality resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be of the same type as, but less than, those stated in section 4.1.1.8.1 NF NOV 05a.1 FS Swamp project.

4.1.1.9 Noise

4.1.1.9.1 NF NOV 05a.1 FS Swamp

Direct, Indirect and Cumulative Impacts

Cutterhead dredges, backhoes, slurry pumps, marsh tracked vehicles, excavator, and bulldozers would be the primary pieces of equipment used for construction of this project. These pieces of equipment exceed noise levels above 55 dBA. Noise levels may result in wildlife avoiding the project area during construction; however, movement of equipment during construction would result in the same avoidance behaviors from wildlife species. There are no residences located within 1000 ft of the project area that would be impacted by noise associated with the proposed project. Noise levels overall should not be higher than ambient during the temporary period of construction, and construction and would be limited to daylight hours to reduce any noise impacts.

Cumulative Impacts

Construction of this project is not anticipated to add significantly to the cumulative effect of noise in the Basin as the construction activities would be restricted to daylight hours and be temporary, during the period of construction which is anticipated to end in 2022.

4.1.1.9.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The impacts to noise resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be of the same type as, but less than, those stated in section 4.1.1.9.1 NF NOV 05a.1 FS Swamp project.

4.1.1.10 Hazardous, Toxic, and Radioactive Waste

4.1.1.10.1 NF NOV 05a.1 FS Swamp

Direct, Indirect and Cumulative Impacts

No RECs were found within the NF NOV 05a.1 project area. The project would deposit dredged material from a borrow site in the Mississippi River to establish a platform which would planted with native swamp species. USACE Engineer Regulation, ER 1165-2-132, HTRW for Civil Works Projects, states that dredged material and sediments beneath navigable waters proposed for dredging qualify as HTRW only if they are within the boundaries of a site designated by the EPA or a state for a response action (either a removal or a remedial action) under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), or if they are a part of an

National Priority List (NPL) site under CERCLA. None of the area proposed for dredging is included in the NPL or within the boundaries of a CERCLA site.

There is a low probability of encountering HTRW or petroleum products in this feature. No direct, indirect, or cumulative impacts are expected at this project site.

4.1.1.10.2 NF NOV 05a.1 and Mitigation Bank FS Swamp Combination

The impacts to HTRW resources for the NF NOV 05a.1 and Mitigation Bank Combination project would be of the same type as, but less than, those stated in 4.1.1.10.2 NF NOV 05a.1 FS Swamp project.

4.1.1.11 Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries

4.1.1.11.1 NF NOV 05a.1 FS Swamp

Direct and Indirect Impacts

According to 2010 U.S. Census data, there are no residents or housing units located within the boundaries of the NF NOV 05a.1 project and therefore no direct impacts to population and housing are expected to occur. Additionally, there are no commercial/industrial properties, public facilities, or transportation infrastructure within the project boundaries and therefore direct or indirect impacts to employment, businesses, industry, public facilities and services, transportation, community and regional growth, or community cohesion are not anticipated to occur under this project. The site of the proposed project was previously drained for agricultural use. Implementing the project would however require the current landowner to forgo the potential opportunity to use the land for agricultural production in the future. Although tax revenue will no longer be generated by use of the land for agriculture or cattle grazing, the impact to tax revenues collected by the Parish is expected to be very minor. Property taxes lost as a result of conversion are also considered an indirect impact but these, too, are expected to be very minor.

Temporarily, residents of communities further than 1000 feet from the project area may experience indirect impacts such as dust and noise from the construction, but these factors would be minimal and temporary in nature.

There would be no direct or indirect impacts to navigation or commercial fishing on any of the nearby waterways from implementation of the project. There are no direct impacts to EJ communities from construction of this project, located on the west bank of Plaquemines Parish, Louisiana. The NF NOV 05a.1 project is located within Block Group 504.1 which stretches from LA Hwy 23 to the Levee Road. According to the Census 2000 data, this area was a minority, low-income community in 2000, with 73 percent of the population a minority and approximately 31 percent of the population low-income (Table 13). These percentages are substantially higher than state or parish figures (Table 14). The ESRI geographic information system company estimates for 2010 indicate a slightly higher percentage of minorities in the block group.

Direct adverse impacts from construction activities include temporary impacts to air quality, noise, and traffic. All of the swamp dredge material will be delivered via an over-ground pipeline coming from the Mississippi River. There will be no trucks passing through the community for the delivery of sediment and minimal disruption during the laying of the pipeline. Delivery of plant materials, including seedlings, will be trucked to the site on LA Hwy 23, a four lane road. West Ravenna Road will most likely be used to access NOV-NF-W-05a.1 which passes through agricultural lands, and no housing is located in the vicinity. Approximately ten truck trips, total, will deliver the plant materials for the construction of the project site. The direct and indirect impacts of noise and other associated construction activities are not anticipated to exert disproportionately high adverse human health or environmental impacts on minority and/or low-income communities.

Cumulative Impacts

The cumulative impacts of the NF NOV 05a.1 project, when added to other past, present, and reasonably foreseeable levee, ecosystem restoration, mitigation or other type projects in the Basin would minimally and temporarily affect socio-economic resources. Due to the relatively small acreage of the NF NOV 05a.1 project, the remote and generally unpopulated area where the project would be constructed, the temporary nature of the project construction activities and the duration, the NF NOV 05a.1 project would add very little and only temporary impacts to any other impacts resulting from past, present, and reasonably foreseeable projects in the region and would not contribute significantly to socioeconomic resources in the Basin. Minimal to no cumulative impacts will result for land use, environmental justice, transporation, navigation, and commercial fisheries resources in the Basin from implementing NF NOV 05a.1.

Table 3. Population, Minority Population, and Low Income Population Data for Plaquemines Parish and the State of Louisiana

Location	2000			2010	
	Total Population	Percent Minority	Percent Low Income	Total Population	Percent Minority
Plaquemines Parish	26,757	30.2	18.0	25,106	31.4
Louisiana	4,468,976	36.1	19.6	4,507,335	36.5

U.S. Census Bureau 2000a, 2000b and ESRI 2010.

Table 4. Population, Minority Population and Low Income Population Data for Census Block Groups in the Project Area

Segment	Census Tract and Block Group	2000			2010	
		Total Population	Percent Minority	Percent Low Income*	Total Population	Percent Minority
NF NOV 05a.1	504.1	1,145	73.0	31.1	1,056	78.2

*Individuals below poverty level and Census Block Group level data are based on a Census 2000 sample.
Data are estimates of the actual figures.
No data – data are not available at the census block group level.

4.2.1 MITIGATION FOR BRACKISH MARSH IMPACTS

Mitigation Bank and ILF Project

Direct, Indirect, and Cumulative Impacts
The TSPs mitigating the brackish marsh features of the TSMP include the purchase of sufficient brackish marsh credits from a bank and/or the ILF program within the deltaic plain to mitigate a total of 106.9 AAHUs. See Table 1 for a breakdown of AAHUs impacted by the NFL NOV construction. The particular bank to be utilized is unknown at this time. Since permitted banks and/or the ILF program exist as reasonably foreseeable projects in the FWOP conditions, no new direct, indirect or cumulative impacts to wetlands and other surface waters, wildlife, threatened and endangered species, fisheries, aquatic resources, water quality, EFH, cultural resources, aesthetics, prime and unique farmland, recreational resources, air quality, noise, HTRW, socioeconomics/land use, environmental justice, transportation, navigation, and commercial fisheries would be incurred from the purchase of these credits for the NFL NOV mitigation.

4.2.1.1 Wetlands and Other Surface Waters

4.2.1.1.1 Big Branch FS Brackish Marsh

Direct and Indirect Impacts
Approximately 370 acres of open water habitat containing SAVs would be converted to brackish marsh. The impact to SAVs would be mitigated as brackish marsh through the expansion of the project area. This project could result in the permanent loss of 106.9 AAHUs of brackish marsh habitat within the Basin if the mitigation takes place outside of that basin. However, implementation of this project would instead create brackish marsh and mitigate impacts within the deltaic plain which includes the Basin. Indirectly, these restored wetlands would produce nutrients and detritus which are important health and persistence of other wetlands in the Lake Pontchartrain estuary thereby contributing to their overall productivity. Although there would be a loss of open water in the deltaic plain, large amounts of wetlands are converting to open water in the deltaic

plain every year and brackish marsh is being depleted in the deltaic plain. See the Fisheries, Aquatic Resources, and Water Quality section 4.2.1.4.1 for analysis of borrow pit impacts.

Cumulative Impacts
Implementation of this project would prevent an overall loss in the deltaic plain of brackish marsh habitat. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the deltaic plain would help slow or retard the loss of wetlands and combat the current trend of conversion of marsh to open water. There would be an overall loss of open water habitat in the deltaic plain, but no permanent adverse impacts are anticipated because this habitat is prevalent throughout the deltaic plain while wetlands are declining due to conversion.

4.2.1.1.2 Fritchie FS Brackish Marsh

Direct and Indirect Impacts
Approximately 350 acres of open water habitat containing SAVs would be converted to brackish marsh. The impact to SAVs would be mitigated as brackish marsh through the expansion of the project area. This project could result in the permanent loss of 106.9 AAHUs of brackish marsh habitat within the Basin if the mitigation takes place outside of that basin. However, implementation of this project would instead create brackish marsh and mitigate impacts within the deltaic plain which includes the Basin. Only temporary impacts are anticipated to occur in the proposed staging areas where flexi floats could be utilized to load and offload equipment near Highway 433. Use of a board road would largely avoid the impacts to wetlands when accessing the project area from Chef Menteur Highway. The staging areas and access corridor would be returned to preconstruction conditions after construction is completed. Indirectly, these restored wetlands would produce nutrients and detritus which are important to the health and persistence of other wetlands in the Lake Pontchartrain estuary thereby contributing to their overall productivity. Although there would be a loss of open water in the deltaic plain, large amounts of wetlands are converting to open water in the deltaic plain every year and brackish marsh is being depleted and open water is prevalent in the deltaic plain. See the Fisheries, Aquatic Resources, and Water Quality section 4.2.1.4.1 for analysis of borrow pit impacts.

Cumulative Impacts
Implementation of this project would prevent an overall loss in the deltaic plain of brackish marsh habitat. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the deltaic plain would help slow or retard the loss of wetlands and combat the current trend of conversion of marsh to open water. There would be an overall loss of open water habitat in the deltaic plain, but no permanent adverse impacts are anticipated because this habitat is prevalent throughout the deltaic plain and wetlands are declining due to conversion.

4.2.1.1.3 Coleman Brackish Marsh

Direct and Indirect Impacts
There would be a beneficial impact to wetlands as approximately 479 acres of open water habitat would be converted to brackish marsh habitat within the Basin. Indirectly, these restored wetlands would produce nutrients and detritus which are important to the health and persistence of other wetlands in the Barataria Bay estuary thereby contributing to their overall productivity. Although there would be a loss of 479 acres of open water in the Basin, large amounts of wetlands are converting to open water in the Basin every year and open water is prevalent in the Basin. See the Fisheries, Aquatic Resources, and Water Quality section 4.2.1.4.1 for analysis of borrow pit impacts.

Cumulative Impacts
Implementation of this project would prevent an overall loss in the Basin of brackish marsh habitat. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the Basin would help slow or retard the loss of wetlands. There would be an overall loss of open water habitat in the Basin, but no permanent adverse impacts are anticipated because this habitat is prevalent throughout the Basin.

4.2.1.1.4 DNWR Main Pass FS Brackish Marsh

Direct and Indirect Impacts
There would be a beneficial impact to wetlands as approximately 638 acres of open water habitat would be converted to intermediate/brackish marsh habitat. This project could result in the permanent loss of 106.9 AAHUs of brackish marsh habitat within the Basin if the mitigation takes place outside of that basin. However, implementation of this project would instead create brackish marsh and mitigate impacts within the deltaic plain which includes the Basin. Indirectly, these restored wetlands would produce nutrients and detritus which are important to the health and persistence of other wetlands in the DNWR thereby contributing to their overall productivity. Although there would be a loss of 638 acres of open water in the deltaic plain, large amounts of wetlands are converting to open water in the deltaic plain every year and brackish marsh is being depleted in the deltaic plain. See the Fisheries, Aquatic Resources, and Water Quality section 4.2.1.4.1 for analysis of borrow pit impacts.

Cumulative Impacts
Implementation of this project would prevent an overall loss in the deltaic plain of intermediate/brackish marsh habitat. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the deltaic plain would help slow or retard the loss of wetlands. There would be an overall loss of open water habitat in the deltaic plain, but no permanent adverse impacts are anticipated because this habitat is prevalent throughout the deltaic plain while wetlands are declining due to conversion.

4.2.1.1.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The wetlands and other surface water resources impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.1.1-4.2.1.1.4.

4.2.1.2 Wildlife

4.2.1.2.1 Big Branch FS Brackish Marsh

Approximately 370 acres of open water would be converted to brackish marsh outside of the Basin. The recipient basin would in return receive significant positive benefits of additional wildlife associated with the brackish marsh habitat. This conversion would eliminate wintering habitat for brown pelican, and increase habitat for wading birds, shorebirds, and raptors (LCWCRTF and WCRA, 1999) as well nutria, muskrat, mink, river otter, raccoon, reptiles and amphibians. As such, construction of the project should not result in entrapment of these species within the marsh creation site.

Species that utilize shallow open water habitats may be displaced from the habitat conversion. However, these impacts would be temporary. Many species utilizing the current habitat type would thrive with the additional foraging, cover and resting habitat the project would create. A rise in turbidity at the borrow site could temporarily impact water quality in the area; however the impact would be reduced by movement of the tides. This impact could temporarily affect prey or food sources for wildlife species.

Cumulative Impacts

This project would prevent an overall loss in the deltaic plain of brackish marsh habitat necessary for many wildlife species. This project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the deltaic plain, would help slow or retard the loss of wetlands and overall decline of wildlife species within the deltaic plain; this would be beneficial both to preserve the species biodiversity and combat the current trend of conversion of marsh to open water.

4.2.1.2.2 Fritchie FS Brackish Marsh

Direct, Indirect and Cumulative Impacts

Up to 350 acres of open water habitat would be converted to brackish marsh habitat outside of the Basin. The recipient basin would in return receive significant positive benefits of additional wildlife associated with the brackish marsh habitat. Since the Fritchie project is in the vicinity of the Big Branch project and both are adjacent to Lake Pontchartrain, the impacts to wildlife at Fritchie would be similar to but less than those for Big Branch as described in section 4.2.1.2.1.

4.2.1.2.3 Coleman FS Brackish Marsh

Direct and Indirect Impacts

Approximately 479 acres of shallow open water would be converted to brackish marsh habitat within the Basin. The Basin would receive additional wildlife associated with the newly created brackish marsh habitat. This conversion would eliminate wintering habitat for brown pelican, and increase habitat for wading birds, shorebirds, and raptors (LCWCRTF and WCRA, 1999) as well nutria, muskrat, mink, river otter, raccoon, reptiles and amphibians. The restored brackish marsh habitat would offer new shelter, nesting, breeding, and foraging grounds for these species. Other wildlife outside the project area may indirectly benefit from having this area as an additional territory for foraging and breeding.

Any wildlife present at the time of construction would be temporarily displaced or permanently relocate to similar adjacent habitat. The common inhabitants of this area are avian species which are fully equipped to relocate to similar adjacent habitat.

Cumulative Impacts
This project would prevent an overall loss in the Basin of brackish marsh habitat necessary for many wildlife species. This project, when added to other past, present, and reasonably foreseeable future ecosystem restoration and mitigation projects in the Basin, would help reduce the loss of wetlands and overall decline of wildlife species within the Basin and would be beneficial to preserving species biodiversity.

4.2.1.2.4 DNWR Main Pass FS Brackish Marsh

Direct and Indirect Impacts
Approximately 638 acres of shallow open water would be converted to intermediate/brackish marsh habitat, with minimal adverse direct and indirect impacts to wildlife. This conversion would eliminate wintering habitat for brown pelican, but increase habitat for wading birds, shorebirds, and raptors (LCWCRTF and WCRA, 1999) as well nutria, muskrat, mink, river otter, raccoon, reptiles and amphibians. As such, construction of the project should not result in entrapment of these species within the marsh creation site. Species that utilize shallow open water habitats may be displaced from the habitat conversion. Migratory waterfowl and other avian species, if present, would likely be only temporarily displaced from the project area or permanently relocate to similar adjacent habitat. However, most of these impacts would be temporary. Many species utilizing the current habitat type would thrive with the additional foraging, cover and resting habitat the project would create. There is the potential for noise generated by project activities to cause wildlife to avoid the area; however, this would be temporary, during the period of construction. Overall populations would not likely be adversely affected because these species would move to abundant existing adjacent habitat areas during construction.

Positive indirect impacts to wildlife are anticipated by building productive coastal intermediate/brackish marsh habitat that would provide new shelter, nesting, breeding, and foraging grounds for wildlife, migratory waterfowl, and other avian species currently existing within or adjacent to the marsh creation area.

The creation of intermediate/brackish marsh would reduce shallow open water habitat and convert it to marsh, reducing available foraging habitat for some avian species but creating nesting and resting habitat for other species. The reduction in the amount of shallow open water is negligible compared to that remaining in the deltaic plain.

Cumulative Impacts
This project would prevent an overall loss in the deltaic plain of intermediate/brackish marsh habitat necessary for many wildlife species. This project, when added to other past, present, and reasonably foreseeable future ecosystem restoration and mitigation projects in the deltaic plain, would help reduce the loss of wetlands and overall decline of wildlife species within the deltaic plain and would be beneficial to preserving species biodiversity.

4.2.1.2.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The wildlife resource impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.2.1- 4.2.1.2.4.

4.2.1.3 Threatened, Endangered and Protected Species

4.2.1.3.1 Big Branch FS Brackish Marsh

Direct Impacts
No direct impacts to West Indian Manatee; Gulf sturgeon; Kemp's ridley, loggerhead or green sea turtles or protected species like bottlenose dolphins are anticipated from construction of this marsh creation project. The shallow open water areas to be filled are not of sufficient depth to be utilized by any of these species. This project could result in the permanent loss of 106.9 AAHUs of brackish marsh habitat that are utilized by threatened, endangered and protected species within the Basin if the mitigation takes place outside of that basin. However, implementation of this project would instead create brackish marsh and mitigate impacts thus benefitting threatened, endangered, and protected species because mitigation occurs within the deltaic plain which includes the Basin.

To minimize impacts to protected species a survey would be performed prior to construction to identify the presence of colonial nesting water birds or nesting bald eagles. If colonial nesting water birds are present, BMPs, developed in coordination with USFWS, would be implemented to avoid potential impacts. See Sections 5.3.2.2 and 8.2. If nesting bald eagles are present, the National Bald Eagle Management Guidelines would be followed.

The West Indian Manatee; the Gulf sturgeon; and the Kemp's ridley, loggerhead, or green sea turtles have the potential to forage or swim in aquatic habitats where borrow dredging for the project is located. The presence of construction-related activity, machinery, and noise is expected to cause these species to avoid the project area

during the construction period (approximately 1-2 months). However, in order to minimize potential adverse impacts to manatees from dredging activities during the construction period (approximately 1-2 months), the standard manatee protection measures found in section 3.2.3.3.1 would be implemented.

Additionally, entrainment of Gulf sturgeon and sea turtles is not expected since hydraulic dredges are slow moving and use of them is not known to impact these species. As such, no direct impacts to Gulf sturgeon or sea turtles are anticipated. Approximately 258 acres of Gulf sturgeon critical habitat would be deepened to obtain the borrow necessary for project construction. The depth of excavation at approximately -20 ft NAVD88 (with assumed water bottom of -8 ft NAVD88), is not anticipated to result in exposure of a different substrate. Therefore, re-colonization of Gulf sturgeon benthic prey is anticipated to occur within a couple growing seasons. The shallow depth of the dredging is not anticipated to create hypoxic/anoxic conditions. No migratory pathways would be blocked by the proposed borrow activities.

Indirect Impacts
Indirect impacts to endangered or threatened species are effects that could occur later in time than direct impacts but still are reasonably certain to occur (NMFS 2006). Potential indirect impacts from the marsh creation would primarily consist of effects from dredging operations, increased turbidity and benthic species removal. However, although the rise in turbidity could immediately reduce water quality in the project area, those effects would be temporary and would be reduced by movement of the tides. Any manatees, Gulf sturgeon, sea turtles, bottlenose dolphins or their prey in the area would be free to relocate during construction since the project area encompasses only a small section of a 403,200 acre estuarine lake. Impacts to prey species are expected to be temporary in the borrow area and additional similar foraging areas are available for these species to utilize throughout Lake Pontchartrain in the interim. As such, no long term, adverse indirect impacts to manatees, Gulf sturgeon, sea turtles or bottlenose dolphins are anticipated from temporary minor impacts to water quality and benthic prey species from construction of the project.

Cumulative Impacts
Potential cumulative impacts to the threatened or endangered species (manatee, Gulf sturgeon, and sea turtles) or protected species that could occur in the vicinity of the project area from construction of the marsh creation project would involve the combined adverse effects on each species from the other projects within the deltaic plain. Due to the size of Lake Pontchartrain (403,200 acres), the size of the designated Gulf sturgeon critical habitat in Lake Pontchartrain (approximately half of the lake), the relatively small size of the borrow area (258 acres), the temporary nature of the borrow activities, the use of a cutterhead dredge for borrow procurement, the duration of dredging (approximately 1-2 months), and the ability of these species to avoid the project area during the construction period, the marsh creation project would add minimal and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the basin and would not contribute significantly to cumulative impacts to threatened and endangered species or protected species in the deltaic plain.

4.2.1.3.2 Fritchie FS Brackish Marsh

Direct, Indirect, and Cumulative Impacts
The borrow site for this project is approximately 258 acres and only the West Indian manatee; Gulf sturgeon; and Kemp's Ridley, loggerhead, and green sea turtles could potentially be found in the project borrow area. Impacts would be similar to those described in 4.2.1.3.1 Big Branch FS Brackish Marsh project.

4.2.1.3.3 Coleman FS Brackish Marsh

Direct and Indirect Impacts
Of the animals and plants under USFWS and/or NMFS jurisdiction, only the West Indian manatee and pallid sturgeon are expected to potentially occur within the project area. The presence of construction-related activities, machinery, and noise would be expected to cause these species to avoid the project area during the construction period. However, in order to minimize the potential for adverse impacts to manatees or pallid sturgeon during the construction period, the standard manatee protection measures and pallid sturgeon protection measures found in Sections 3.2.3.3.1 and 3.2.2.3.1 respectively would be implemented.

To minimize impacts to protected species a survey would be performed prior to construction to identify the presence of colonial nesting water birds or nesting bald eagles. If colonial nesting water birds are present, BMPs, developed in coordination with USFWS, would be implemented to avoid potential impacts. See Sections 5.3.3.2 and 8.2. If nesting bald eagles are present, the National Bald Eagle Management Guidelines would be followed.

Potential indirect impacts from the proposed action would primarily consist of effects from dredging operations, increased turbidity and benthic species removal. However, although the rise in turbidity could immediately reduce water quality in the project area, those effects would be temporary and would be reduced by movement of the tides/river. Any manatees or pallid sturgeon, protected species or their prey in the area would be free to relocate during construction since the project area encompasses only a small section of the Basin and the Mississippi River. Additional similar habitat is available for these species to utilize for foraging throughout the Basin in the interim. As such, this project is not likely to adversely affect any of these species.

Cumulative Impacts
Potential cumulative impacts to threatened or endangered species (manatee or pallid sturgeon) or protected species from construction of the marsh creation project would involve the combined adverse effects on the species from the other projects within the deltaic plain. Due to the size of the Mississippi River, the relatively small size of the borrow area, the temporary nature of the borrow activities, the use of a cutterhead dredge for borrow procurement, the duration of dredging, and the ability of these species to avoid the project area during the construction period, this marsh creation

project would add minimal and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the Basin and would not contribute significantly to cumulative impacts to threatened and endangered species in the Basin.

4.2.1.3.4 DNWR Main Pass FS Brackish Marsh

Direct and Indirect Impacts
Although threatened or endangered species may occur within the general project vicinity, their presence within the project area is highly unlikely. Manatee and pallid sturgeon are unlikely to occur in the project dredging area because pallid sturgeon normally inhabit the Mississippi River a couple hundred river miles north and manatee prefer habitat of shallow, slow moving water with grass beds. Manatee could be present in coastal waters and areas such as the marsh creation placement area during the summer months (i.e. June through September). However, the standard manatee protection measures and pallid sturgeon protection measures found in Sections 3.2.3.3.1 and 3.2.2.3.1 respectively would be implemented to prevent any impacts to manatee or pallid sturgeon.

Piping plovers could occur along the shoreline and in the intertidal and shallow waters of the project area during winter migration, but are not permanent residents of the area. During placement of dredged material for the marsh creation construction, piping plovers may be temporarily displaced to other areas for foraging and loafing; however, this is not considered to be detrimental due to an abundance of similar habitat in the vicinity of the project area.

Additionally, the DNWR Main Pass project area does not contain critical habitat for Federally-listed species under the jurisdiction of USFWS, and the open water areas as well as shoreline and in the intertidal and shallow waters surrounding the project area would allow manatee or pallid sturgeon, red knot or piping plovers to easily avoid the project activities. Therefore, this project is unlikely to cause adverse direct or indirect impacts to (i.e., “not likely to adversely affect”) these Federally-listed threatened or endangered species, or their critical habitat, under the jurisdiction of USFWS. The USFWS concurred with this determination in a letter dated September 20, 2019 (Appendix M).

High levels of sediment in the water column and low prey availability probably preclude any high use by sea turtles in the lower Mississippi River Delta. Furthermore, hydraulic cutterhead pipeline dredging operations have not been identified as a source of sea turtle mortality. Hopper dredges pose the most threat to sea turtles and they will not be utilized for this project. The three species of sea turtles that may be found within the proposed project area are the Kemp’s Ridley, leatherback, and loggerhead. However, MVN has concluded that no critical habitat for any threatened, endangered, or candidate species under the purview of NMFS has been designated within the project area, and that there would likely be no adverse impacts (i.e., “no effect”) to any of the NMFS Federally-listed species such as marine turtles or Gulf sturgeon that could

potentially occur within the project area. This is due to the use of cutterhead dredges, the borrow site's distance from the Gulf and limited access to the placement area.

In order to prevent construction activities from having adverse impacts on listed species, dredging operations will utilize standard protection measures for manatee and pallid sturgeon described in Sections 3.2.3.3.1 and 3.2.2.3.1 respectively would be implemented.

The marsh creation construction is not likely to adversely affect brown pelicans and other colonial nesting birds and seabirds potentially occurring in the project area. However in order to minimize any unforeseen potential impacts, operations would observe any restrictions on activity provided by the USFWS, Lafayette, Louisiana Field Office. In addition, dredging activities would be restricted to non-nesting periods for colonial nesting wading birds and seabirds when practicable. Although the red knot can be found in Plaquemines Parish, LA, it is not likely that they will be adversely affected by the DNWR Main Pass project construction because it is not a breeding area. The same guidelines for dredging operations for brown pelicans and other shorebirds will be followed.

DNWR Main Pass project construction is not located within critical habitat of the hawksbill, leatherback, Kemp's Ridley, loggerhead sea turtles or Gulf sturgeon. Additionally, entrainment of Gulf sturgeon and sea turtles or protected species such as bottlenose dolphins is not expected since hydraulic dredges are slow moving and use of them is not known to impact these species. As such, no direct impacts to Gulf sturgeon, sea turtles or bottlenose dolphins are anticipated. Potential indirect impacts from the marsh creation would primarily consist of effects from dredging operations, increased turbidity and benthic species removal. However, although the rise in turbidity could immediately reduce water quality in the project area, those effects would be temporary and would be reduced by movement of the tides. Any manatees, Gulf sturgeon, sea turtles or protected species in the area would be free to relocate during construction. Impacts to prey species are expected to be temporary in the borrow area and additional similar foraging areas are available for these species to utilize throughout the Mississippi River delta in the interim. As such, no impacts to manatees, Gulf sturgeon or sea turtles are anticipated from temporary minor impacts to water quality and benthic species from construction of the project. Therefore project activities are not likely to adversely affect these species.

This project could result in the permanent loss of 106.9 AAHUs of intermediate/brackish marsh habitat that are utilized by threatened, endangered and protected species within the Basin if the mitigation takes place outside of that basin. However, implementation of this project would instead create intermediate/brackish marsh and mitigate impacts within the deltaic plain which includes the Basin. Restoration of intermediate/brackish marsh would once again provide habitat that could be used by threatened, endangered and protected species that was initially lost during NOV construction.

Cumulative Impacts

Potential cumulative impacts to threatened or endangered species (manatee, piping plover, red knot, pallid sturgeon, Gulf sturgeon, and sea turtles) from construction of the marsh creation project would involve the combined adverse effects on the species from the other projects within the deltaic plain. Due to the size of the Mississippi River delta, the relatively small size of the borrow area, the temporary nature of the borrow activities, the use of a cutterhead dredge for borrow procurement, the duration of dredging, and the ability of these species to avoid the project area during the construction period, this marsh creation project would add minimal and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the deltaic plain and would not contribute significantly to cumulative impacts to threatened and endangered species in the deltaic plain.

4.2.1.3.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The threatened and endangered species resource impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.3.1-4.2.1.3.4.

4.2.1.4 Fisheries, Aquatic Resources, and Water Quality

4.2.1.4.1 Big Branch FS Brackish Marsh

Direct and Indirect Impacts

Approximately 370 acres of open water and mud substrate would be replaced with brackish marsh, increasing spawning, nursery, forage and cover habitat for fisheries resources. This project could result in the permanent loss of 106.9 AAHUs of fishery and aquatic resource habitat and improvements to water quality within the Basin if the mitigation takes place outside of that basin. However, implementation of this project would instead create fishery and aquatic resource habitat, improve water quality, and mitigate impacts because mitigation occurs within the deltaic plain which includes the Basin. Turbidity during borrow excavation and fill placement could temporarily impair visual predators and impact filter feeders, but this impact is expected to cease and benthic species would rebound once construction is complete. It is anticipated that anoxic conditions would be avoided with this depth of dredging and that mobile fishery species would avoid the proposed borrow site during construction, thereby minimizing direct and indirect impacts to those species. Due to the lack of escape routes, most fish species in the placement area would experience demise during borrow material placement. Temporary water quality impacts from turbidity are not anticipated to be substantial enough to cause impairment of the water body's designated uses as defined under the standards of Louisiana Administrative Code, Title 33, Part IX, Chapter 11. Impacts to the fill area would not add to the water quality impairment of this subsegment because it would not contribute benzo(a)pyrene to the adjacent water bodies.

Cumulative Impacts

Although there would be a loss of open water from construction of this project, open water is found in abundance throughout the deltaic plain. The resulting marsh would

provide a cumulative benefit in the form of additional spawning, nursery, forage and cover habitat for important fish species and aquatic resources in the deltaic plain.

Temporary impacts to water quality in Lake Pontchartrain from construction of this project when added to similar impacts produced by other projects found in the future without project (FWOP) conditions could result in temporary decreases in water quality throughout the deltaic plain. However, those projects in the FWOP conditions which include marsh restoration as well as this marsh construction could have the long-term beneficial impact of increased dissolved oxygen and increased filtration which helps control local turbidity.

4.2.1.4.2 Fritchie FS Brackish Marsh

Direct, Indirect, and Cumulative Impacts
Impacts to fisheries, aquatic resources, and water quality would be similar to those described for the 4.2.1.4.1 Big Branch FS Brackish Marsh project. In addition, use of flexi floats and board roads for construction staging and access may temporarily impact fisheries and aquatic resources in the vicinity but such impacts would be temporary and cease after construction. The borrow site for this project is approximately 258 acres.

4.2.1.4.3 Coleman Brackish Marsh

Direct and Indirect Impacts
With implementation of this project, there would be some direct and indirect impacts to fisheries in the form of physically altered open water bottom habitat, and temporary increases in turbidity during construction activities. Approximately 479 acres of open water would be converted to brackish marsh habitat and no longer be available for open water fishery and aquatic species. Due to the lack of escape routes, most fish species in the placement area would experience demise during borrow material placement. Approximately 348 acres of the Mississippi River would be deepened to approximately -75 feet NAVD88. According to recent surveys in this area, the Mississippi River depth in this area ranges from -40 to -60 ft AVD88. It is anticipated that anoxic conditions would be avoided with this depth of dredging and the movement of water in this area of the Mississippi River, and that mobile fishery species would avoid the proposed borrow site during construction, thereby minimizing direct and indirect impacts to those species. The benthic animals living on, adjacent to, or in the dredged material would most likely be killed during either the mining or the placement of the dredge material. Sediment particles suspended due to construction activities may indirectly impact filter feeding benthic invertebrates by fouling feeding apparatus if the concentration of such particles is excessively high at the dredge site and adjacent to the placement site. However, these species are commonly found throughout the Basin in similar shallow water environments that exist in abundance. As such, impacts to the overall population of these species in the Basin from the borrow placement is expected to be negligible. As the Mississippi River is a highly dynamic environment, frequently experiencing disturbances that change the river bottom and produce high turbidity levels, little impact to fisheries or benthic resources is expected from dredging operations.

The reinstitution of brackish marsh in areas that are currently open water would provide benefits to fisheries by providing additional foraging, breeding, and nursery habitat as well as nourishing existing wetlands by providing nutrients to the system in the form of detritus. Although there would be a loss of open water from construction of this project, open water is found in abundance throughout the Basin and does not provide the same benefits as brackish marsh.

The temporary impacts to the Mississippi River from borrow excavation are not anticipated to be substantial enough to cause water quality impairment under the standards of Louisiana Administrative Code, Title 33, Part IX, Chapter 11. Impacts in the fill area would temporarily add to the water quality impairment of this sub-segment through increased turbidity, but these impacts would be minimized through BMPs and would cease after construction.

Cumulative Impacts
Though construction of this project would result in the conversion of fisheries habitat, the loss of some fish, and temporary impacts to water quality and benthic habitat; an overall impact to fish and benthic species populations is not anticipated because this habitat is abundant throughout the Basin, impacts to existing fisheries are minimal, and water quality and benthic species should rebound once project construction is complete. As such, construction of this project would result in minimal loss to fisheries, aquatic resources, and water quality experienced in the Basin from the past, present and reasonably foreseeable projects in the Basin.

Temporary impacts to water quality from the project would add incrementally to similar cumulative impacts throughout the Basin as other projects listed in the FWOP conditions are constructed, causing temporary decreases in water quality throughout the Basin. However, those projects in the FWOP conditions which include marsh restoration, in addition to the Coleman project could have the long-term beneficial impact of increased dissolved oxygen and increased filtration which helps control local turbidity. There would be a positive cumulative impact on fisheries and aquatic species due to the long-term stability of the newly created brackish marsh and the functions it provides.

4.2.1.4.4 DNWR Main Pass FS Brackish Marsh

Direct and Indirect Impacts
Approximately 638 acres of open water would be converted to intermediate/brackish marsh habitat and no longer be available for open water fishery and aquatic species. This project could result in the permanent loss of 106.9 AAHUs of fishery and aquatic resource habitat and improvements to water quality within the Basin if the mitigation takes place outside of that basin. However, implementation of this project would instead create fishery and aquatic resource habitat, improve water quality, and mitigate impacts within the deltaic plain which includes the Basin. Due to the lack of escape routes, most fish species in the placement area would experience demise during borrow

material placement. Approximately 366 acres of the Mississippi River would be deepened to approximately -75 feet NAVD88. The temporary water impacts, including low dissolved oxygen levels in the Mississippi River from borrow excavation, are not anticipated to be substantial enough to cause water quality impairment under the standards of Louisiana Administrative Code, Title 33, Part IX, Chapter 11. Impacts in the fill area would temporarily add to the water quality impairment, nor change its designated uses of this sub-segment through increased turbidity, but these impacts would be minimized through BMPs and would cease after construction.

With implementation of the DNWR Main Pass project, there would be some minimal direct and indirect effects to aquatic resources/fisheries in the form of altered open water bottom habitats in the placement area as well as the borrow area. The project borrow area is located within the river channel with a substantial amount of river flow, therefore, it is anticipated that mobile fishery species would avoid the project site during the construction period, thereby minimizing direct and indirect impacts to those species.

Brown shrimp, white shrimp, and crabs may be directly impacted through dredged material placement; however, these species could potentially indirectly benefit from the abundance of introduced detritus, and subsequent food resources, from these materials. Sessile, or slow moving benthic organisms may be smothered in areas of direct placement of dredged material. Sediment particles that become suspended due to dredging and disposal activities may impact filter-feeding benthic invertebrates by fouling feeding apparatus if the concentration of such particles is excessively high. Clams and oysters, in particular, may experience a reduction in pumping (filtering) rates with increased turbidity (Loosanoff 1961). Since the project area is a naturally turbid environment and the majority of resident finfish and shellfish species are generally adapted to, and very tolerant of, high suspended sediment concentrations, the effects of turbidity and suspended solids on fisheries in the area would likely be negligible.

With implementation of the DNWR Main Pass project, some positive indirect impacts to fisheries at disposal areas are expected from the marsh creation. The expansive emergent and elevated wetland vegetation expected to colonize this area would enhance primary and secondary productivity in the area. Wetland vegetation provides substantial finfish and shellfish fishery benefits resulting from valuable foraging, breeding, and nursery habitat while helping to offset the considerable wetlands loss currently taking place in this portion of the Mississippi River Delta. Creation of new coastal habitat would provide highly productive fisheries habitat, increase detrital food material, and likely contribute to overall increased fisheries productivity in the project area. As a result of borrow placement and the type of containment utilized for this project, land adjacent to the mitigation project may receive material suspended in the dredge effluent. This would nourish adjacent marsh habitat and may cause adjacent shallow open water to become shallower or be filled, encouraging the colonization of these areas by emergent marsh species and providing a more diverse habitat for fisheries species.

Cumulative Impacts

Though construction of this project would result in the loss of fisheries habitat, some fish, and temporary impacts to water quality and benthic habitat, this habitat is abundant throughout the deltaic plain, impacts to existing fisheries are minimal, and water quality and benthic species would rebound once project construction is complete. As such, construction of this project would result in minimal loss to fisheries, aquatic resources, and water quality experienced in the deltaic plain from the past, present and reasonably foreseeable projects in the deltaic plain. The reinstitution of brackish marsh in areas that are currently open water could provide indirect benefits to fisheries in the future by providing nutrients to the system in the form of detritus. Since marsh is more productive than open water, there would be a positive cumulative impact on fisheries and aquatic species due to the long-term stability of the new marsh habitat. As a result of borrow placement and the type of containment utilized for this project, land adjacent to the mitigation project may receive material suspended in the dredge effluent. This would nourish adjacent marsh habitat and may cause adjacent shallow open water to become shallower or be filled, encouraging the existing habitat to move through early successional phases faster.

These temporary impacts to water quality would add incrementally to similar cumulative impacts throughout the deltaic plain as other projects listed in the FWOP conditions are constructed, causing temporary decreases in water quality throughout the deltaic plain. However, those projects in the FWOP conditions which include marsh restoration as well as the HSDRRS Mitigation could have the long-term beneficial impact of increased dissolved oxygen and increased filtration which helps control local turbidity. The temporary impacts to the Mississippi River from borrow excavation are not anticipated to be substantial enough to cause water quality impairment under the standards of Louisiana Administrative Code, Title 33, Part IX, Chapter 11. Impacts in the fill area would temporarily add to the water quality impairment of this sub-segment through increased turbidity, but these impacts would be minimized through BMPs and would cease after construction. Although there would be a loss of open water from construction of this project, open water is found in abundance throughout the deltaic plain. There would be a positive indirect and cumulative impact on fisheries and aquatic species due to the long-term stability of the new brackish marsh.

4.2.1.4.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The fisheries, aquatic and water quality resource impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.4.1-4.2.1.4.4.

4.2.1.5 Essential Fish Habitat

4.2.1.5.1 Big Branch FS Brackish Marsh

Direct and Indirect Impacts

Estuarine water column, mud substrate, SAV would be permanently replaced with emergent marsh. Negative impacts to estuarine water column, mud substrate, and SAV would be offset by the creation of estuarine emergent brackish marsh wetlands since the support functions of the created marsh are greater than the support functions of the existing open water habitats. This project could result in the permanent loss of 106.9 AAHUs of EFH within the Basin if the mitigation takes place outside of that basin. However, implementation of this project would instead create EFH and mitigate impacts within the deltaic plain which includes the Basin. Excavation of borrow from Lake Pontchartrain would deepen estuarine water column and may expose a different substrate, which could impact post larval and juvenile brown shrimp, white shrimp, and red drum by reducing available cover and foraging habitat for shrimp species and drum species.

Cumulative Impacts
This project would cause one type of EFH in the deltaic plain to be replaced by another type of EFH. The switching of EFH types from construction of the marsh creation project is not anticipated to have a significant impact on the overall EFH in the deltaic plain. Impacts to cover and foraging for EFH species in the borrow site are not anticipated to result in significant increases in cumulative impacts to EFH species experienced from the implementation of FWOP condition projects as the borrow area is small in size compared to the available EFH habitat in the deltaic plain providing similar habitat. The borrow area will continue to be categorized as EFH after construction, just at a different depth.

4.2.1.5.2 Fritchie FS Brackish Marsh

Direct, Indirect, and Cumulative Impacts
Impacts would be similar to those described for the 4.2.1.5.1 Big Branch FS Brackish Marsh project. The borrow site for this project is approximately 258 acres.

4.2.1.5.3 Coleman Brackish Marsh

Direct and Indirect Impacts
Several types of EFH associated with open water would be permanently replaced with brackish marsh and other associated EFH. Negative impacts to the existing EFH would be more than offset by the creation of brackish marsh since the support functions of the created marsh are greater than the support functions of the existing open water. As such, compensatory mitigation for the conversion of EFH would not be required. The borrow area does not contain EFH.

Cumulative Impacts
This project would cause one type of EFH in the Basin to be replaced by another type of EFH. The switching of EFH types from construction of the brackish marsh creation project is not anticipated to have a significant impact to the overall EFH in the Basin.

4.2.1.5.4 DNWR Main Pass FS Brackish Marsh

Direct and Indirect Impacts

Excavation and deepening of the Mississippi River borrow site water column may expose a different bottom substrate, which could directly impact managed EFH species by reducing available cover and foraging habitat. However, since dredge operations are currently occurring on a fairly regular basis and the project location is within an already disturbed area, additional impacts are not likely. Moreover, additional, short term direct EFH impacts, include a temporary and localized increase in estuarine water column turbidity during the placement of dredge material in shallow open water areas; however the project area is a naturally turbid environment and increased turbidity is not expected to significantly affect EFH needs within the project area. It is the determination of MVN that increasing dredge depth in this area of the Mississippi River will likely have no adverse long-term impacts to EFH. It is the determination of MVN that increasing dredge depth in this area of the Mississippi River will likely have no adverse long-term impacts to EFH. This project could result in the permanent loss of 106.9 AAHUs of EFH within the Basin if the mitigation takes place outside of that basin. However, implementation of this project would instead create EFH and mitigate impacts within the deltaic plain which includes the Basin.

The marsh creation project would cause some indirect impacts through the placement of dredged material within the DNWR to create intermediate/brackish marsh habitat. Initially some white shrimp, brown shrimp, reef fish, and red drum would be directly impacted during the placement of dredged material for marsh creation in the shallow open water. Shallow open water bottom and associated EFH (e.g., mud/sand substrates, SAV) would be potentially impacted by the placement of dredged material in the disposal areas; however, these areas would be converted to generally more productive categories of EFH (e.g., estuarine emergent marsh, marsh edge, inner marsh, marsh/water interface) as they eventually become colonized by emergent vegetation. Thus, the marsh creation would provide mainly positive indirect impacts to EFH, and any direct or temporary adverse impacts would be sufficiently offset by the net benefits from creating marsh, new shallow open water habitat, and associated EFH.

Cumulative Impacts
This project would cause one type of EFH in the deltaic plain to be replaced by another type of EFH. The switching of EFH types from construction of the marsh creation project, in addition to impacts from other projects, is not anticipated to have a significant impact to the overall EFH in the deltaic plain. Impacts to cover and foraging for managed species are not anticipated to add significantly to cumulative impacts to managed species as the borrow area is small in size compared to the available EFH habitat in the deltaic plain providing similar habitat.

4.2.1.5.5 Corps Constructed/Mitigation Bank and/or ILF Combination
The EFH resource impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.5.1- 4.2.1.5.4.

4.2.1.6 Cultural Resources

4.2.1.6.1 Big Branch FS Brackish Marsh

Direct Impacts
Activities associated with this project have the potential to directly impact previously undocumented cultural resources that may exist within the project area. A review of previous research in the project area did not identify any significant cultural resources that could be impacted. Should this area be utilized in the future for this type of activity, "section 106 consultation" would need to occur to address the potential for historic properties/cultural resources.

Indirect and Cumulative Impacts
The erosion caused by natural forces and human activity would continue to impact potential cultural resources in the project area. The loss of land within the project area threatens the existence and integrity of these sites. Implementation of this project would work synergistically with other ecosystem restoration projects in coastal Louisiana. The implementation of measures to restore ecosystems and habitat could work to reduce continued land loss and erosion, and prevent exposure and impact to significant cultural resources that may exist in the project area.

Cumulative impacts to cultural resources would be the additive combination of impacts by this and other Federal, state, local, and private restoration efforts. Any additional evaluations would include examination of records of known sites and an intensive cultural resources inventory in areas determined to have a high probability of historic and cultural resources. Mitigation, usually in the form of avoidance, would be necessary if a determination was made that significant cultural resources would be impacted by this marsh creation project. As is the case for direct impacts, should this area be utilized in the future for this type of activity, "section 106 consultation" would need to occur to address the potential for historic properties/cultural resources.

4.2.1.6.2 Fritchie FS Brackish Marsh

Direct, Indirect and Cumulative Impacts
Unidentified cultural resources could exist within the created new marsh, or the required borrow area and transport area, however no impacts to historic properties, cultural resources, or tribal resources are anticipated to occur as a result of implementing the proposed action, due to CEMVN's intent to avoid historic properties should they be identified.

While the distribution of this EA is initiating the "section 106 process," CEMVN will consult with the LA SHPO and Federally recognized Tribes (the Alabama-Coushatta Tribe of Texas [ACTT], the Choctaw Nation of Oklahoma [CNO], the Coushatta Tribe of Louisiana [CT], the Chitimacha Tribe of Louisiana [CTL], the Jena Band of Choctaw Indians [JBCI], the Mississippi Band of Choctaw Indians [MBCI], the Muscogee (Creek)

Nation [MCN], the Seminole Nation of Oklahoma [SNO], the Seminole Tribe of Florida [STF], and the Tunica-Biloxi Tribe of Louisiana [TBTL]), regarding the agency's determination and update the impacts assessment accordingly.

Required determinations of National Register-eligibility and findings of effect will be accomplished, and coordination of results with the SHPO and Federally-recognized Tribes will be completed prior to approval of the Project Description Document (PDD) and federal funding for the proposed undertaking. Regardless of the outcome of the consultation, CEMVN will apply standard discovery provisions, and comply with the Louisiana Unmarked Human Burial Sites Act if remains are found on state or private land and the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001-3013, should Native American human remains be encountered on USFWS refuge land.

4.2.1.6.3 Coleman FS Brackish Marsh

Direct and Indirect Impacts
This project has not been previously surveyed for cultural resources. Although the potential does exist, modern activities and conditions give this project area a low probability to contain intact cultural resources. Removal of borrow material from the Mississippi River is not likely to directly impact any known or previously unrecorded cultural resources or shipwrecks, because the river is regularly dredged to maintain navigation. Since activities associated with this project have the potential to directly impact previously undocumented cultural resources that may exist within the project area. Should this area be utilized in the future for this type of activity, "section 106 consultation" would need to occur to address the potential for historic properties/cultural resources.

Cumulative Impacts
Cumulative impacts will be similar to those described in Section 4.2.1.6.1.

4.2.1.6.4 DNWR Main Pass FS Brackish Marsh

Direct Impacts
A Phase I Marine Survey was conducted in this area for the Hopper Dredge Disposal Area (HDDA) that provides regular maintenance of the Mississippi River for purposes to increase the authorized depth to -50 feet MLG (-53.5 MLLW) below surface, by R. Christopher Goodwin and Associates, Inc. in 2006 (State Report 22-5711). This survey found no historic resources, and the report of findings recommended that no further studies were necessary. An Executive Summary presenting these conclusions for no effect to historic properties, was presented by USACE to the Louisiana State Historic Officer (SHPO) and SHPO agreed with that conclusion with a letter dated November 15, 2006, and again with acceptance of the Draft Report on September 13, 2017.
This marsh creation project would disturb additional sediments, however, no historic properties are known to exist in the project area or pre-existing beneficial use locations, and no historic properties would likely be disturbed. However, should this area be

utilized in the future for this type of activity, “section 106 consultation” would need to occur to address the potential for historic properties/cultural resources.

Cumulative and Indirect Impacts
Cumulative impacts would be similar to those described in Section 4.2.1.6.1.

4.2.1.6.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The cultural resource impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.6.2.

4.2.1.7 Recreational Resources

4.2.1.7.1 Big Branch FS Brackish Marsh

Direct Impacts
After the marsh creation is complete, 370 acres of brackish marsh habitat could improve recreational opportunities such as fishing, hunting, bird watching, boating etc. since the marsh restoration would provide additional foraging, spawning, nursery and cover habitat for fish species and grasses and nutrients that would attract waterfowl within the NWR at the site if the new land owner, the State, manages the site for recreational activities.

The primary borrow site for materials used to restore the marsh would be piped in from a site just offshore in Lake Pontchartrain. Direct, temporary impacts to recreational fishing from dredging may occur in the immediate vicinity due to increases in turbidity and from the placement of the material in the receiving area. Additionally, the floating pipelines may cause a temporary inconvenience to boaters.

Indirect and Cumulative Impacts
Indirect impacts would be minimal and include temporary disruption of recreational fishing and hunting in nearby waters from the dredging and placement of the material used for marsh creation. Cumulative impacts are positive; as more areas are restored including the CWPPRA project to restore wetlands adjacent to the marsh site in Big Branch, recreational opportunities such as fishing, hunting, bird watching, boating etc. will improve.

4.2.1.7.2 Fritchie FS Brackish Marsh

Direct Impacts
*O*nce the marsh restoration is complete, a more productive fishery habitat could produce more public fishing and hunting opportunities at the site if the new land owner, the State, manages the site for recreational activities. Short-term impacts include disruption of fishing and hunting activities from the dredging and placement activities in the borrow site in Lake Pontchartrain and in the receiving areas. Additionally, boaters

may have to bypass the floating pipeline that will be used to convey the dredge material from the borrow site 2,800 ft off shore, to the marsh creation site.

Indirect and Cumulative Impacts
Fish and wildlife in adjacent waters should benefit from an improved habitat resulting from the brackish marsh creation. Cumulative impacts include better recreational fishing and hunting opportunities in the deltaic plain as marsh and swamp are restored in other areas.

4.2.1.7.3 Coleman FS Brackish Marsh

Direct and Indirect Impacts
Approximately 479 acres of shallow, open water and mud bottom would be replaced with brackish marsh, increasing recreational opportunities in the area as the new habitat will provide spawning, nursery, forage and cover habitat for fish species including red drum, gulf menhaden, southern flounder, white and brown shrimp, and blue crab (LCWCRTF and WCRA, 1999). The recreational environment in and around the project area would experience limited short-term disruption imposed by the physical size and working activities of the construction phase of the project. With marsh creation, there would also be the potential for recreation opportunities such as duck hunting. Positive long-term benefits would be the creation of the marsh and the added benefits of providing shelter and habitat for wildlife and improving or creating recreational opportunities such as fishing, hunting, bird watching, boating etc. on land.

Borrow material necessary for construction of the marsh feature would be obtained from the Mississippi river. Because minimal recreation takes place in the Mississippi River or on private land such as the Coleman site, there will likely be no impacts to recreation resources from excavation of dredge material or placement of the overland/water pipeline.

Fishing in the general area may improve because of the brackish marsh habitat increasing spawning, nursery, forage and cover habitat for recreational fisheries resources including red drum, gulf menhaden, southern flounder, white and brown shrimp, blue crab, largemouth bass, and channel catfish (LCWCRTF and WCRA, 1999).

Cumulative Impacts
Cumulative impacts will be similar to those described in Section 4.2.2.7.1.

4.2.1.7.4 DNWR Main Pass FS Brackish Marsh

Direct and Indirect Impacts
Maintenance dredging already occurs regularly on the Mississippi River in the borrow area; however recreational resources in the public land of the DNWR will likely be impacted by increased construction vessel traffic during marsh creation construction. The project would eliminate approximately 638 acres of open water that is currently available for boating and fishing in the DNWR water body. Species would relocate

during project construction. The recreational environment in and around the project area would experience limited short-term disruption imposed by the physical size and working activities of the construction phase of the project. Positive long-term benefits would be the creation of the marsh and the added benefits of providing shelter and habitat for wildlife. With the intermediate/brackish marsh creation, there would be the potential for public recreation opportunities such as duck hunting and canoeing/kayaking if access is allowed.

Indirect negative impacts to recreation may occur during placement of dredged material in shallow open water areas which could cause minor disruptions to small vessels using these portions of the project area; however, the effects on navigation would be temporary. The marsh creation areas would become inaccessible to some watercraft as vegetation colonizes the area; however, the shallow nature of the area currently limits most vessel access. Following construction of the intermediate/brackish marsh project, portions of the marsh may still be navigable by recreation air boats or very shallow draft vessels (kayaks, skiffs, etc.), but not by watercraft with deeper draft.

Intermediate/brackish marsh would also improve the habitat for recreational species in the area around the site by increasing spawning, nursery, forage and cover habitat for fisheries resources including red drum, gulf menhaden, southern flounder, white and brown shrimp, and blue crab (LCWCRTF and WCRA, 1999), thus increasing fishing opportunities. Turbidity from construction of the brackish marsh project could impede on surrounding waters. However, any indirect impact on recreational resources will be short lived and water conditions should return to pre-construction conditions.

Cumulative Impacts
Cumulative impacts will be similar to those described in Section 4.2.1.7.1.

4.2.1.7.5 Corps Constructed/Mitigation Bank and/or ILF Combination
The recreational resource impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.7.1- 4.2.1.7.4.

4.2.1.8 Air Quality

4.2.1.8.1 Big Branch FS Brackish Marsh

Direct Impacts
During construction of this project, an increase in air emissions could be expected. These emissions could include exhaust emissions from operations of various types of non-road construction equipment such as a cutterhead dredge, tender boats, marsh buggies, backhoes, etc. and from vehicles used to access the project area. Fugitive dust emissions are not anticipated during construction.

Any site-specific construction effects to air quality would be temporary, and air quality would return to pre-construction conditions shortly after the completion of construction

activities. Because the project area is in St. Tammany parish which is in attainment of NAAQS, a conformity analysis is not required.

Indirect Impacts
There would likely be no adverse indirect impacts to air quality in the parish with construction of this marsh creation project.

Cumulative Impacts
Cumulative impacts to air quality in the project area due to construction of this project in addition to the other construction activities within the deltaic plain that may be occurring concurrently would be temporary and would be very minimal, especially considering that placement of dredged material would not create fugitive dust. After the construction period, there would be no incremental contribution to cumulative air quality impacts due to the proposed action.

4.2.1.8.2 Fritchie FS Brackish Marsh

Direct, Indirect, and Cumulative Impacts
Impacts to air quality would be similar to the Big Branch brackish marsh project described in 4.2.1.8.1.

4.2.1.8.3 Coleman FS Brackish Marsh

Direct, Indirect, and Cumulative Impacts
Impacts to air quality would be similar to the Big Branch brackish marsh project described in 4.2.1.8.1 because construction techniques would be similar and Plaquemines Parish air quality status is also in attainment.

4.2.1.8.4 DNWR Main Pass FS Brackish Marsh

Direct, Indirect, and Cumulative Impacts
Impacts to air quality would be similar to the Big Branch brackish marsh project described in 4.2.1.8.1 because construction techniques would be similar and Plaquemines Parish air quality status is also in attainment.

4.2.1.8.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The air quality impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.8.1-4.2.1.8.4.

4.2.1.9 Noise

4.2.1.9.1 Big Branch FS Brackish Marsh

Direct and Indirect Impacts
Cutterhead dredges and backhoes would be the primary pieces of equipment used for construction of this project. These pieces of equipment exceed noise levels above 55

dBA. Noise levels may result in wildlife temporarily avoiding the project area during construction; however, movement of equipment during construction would result in the same avoidance behaviors from wildlife species. In addition, noise levels quickly drop off once a buffer is established between the noise source and the receptor (e.g. vegetation). As such, any wildlife in the adjacent habitats should be largely undisturbed by the additional noise from this project's construction. No impact to human populations is anticipated as this project area is remote and uninhabited.

Cumulative Impacts
Construction of this project is not anticipated to add significantly to the cumulative effects of noise in the deltaic plain as the construction activities would be temporary, the area is remote, and avoidance of the project area by wildlife would occur due to the movement of machinery in the area even without the additional construction noise.

4.2.1.9.2 Fritchie FS Brackish Marsh

Direct and Indirect Impacts
Cutterhead dredges and backhoes would be the primary pieces of equipment used for construction of this project. These pieces of equipment exceed noise levels above 55 dBA. Noise levels may result in wildlife temporarily avoiding the project area during construction; however, movement of equipment during construction would result in the same avoidance behaviors from wildlife species. In addition, noise levels quickly drop off once a buffer is established between the noise source and the receptor (e.g. vegetation). As such, any wildlife in the adjacent habitats should be largely undisturbed by the additional noise from this project's construction. There would be minor temporary impacts to human populations along Salt Bayou and Old Spanish Trail Road to camps which run parallel and adjacent to the Fritchie Brackish Marsh project, because residences could experience higher than ambient noise levels during construction when the dredge pipeline is installed along Salt Bayou; however these levels would be temporary during the period of construction and would be limited to daylight hours.

Cumulative Impacts
Construction of this project is not anticipated to add significantly to the cumulative effects of noise in the deltaic plain as the construction activities would be temporary, the area is remote, and avoidance of the project area by wildlife would occur due to the movement of machinery in the area even without the additional construction noise.

4.2.1.9.3 Coleman Brackish Marsh Project

Direct, Indirect, and Cumulative Impacts
Due to similarities in construction activities and equipment, and the lack of residences located within the project area, direct, indirect, and cumulative impacts would be similar to those described in Section 4.2.1.9.1 Big Branch brackish marsh project.

4.2.1.9.4 DNWR Main Pass FS Brackish Marsh

Direct, Indirect, and Cumulative Impacts
Due to similarities in construction activities and equipment, and the lack of residences located within the project area, direct, indirect, and cumulative impacts would be similar to those described in Section 4.2.1.9.1 Big Branch brackish marsh project.

4.2.1.9.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The noise impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.9.1-4.2.1.9.4

4.2.1.10 Hazardous, Toxic, and Radioactive Waste

4.2.1.10.1 Big Branch FS Brackish Marsh

Direct, Indirect and Cumulative Impacts
No recognized environmental conditions (RECs) were found within or near the Big Branch Marsh project area. There are no pipelines crossing the area. No wells or waste pits have been identified within the area. Therefore, no direct, indirect or cumulative impacts to HTRW are anticipated for the Big Branch Marsh project.

4.2.1.10.2 Fritchie FS Brackish Marsh

Direct, Indirect and Cumulative Impacts
No RECs were found within or near the proposed Fritchie Marsh project area. There are no pipelines crossing the area. No wells or waste pits have been identified within the area. Therefore, no direct, indirect or cumulative impacts to HTRW are anticipated for the Fritchie Marsh project.

4.2.1.10.3 Coleman Brackish Marsh Project

Direct, Indirect and Cumulative Impacts
No RECs were found within the Coleman project area, three dry and plugged wells were identified but they are not considered RECs. The area is currently open water. It would be filled with dredged material from a borrow site in in the Mississippi River to establish a platform, which would allow native marsh plants to colonize. USACE Engineer Regulation, ER 1165-2-132, HTRW for Civil Works Projects, states that dredged material and sediments beneath navigable waters proposed for dredging qualify as HTRW only if they are within the boundaries of a site designated by the EPA or a state for a response action (either a removal or a remedial action) under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), or if they are a part of an National Priority List (NPL) site under CERCLA. None of the area proposed for dredging is included in the NPL or within the boundaries of a CERCLA site.

The dredge material pipeline would cross two natural gas pipelines that would be considered RECs. Precautions must be taken to prevent damage to or breakage of the pipelines.

There is a low probability of encountering HTRW or petroleum products in the Coleman project area. No direct, indirect, or cumulative impacts are expected at this project site provided the proper precautions are taken to avoid breaking or damaging the natural gas pipelines.

4.2.1.10.4 DNWR Main Pass FS Brackish Marsh

Direct, Indirect and Cumulative Impacts
No RECs were identified within or near the proposed DNWR Main Pass project area. Therefore, no direct, indirect or cumulative impacts to HTRW are anticipated for the DNWR Main Pass Marsh project.

4.2.1.10.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The HTRW impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.10.1-4.2.1.10.4.

4.2.1.11 Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries

4.2.1.11.1 Big Branch FS Brackish Marsh

Direct, Indirect, and Cumulative Impacts
According to 2010 U.S. Census data, there are no residents located within the boundaries of the Big Branch brackish marsh project and therefore impacts to population or housing are not expected to occur. There are no commercial/industrial properties, public facilities, or transportation infrastructure within the project boundaries. No impacts to employment, businesses, industry, public facilities and services, community and regional growth, community cohesion, or tax revenues and property values are anticipated to occur with construction of this project. The proposed project does not require any acres of agricultural or forestry land to be converted.

There would be no direct and only minimal indirect impacts to transportation during project construction from heavy vehicle traffic in the vicinity of the restoration site. It is expected that once the necessary construction equipment is on site that no additional transportation impacts would occur until the project construction is complete since borrow would be obtained from Lake Pontchartrain and all construction activities would be within the project site.

The nearest navigable waterway to the brackish marsh project is Lake Pontchartrain. There would be no direct impacts to navigation from implementation of the brackish marsh creation project. Potential indirect impacts to navigation would be minimal as the

project area could be avoided with minor course corrections. There would be no direct and only minimal indirect impacts to commercial fisheries from implementation of the brackish marsh creation project due to borrow dredging. Indirect impacts would be a result of increased turbidity in the vicinity of the project area. These would be temporary during the period of construction and minimal as the borrow area makes up a small percentage of a 403,200 acre lake. Positive indirect impacts from the brackish marsh creation include increased spawning, nursery, forage and cover habitat for commercial fishery resources.

The cumulative impacts of this project, when added to other past, present, and reasonably foreseeable ecosystem restoration, mitigation or other type projects in the deltaic plain would minimally and temporarily affect socio-economic resources. Due to the size of Lake Pontchartrain (403,200 acres), the relatively small size of the borrow areas, the temporary nature of the borrow activities and the duration of dredging, the brackish marsh creation project would add minimal and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the deltaic plain and would not contribute significantly to cumulative impacts to socio-economic resources in the deltaic plain. Minimal, positive impacts to commercial fishing from the other marsh creation projects would occur as a result of marsh and wetland restoration improving spawning, nursery, forage and cover habitat of important commercial fish species in the deltaic plain. However the positive benefits cannot be considered part of a cumulative impact on this socio-economic resource because mitigation projects replace habitat lost as a result of damage from construction such as HSDDRS. Any resulting benefits to the commercial fishing industry from the brackish marsh creation project, in theory, replace those lost during levee construction and therefore there are no net cumulative impacts.

Impacts from restoration projects can temporarily disrupt transportation, navigation and commercial fishing in project areas during construction activities including dredging and material placement in the restoration areas. This restoration project is located in an unpopulated area, and as such, land uses such as commercial/industrial properties and public facilities are unlikely to be affected. Additionally, Environmental Justice issues should not typically arise from the construction of this restoration project as the mitigation site is uninhabited.

4.2.1.11.2 Fritchie FS Brackish Marsh

Direct, Indirect, and Cumulative Impacts
Direct, Indirect and Cumulative impacts from the Fritchie brackish marsh creation project would be similar to those described for the Big Branch brackish marsh creation project (see section 4.2.1.11.1).

4.2.1.11.3 Coleman FS Brackish Marsh

Direct, Indirect and Cumulative Impacts

The proposed project is likely to have minimal to no direct or indirect impacts on population, as the project site is located well west of housing located between LA Hwy 23 and the Mississippi River. Due to the remote location, the proposed project site is expected to have little to no impact on business and industry in the affected area.

The proposed project will convert private land into brackish marsh. Although the land is not currently used for profit, the landowner will forfeit any future potential opportunities to use the land for gaining profit.

According to 2010 U.S. Census data, there are no residents located within the boundaries nor in the vicinity of the Coleman Brackish Marsh restoration project and therefore there are no Environmental Justice communities.

There are no long-term direct, indirect or cumulative impacts on transportation or commercial fishing or navigation from the proposed project. Fishermen in boats will not be able to access the project site during construction. However, boats and ships will be able to easily navigate around the dredging area and project area during and after construction on the Mississippi River.

4.2.5.11.4 DNWR Main Pass FS Brackish Marsh

Direct, Indirect and Cumulative Impacts
Due to the similarities in project activities and socioeconomic/land use resources in the project area, direct, indirect and cumulative impacts from construction of the DNWR Main Pass intermediate/brackish project are expected to be similar to those described for the Big Branch brackish marsh project, Section 4.2.1.11.1, except that the borrow source is in the Mississippi River so those impacts would be similar to the Coleman brackish marsh project, Section 4.2.1.11.3.

4.2.1.11.5 Corps Constructed/Mitigation Bank and/or ILF Combination

The Socioeconomics/Land Use, Environmental Justice, Transportation, Navigation, and Commercial Fisheries impacts for the Corps Constructed/Mitigation Bank and/or ILF Combination project would be of the same type as, but less than, those stated in the Corps Constructed projects described in 4.2.1.11.1- 4.2.1.11.4.

5.0 ENVIRONMENTAL CONSEQUENCES OF PLAN ALTERNATIVES

5.1 INTRODUCTION

This section describes the direct, indirect and cumulative effects of the No Action Alternative and the TSA. Aesthetics and prime and unique farmlands will not be impacted so will not be discussed further in this SEA 543a.

5.1.1 No Action – Overview

Direct Impacts

Under the No Action alternative, no compensatory mitigation for swamp, open water, and intermediate, brackish and saline marsh impacts would take place as described in section 2.8.1. Wetlands and other surface waters, wildlife, threatened and endangered species, fisheries, aquatic resources, water quality, EFH, cultural resources, recreational resources, air quality, noise, HTRW, socioeconomics/land use, environmental justice, transportation, navigation, and commercial fisheries within the Basin would be impacted from construction of the NFL NOV. Therefore, with implementation of the No Action Alternative, there would be an overall loss of swamp, intermediate, brackish, and saline marsh and open water habitat within the deltaic plain of approximately 208.7 acres, and 140.9 AAHUs. See Table 1 for impacts by habitat type and levee section. Moreover, CEMVN's legal obligation to compensate for habitat losses caused by construction of the NFL NOV project would not be satisfied.

Indirect Impacts
There would be an overall loss of marsh and swamp habitat within the deltaic plain that once provided cover, resting, nesting and foraging habitat for wildlife, fisheries, and aquatic species, which would indirectly impact these resources. The loss of these habitats, and the effect that such losses would have on wildlife and fish species, would cause recreational opportunities in the Basin and deltaic plain to also suffer loss. The loss of wetlands and the detritus and filtering function they provide would indirectly impact fisheries productivity and water quality.

Cumulative Impacts
The overall loss of marsh and swamp habitat within the system combined with other habitat loss incurred from implementation of projects in the FWOP conditions could have cumulative adverse impacts to wildlife, fisheries, aquatic resources, water quality, EFH and recreational resources.

The indirect and cumulative impacts of the No Action Alternative on relevant resources is discussed in greater length in Sections 5.3.1 through 5.3.11.

5.1.*2* Tentatively Selected Alternative (TSA) – Overview

The Tentatively Selected Alternative (Table 15) is a combination of the tentatively selected projects (TSPs) that were identified in Section 4. Thus, the Tentatively Selected Alternative (TSA) includes:

1. Tentatively Selected Alternative
    a. For swamp impacts – the purchase of swamp mitigation bank credits
    b. For intermediate marsh, brackish marsh, saline marsh and open water impacts – construction of the Fritchie FS Brackish Marsh Project

The TSA would mitigate for all swamp, intermediate marsh, brackish marsh, saline marsh and open water habitat impacts that have already occurred, or are expected to occur, as a result of the construction of the NFL NOV project.

Table 5. Results of the TSA

Mitigation Projects	NFL NOV Acres impacted	NFL NOV AAHUs impacted	Estimated Mitigation
Mitigation Bank FS Swamp	39.6	33.9	TBD*
Fritchie FS Brackish Marsh (includes intermediate, brackish and saline marsh, and open water)	169.1	106.9	Up to 350 acres which includes 10% buffer
Total	208.7	140.9	

*Since the mitigation bank that will ultimately be selected for use is unknown at this time, the mitigation potential at that bank and the number of acres necessary to satisfy the mitigation requirement is similarly unknown.

5.2 IMPACTS TO RELEVANT RESOURCES - TSP MITIGATION BANKS

Direct, Indirect and Cumulative Impacts
Credits purchased as the swamp features of the TSA would be from approved mitigation banks in the watershed. Because permitted banks are in the FWOP conditions (impacts from their construction have already been assessed and accounted for), no new direct or indirect impacts to any relevant resource would be incurred from the purchase of these credits to satisfy the NFL NOV mitigation requirement.

No new cumulative impacts to any resource would be incurred from the purchase of credits from approved mitigation banks in the watershed for the NFL NOV mitigation under the TSA. The purchase of mitigation bank credits, considering the impacts that all other past, present, and reasonably foreseeable projects have on the relevant resources in the Basin, would be cumulatively neutral, as it would offset the loss of 33.9 AAHUs of swamp habitat within the Basin.

In the event sufficient credits are not available for these habitat types to offset impacts resulting from NFL NOV construction, the district engineer would determine appropriate compensatory mitigation based on the factors described in 33 CFR Part 332.3(b) and the alternatives described in SEA 543a. See Section 2.4.2 and 2.8 for additional information.

5.3 IMPACTS TO RELEVANT RESOURCES – NO ACTION, AND REMAINING COMPONENTS OF THE TSA

The following sections describe the impacts of the No Action Alternative and the remaining components of the TSA on the relevant resources in the deltaic plain. Since impacts to relevant resources from implementation of the swamp features of the TSA are discussed in Section 5.2, the following sections will only look at the brackish marsh feature of the TSA (Fritchie FS Brackish Marsh Project).

5.3.1 WETLANDS AND OTHER SURFACE WATERS

5.3.1.1 No Action

Direct and Indirect Impacts
Under the No Action Alternative, mitigation for swamp, intermediate, brackish, and saline marsh, and open water impacts would not occur and CEMVN's legal obligation to compensate for habitat losses caused by construction of the NFL NOV would not be satisfied.

There would be an overall loss of swamp and marsh within the deltaic plain that once provided cover, resting, nesting and foraging habitat for wildlife, fisheries, and aquatic species, which would indirectly impact these resources. The loss of these habitats, and the effect such losses would have on wildlife and fish species, could cause recreational opportunities in the deltaic plain to also suffer loss. The loss of wetlands and the detritus and filtering function they provide would indirectly impact fisheries productivity and water quality.

Cumulative Impacts
Appendix L and Section 2.8.1 identify other projects in and around coastal Louisiana for redevelopment, coastal and wetland restoration, flood risk reduction, and transportation. Completing construction of the NFL NOV and HSDRRS flood risk reduction projects would reduce saltwater intrusion from smaller storms and indirectly benefit protected side habitats. Transportation projects utilizing best management practices and following Stormwater Pollution Prevention Permits (SWPPP), including installation of drainage features and culverts, could negatively impact wetlands and other surface waters during construction but benefit them by improving hydrologic connection and flow upon construction completion. Future diversions planned for the Mississippi River, and other wetland creation projects planned and constructed under the CWPPRA could reduce wetland loss in the Basin and throughout coastal Louisiana. The overall loss of swamp and marsh within the system combined with other habitat loss incurred from implementation of projects in the FWOP conditions would result in cumulative adverse impacts to wetlands and the wildlife and fish species that utilize these areas.

5.3.1.2 Remaining TSA – Fritchie FS Brackish Marsh Projects

Direct and Indirect Impacts
The TSA mitigates for all NFL NOV swamp, intermediate marsh, brackish marsh, saline marsh, and open water impacts in the deltaic plain. The swamp TSA is discussed in section 5.2. This project could result in the permanent loss of 106.9 AAHUs of brackish

marsh habitat and overall wetland loss within the Basin, but would increase brackish marsh and wetlands created within the deltaic plain which includes the Basin. Constructing the Fritchie Brackish Marsh project would restore up to approximately 350 acres of brackish marsh in the project area that had converted to open water habitat. There would be a loss of 350 acres of open water habitat from construction of the project, but this habitat is prevalent and increasing in the deltaic plain. There would be some temporary impacts from the staging area on the eastern side of Hwy 433 and the 30 ft wide by 1595 ft long board access road, but once construction is complete these areas would be returned to preconstruction conditions. There would be temporary impacts to the 258 acre borrow site in Lake Pontchartrain as the borrow material is dredged. However, over time this borrow source is anticipated to refill somewhat with sediment due to lake circulation and repopulate with benthic invertebrates and suitable vegetation.

Cumulative Impacts
Appendix L and Section 2.9.1 identify other projects in and around coastal Louisiana for redevelopment, coastal and wetland restoration, flood risk reduction, and transportation. Increasing the height of the levee and completing construction of the NFL NOV and HSDRRS flood risk reduction projects would reduce saltwater intrusion from smaller storms and indirectly benefit the habitat. Transportation projects utilizing best management practices and following Stormwater Pollution Prevention Permits (SWPPP) including installation of drainage and culverts could impact wetlands and other surface waters during construction and benefit them by improving drainage and flow upon construction completion. Future diversions planned for the Mississippi River, and other wetland creation projects planned and constructed under the CWPPRA (Appendix L and Section 2.9.1) could reduce wetland loss in the Basin as well as throughout the deltaic plain and coastal Louisiana.

Implementation of the Fritchie Brackish Marsh Project would prevent an overall loss in the deltaic plain of brackish marsh habitat. Completing the Fritchie mitigation project when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the deltaic plain would help slow or retard the loss of wetlands. There would be an overall loss of open water habitat in the deltaic plain, but no permanent adverse impacts are anticipated because this habitat is prevalent throughout the deltaic plain and wetlands are declining due to conversion.

5.3.2 WILDLIFE

5.3.2.1 No Action

Direct and Indirect Impacts
Wildlife species that utilize the 39.6 acres of swamp habitat and 169.1 acres of intermediate, brackish, saline marsh and open water would be impacted by the loss of these habitats. Wildlife species that would be displaced due to NOV-NFL construction would be permanently displaced to adjacent habitats due to the loss of habitat which may impact the carrying capacity of adjacent habitats. No new impacts to mobile and

non-mobile wildlife species would occur because under the no action alternative no new construction would take place and there would be no habitat created to mitigate this habitat loss.

Cumulative Impacts
Without construction of an action alternative, there would be an overall loss of brackish marsh and swamp within the system. Subsidence within the system would continue and emergent marsh habitat would continue to be lost resulting in the creation of more open water habitat. Changes to plant communities and submerged aquatic vegetation would likely take place due to these factors, thus negatively impacting wildlife diversity and utilization in the deltaic plain. Land based animals would be the most directly affected, due to loss of the herbaceous and wooded wetlands around the project area. Because the habitat losses caused by the construction of NOV-NFL would not be compensated, wildlife species inhabiting swamp and marsh habitats would sustain permanent habitat loss and population decrease within the deltaic plain. CEMVN's legal obligation to compensate for habitat losses caused by construction of NOV-NFL would not be satisfied.

5.3.2.2 Remaining TSA – Fritchie FS Brackish Marsh Project

Direct and Indirect Impacts
Direct impacts to wildlife would result from the conversion of up to 350 acres of shallow open water to brackish marsh habitat outside of the Basin. The recipient basin would in return receive significant positive benefits of additional wildlife associated with the brackish marsh habitat. This conversion would reduce use and function of these areas for brown pelicans, seabirds, dabbling and diving ducks, coots, and gallinules and other species that feed in the shallow open water in this location. However, it is anticipated they would utilize adjacent areas of open water habitat that are abundant in close proximity to the proposed features.

It is anticipated that the project area would experience improved overall wetland habitat functions once construction and establishment of the proposed marsh is achieved. Reptiles including the American alligator and eastern mud turtle are likely to utilize and populate the project area as well. Amphibians, such as the green tree frog would likely colonize the project area. The edges and small areas of open water that would form over time would also provide feeding habitat for common wading bird species.

Bird species, including brown pelicans and seabirds would be expected to forage in and near the project area. Migratory and resident non-game birds, such as the *Quiscalus major* (boat-tailed grackle), *Agelaius phoeniceus* (red-winged blackbird), *Ammodramus maritimus* (seaside sparrow), *Circus hudsonius* (northern harrier), *Megaceryle alcyon* (belted kingfisher), and *Cistothorus palustris* (marsh wrens) would also use the project areas. Game birds using the area would include the *Rallus crepitans* (clapper rail), *Porzana carolina* (sora rail), *Rallus limicola* (Virginia rail), American coot, *Gallinula*

chloropus (common moorhen), and *Gallinago gallinago* (common snipe) in addition to resident and migratory waterfowl.

Cumulative Impacts
This project would help to offset an overall loss in the deltaic plain of brackish marsh and swamp habitat necessary for many wildlife species. These projects, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the basin, would prevent the net loss of brackish marsh and swamp function and overall decline of wildlife species within the basin and would be beneficial in both preserving the species bio-diversity and combating the current trend of conversion of coastal marsh to open water, which would be accelerated due to sea level rise.

5.3.3 THREATENED AND ENDANGERED SPECIES

5.3.3.1 No Action

Direct and Indirect Impacts
None of the animals under USFWS and/or NMFS jurisdiction would be impacted by implementation of the No Action alternative, however no habitat would be created or preserved that might be utilized by T&E species in the future. The overall loss of swamp and marsh within the deltaic plain that provides cover, resting, nesting and foraging habitat for wildlife species could also indirectly impact T&E species.

Cumulative Impacts
Appendix L and Section 2.9.1 identify other projects in and around coastal Louisiana for redevelopment, coastal and wetland restoration, flood risk reduction, and transportation. Completing construction of the NFL NOV and HSDRRS flood risk reduction projects would reduce saltwater intrusion from smaller storms and indirectly benefit protected side habitats. Transportation projects utilizing best management practices and following SWPPP, could negatively impact wetlands and other surface waters during construction; but benefit them by improving hydrologic connection and flow upon construction completion. Future diversions planned for the Mississippi River, and other wetland creation projects planned and constructed under the CWPPRA could reduce wetland loss in the Basin and the deltaic plain of coastal Louisiana. The overall loss of swamp and marsh within the system created by the no action alternative of not mitigating the wetland impacts incurred by constructing the NOV-NFL combined with other habitat loss incurred from implementation of projects in the FWOP conditions would result in cumulative adverse impacts to T&E species that utilize these areas.

5.3.3.2 Remaining TSA – Fritchie FS Brackish Marsh Project

Direct Impacts
No direct impacts to West Indian manatee; Gulf sturgeon; or Kemp's ridley, loggerhead or green sea turtles or protected species such as bottlenose dolphins are anticipated from construction of the Fritchie brackish marsh project. The shallow open water areas are to be filled are not of sufficient depth to be utilized by any of these species. This

project could result in the permanent loss of 106.9 AAHUs of brackish marsh habitat that could be utilized by threatened, endangered, and protected species within the Basin, but would increase brackish marsh created within the deltaic plain, which includes the basin, and mitigate impacts thus benefitting threatened, endangered, and protected species.
There are no known protected species, such as colonial nesting water birds or existing bald eagle nests near the Fritchie marsh project site. Regardless, through careful design of project features, timing of construction and the implementation of best management practices, adverse impacts to protected birds and their nests would be avoided. A qualified biologist would inspect the proposed worksites for the presence of undocumented nests during the nesting seasons (i.e., February 15 through September 1 for colonial nesting birds and October through May for bald Eagles) and prior to construction. To minimize disturbance to nesting birds all activity occurring within 1,000 feet of a rookery or 660 feet of an eagle nest would be restricted to the non-nesting period. During nesting season the no-work distances would be implemented and coordinated with USFWS and LDWF.

The manatee; the Gulf sturgeon; or the Kemp's ridley, loggerhead, or green sea turtles or bottlenose dolphins have the potential to forage or swim in aquatic habitats where borrow dredging for the project is located. The presence of construction-related activity, machinery, and noise would be expected to cause these species to avoid the project area during construction. Any of these species or their prey in the borrow area would be free to relocate during construction since the borrow area encompasses only a small section of a 403,200 acre estuarine/brackish lake.

Dredging in Lake Pontchartrain for borrow would occur via hydraulic cutterhead dredge. Entrainment of Gulf sturgeon and sea turtles is not expected since hydraulic dredges are slow moving and use of them is not known to impact these species. As such, no direct impacts to Gulf sturgeon or sea turtles are anticipated. Approximately 258 acres of Gulf sturgeon critical habitat would be deepened to obtain the borrow necessary for project construction. The depth of the borrow excavation is -20 ft NAVD88 (with assumed water bottom of -8 ft NAVD88), and this water depth is not anticipated to result in exposure of a different substrate; therefore, re-colonization of benthic species (Gulf sturgeon prey) is anticipated to occur within a couple growing seasons. No migratory pathways would be blocked by the proposed borrow activity.

However, in order to minimize the potential for dredging activities under the proposed action to cause adverse impacts to manatees during the construction period the standard manatee protection measures would be implemented:

> **Manatees:** All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel would be responsible for observing water-related activities for the presence of manatees. Temporary signs would be posted prior to and during all construction/dredging activities to remind personnel to be observant for

manatees during active construction/dredging operations or within vessel movement zones (i.e., the work area), and at least one sign would be placed where it is visible to the vessel operator. Siltation barriers, if used, would be made of material in which manatees could not become entangled and would be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions would be implemented, including: moving equipment would not operate within 50 ft of a manatee; all vessels would operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions would no longer be necessary, but careful observations would be resumed. Any manatee sighting would be immediately reported to the U.S. Fish and Wildlife Service (337/291-3100) and the Louisiana Department of Wildlife and Fisheries (LDWF), Natural Heritage Program (225/765-2800).

Indirect Impacts

Indirect impacts to endangered, threatened, or protected species would primarily consist of effects from dredging operations, increased turbidity and benthic species removal. However, although the rise in turbidity could immediately reduce water quality in the project area, those effects would be localized, temporary, and would be reduced by movement of the tides. Impacts to prey species are expected to be temporary in the borrow area and additional foraging areas are available for manatee, Gulf sturgeon, sea turtles and bottlenose dolphin to utilize throughout Lake Pontchartrain in the interim. As such, minimal impacts to manatees, Gulf sturgeon, sea turtles, or bottlenose dolphins are anticipated from temporary minor impacts to water quality and benthic species from construction of the project.

There is potential for nesting of wading/water birds to utilize the habitats. Indirectly, species that utilize shallow open water habitats would be displaced by the habitat conversion. However, these species would have the opportunity to utilize adjacent shallow open water areas. Many species utilizing the current habitat type would thrive with the additional foraging, cover, and resting habitat the project would create. A rise in turbidity at the borrow site could immediately reduce water quality in the area which impacts prey availability and food sources for wading/water birds; however those effects would be temporary and would be reduced by movement of the tides.

Cumulative Impacts

Potential cumulative impacts to the threatened or endangered species (manatee, Gulf sturgeon and sea turtles) or protected species that could occur in the vicinity of the project area from construction of the Fritchie brackish marsh project would involve the combined adverse effects on each species from the other projects within the deltaic plain. Due to the large size of Lake Pontchartrain (403,200 acres), the size of the designated Gulf sturgeon critical habitat in Lake Pontchartrain (approximately half of the lake), the relatively small size of the borrow area (258 acres), the temporary nature of the borrow activities, the sediments in the borrow area, the depth of excavation, the use

of cutterhead dredges for borrow procurement, the duration of dredging, the ability of benthic species to quickly re-colonize the borrow areas, the ability of threatened and endangered species and protected species to avoid the project area during the construction period, and the use of protection measures, the Fritchie brackish marsh project would add minimal and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the deltaic plain and would not contribute significantly to cumulative impacts to threatened and endangered species or protected species or their habitat in the deltaic plain.

5.3.4 FISHERIES, AQUATIC RESOURCES, AND WATER QUALITY

5.3.4.1 No Action

Direct and Indirect Impacts
Under the No Action Alternative, mitigation for swamp and intermediate, brackish, and saline marsh and open water impacts would not occur and CEMVN's legal obligation to compensate for habitat losses caused by construction of the NFL NOV would not be satisfied. The loss of swamp, marsh, and open water habitat within the system would indirectly impact fisheries productivity and water quality through the loss of cover, foraging, spawning, and nursery habitat as well as the loss of detritus and the filtering function wetlands provide.

Cumulative Impacts
The NFL NOV project and multiple flood control projects ongoing in the region (See Appendix L and Section 2.9.1) have the potential for cumulative impacts on fisheries, aquatic resources, and temporarily impair water quality by increasing turbidity, runoff, and siltation. However, BMPs would be used to minimize the impacts of dredging and levee expansion. Additional temporary impairment from construction stormwater runoff would occur on water resources if there is a major rain event during construction of levee and floodwall reaches. Transportation projects utilizing BMPs and following SWPPP could negatively impact wetlands and other surface waters during construction but benefit them by improving hydrologic connection and flow upon construction completion. Future diversions planned for the Mississippi River, and other wetland creation projects planned and constructed under the CWPPRA could reduce wetland loss in the deltaic plain. The ecosystem restoration projects in the basin and deltaic plain would continue work to enhance and restore historic ecosystem processes within the deltaic to offset these impacts. However, the overall loss of swamp and marsh within the system combined with other habitat loss incurred from implementation of projects in the FWOP conditions would result in cumulative adverse impacts to fish species that utilize these areas, aquatic resources, and water quality.

5.3.4.2 Remaining TSA – Fritchie FS Brackish Marsh Project

Direct and Indirect Impacts
At the Fritchie brackish marsh project site, up to approximately 350 acres of shallow open water containing some submerged aquatic vegetation would be positively

impacted by conversion to intermediate and brackish marsh habitat and would continue to be available for fishery and aquatic species. This marsh creation would increase spawning, nursery, forage and cover habitat for fisheries resources in the area. This project could result in the permanent loss of 106.9 AAHUs of fishery and aquatic resource habitat and improvements to water quality within the Basin, but would increase fishery and aquatic resource habitat, improve water quality, and mitigate impacts within the deltaic plain, which includes the Basin. Use of flexi floats and board roads for construction staging and access could temporarily impact fisheries and aquatic resources in the vicinity but it would be temporary and cease after construction. Construction during borrow excavation and fill placement could temporarily impair visual predator and impact filter feeders, but this impact is expected to cease and benthic species would rebound once construction is completed. Temporary impacts to Lake Pontchartrain from borrow excavation is not anticipated to be substantial enough to cause impairment of the water body's designated uses as defined under the standards of Louisiana Administrative Code, Title 33, Part IX, Chapter 11. Turbidity impacts at the Fritchie marsh creation area would temporarily cause water quality impairments by increasing turbidity and could cause localized dissolved oxygen depletion, but these impacts would be minimized by BMPs and would cease after construction.

Cumulative Impacts
Accounting for other ongoing projects in the basin and the deltaic plain, this project would prevent an overall loss of wetland habitat necessary for many fisheries and aquatic resources. The Fritchie Brackish Marsh Project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the deltaic plain, would result in minimal loss to fisheries, aquatic resources, and water quality experienced in the deltaic plain and would be beneficial to preserving species biodiversity. The reinstitution of intermediate and brackish marsh in areas that are currently open water could provide indirect benefits to fisheries in the future by providing nutrients to the system in the form of detritus. As a result of borrow placement and the type of containment utilized for this project, land adjacent to the mitigation project may receive material suspended in the dredge effluent. This would nourish adjacent marsh habitat and may cause adjacent shallow open water to become shallower. There would also be a positive indirect and cumulative impact on fisheries and aquatic species due to the long-term stability of the new brackish marsh.

5.3.5 ESSENTIAL FISH HABITAT

5.3.5.1 No Action

Direct and Indirect Impacts
Under the No Action alternative, construction of the Fritchie Brackish Marsh Project would not occur. With implementation of the No Action Alternative, there would be an overall loss of marsh and open water habitat within the basin and the deltaic plain of approximately 169.1 acres (106.9 AAHUs) because the impacts incurred by constructing the NFL NOV were not mitigated. Intertidal marshes and some open water habitats are designated EFH, and loss of marsh and open water habitat in the basin and

the deltaic plain would equate to a loss of EFH in the Basin. CEMVN's legal obligation to compensate for habitat losses caused by construction of the NFL NOV would not be satisfied.

Cumulative Impacts
The NFL NOV project and multiple flood control projects ongoing in the region (Appendix L) would have potential adverse cumulative impacts on EFH resources through loss of this habitat or by producing turbidity that could affect the survival of SAVs or cause siltation of bottom substrates. BMPs would be used to minimize the impacts of dredging and levee expansion. The ecosystem restoration projects in the Basin would work to enhance and restore historic ecosystem processes within the Basin to offset these impacts.

5.3.5.2 Remaining TSA – Fritchie FS Brackish Marsh Project

Direct and Indirect Impacts
Up to approximately 350 acres of new marsh would be created as part of the Fritchie Brackish Marsh Project and in the process, several types of EFH associated with open water would be permanently replaced with intermediate and brackish marsh and other associated EFH. Negative impacts to the existing EFH would be more than offset by the creation of estuarine emergent wetlands since the support functions of the created marsh is greater than the support functions of the existing open water. This project could result in the permanent loss of 106.9 AAHUs of EFH within the Basin, but would create EFH and mitigate impacts within the deltaic plain, which includes the Basin. Excavation of borrow from Lake Pontchartrain would deepen estuarine water column and may expose a different substrate, which could impact post larval and juvenile brown shrimp, white shrimp, and red drum by reducing available cover and foraging habitat for shrimp species and foraging habitat for drum. As a result of these actions, adverse impacts to some types of EFH may occur, but marsh creation would compensate for these impacts, and the overall productivity of Federally-managed species would be benefitted.

Cumulative Impacts
Accounting for other ongoing projects in the deltaic plain, this project would prevent an overall loss in the deltaic plain of wetland habitat necessary for EFH. The Fritchie Brackish Marsh project, when added to other past, present, and reasonably foreseeable ecosystem restoration and mitigation projects in the deltaic plain, would help slow or retard the loss of wetlands in the deltaic plain and would be beneficial to preserving species biodiversity. There would also be a positive cumulative impact on EFH due to the long-term stability of the new intermediate and brackish marsh which would provide habitat for an abundance of species.

5.3.6 CULTURAL RESOURCES

5.3.6.1 No Action

Direct, Indirect, and Cumulative Impacts
Under the No Action alternative, the cultural resources within the basin and the deltaic plain would not be directly impacted from the construction of any of the proposed projects. There would be no additional potential for impacts to undiscovered cultural resources resulting from the No Action alternative that have not been addressed in previous NEPA documents and consultations required by Section 106 of the NHPA.

5.3.6.2 Remaining TSA – Fritchie FS Brackish Marsh Project

Direct and Indirect Impacts
The Fritchie Marsh area is largely water and submerged land, but was once shoreline where both prehistoric and historic activities may have occurred. Activities associated with implementation of the TSA could have a direct impact on existing or as yet undiscovered cultural resources. Unidentified cultural resources could exist within the created new marsh, or the required borrow area and transport area, however no impacts to historic properties, cultural resources, or tribal resources are anticipated to occur as a result of implementing the proposed action, due to CEMVN's intent to avoid historic properties should they be identified.

While the distribution of this EA is initiating the "section 106 process," CEMVN will consult with the LA SHPO and Federally recognized Tribes (the Alabama-Coushatta Tribe of Texas [ACTT], the Choctaw Nation of Oklahoma [CNO], the Coushatta Tribe of Louisiana [CT], the Chitimacha Tribe of Louisiana [CTL], the Jena Band of Choctaw Indians [JBCI], the Mississippi Band of Choctaw Indians [MBCI], the Muscogee (Creek) Nation [MCN], the Seminole Nation of Oklahoma [SNO], the Seminole Tribe of Florida [STF], and the Tunica-Biloxi Tribe of Louisiana [TBTL]), regarding the agency's determination and update the impacts assessment accordingly.

Required determinations of National Register-eligibility and findings of effect will be accomplished, and coordination of results with the SHPO and Federally-recognized Tribes will be completed prior to approval of the Project Description Document (PDD) and federal funding for the proposed undertaking. Regardless of the outcome of the consultation, CEMVN will apply standard discovery provisions, and comply with the Louisiana Unmarked Human Burial Sites Act if remains are found on state or private land and the Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3001-3013, should Native American human remains be encountered on USFWS refuge land.

Cumulative Impacts
Implementation of this project would work synergistically with other ecosystem restoration projects in coastal Louisiana. Cumulative impacts to cultural resources would be the additive combination of impacts by this and other Federal, state, local, and private restoration efforts, and would be further evaluated on a project-by-project basis.

5.3.7 RECREATIONAL RESOURCES

5.3.7.1 No Action

Direct and Indirect Impacts
Under the no action plan, recreational resources in the project area would continue to be affected by the loss of the impacted wetlands/marshes. The loss of these habitats, and the effect such losses would have on wildlife and fish species, would cause recreational opportunities in the Basin and deltaic plain to also suffer loss. Many recreation activities are based on aquatic resources and are directly related to the habitat and species in an area. Habitat changes affect fish and wildlife populations, thereby affecting many recreational resources. Fishing opportunities would be lost with the decline in fish populations dependent on the lost wetlands for spawning and nursery habitat. Hunting and bird viewing opportunities would be lost with the decline in migratory bird and game species populations directly dependent on the marsh and swamp for all or part of their life cycles.

Cumulative Impacts
Without construction of an action alternative, there would be an overall loss of swamp and marsh within the system. Loss of habitat in the Basin would equate to a loss in recreational fishing and hunting opportunities. The overall loss of swamp and brackish marsh within the system combined with other habitat loss incurred from implementation of projects in the FWOP conditions could have cumulative adverse impacts to wildlife, fisheries, aquatic resources, as explained in the immediately preceding subsections, and therefore recreational resources.

5.3.7.2 Remaining TSA – Fritchie FS Brackish Marsh Projects

Direct and Indirect Impacts
*O*nce the marsh restoration is complete, a more productive fishery habitat could produce more public fishing and hunting opportunities at the site if the new land owner, the State, manages the site for recreational activities. Short-term impacts include disruption of fishing and hunting activities from the dredging and placement activities in the borrow site in Lake Pontchartrain and in the receiving areas at the Fritchie site. Additionally, boaters are not expected to be impacted by the floating or submerged pipeline that will be used to convey the dredge material from the borrow site, 2,800 ft off of the shore, to the marsh creation site. Impacts to camps along Salt Bayou Road will be minimal as the pipeline will be placed along the southern shore of Salt Bayou.

Cumulative Impacts
Fish and wildlife in adjacent waters should benefit from an improved habitat resulting from the brackish marsh creation. Cumulative impacts include better recreational fishing and hunting opportunities in the deltaic plain as marsh and swamp are restored in other areas. Because of the temporary nature and small size of the project area and construction activities, construction of the TSA would add minimal and only temporary adverse recreational impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the region and would not contribute significantly to adverse cumulative impacts to recreational resources in the basin and the deltaic plain.

5.3.8 AIR QUALITY

5.3.8.1 No Action

Direct and Indirect Impacts
Under the No Action Alternative, no direct or indirect impacts to air quality would occur as the required mitigation would not be constructed.

Cumulative Impacts
The No Action is not anticipated to add to the cumulative impacts to air quality in the basin or the deltaic plain as the required mitigation would not be constructed.

5.3.8.2 Remaining TSA – Fritchie FS Brackish Marsh Project

Direct and Indirect Impacts
During construction of the Fritchie brackish marsh creation, an increase in air emissions could be expected that include exhaust emissions from operations of various types of non-road construction equipment such as a cutterhead dredge, backhoes, tractors, marsh buggies, crew boats, and vehicles used to access the project area. The impacts, however, would be minor and temporary, and air quality would return to pre-construction conditions shortly after the completion of construction activities. There would be no adverse indirect impacts to air quality in St. Tammany parish with construction of the proposed action. As St. Tammany parish is classified as in attainment for all NAAQS (EPA 2009), no Conformity Determination or other effort is required of the TSA.

Cumulative Impacts
Construction of the TSA project is not anticipated to have a cumulative significant impact to air quality in the deltaic plain as construction activities would be temporary along with other development, diversion and coastal restoration, and transportation projects (Appendix L). Cumulatively all of these projects could temporarily impact air quality, but they would not all be under construction at the same time.

5.3.9 NOISE

5.3.9.1 No Action

Direct and Indirect Impacts
Under the No Action Alternative, no direct or indirect impacts to noise would occur as the required mitigation would not be constructed.

Cumulative Impacts
The No Action is not anticipated to add to the cumulative impacts to noise in the basin or the deltaic plain as the required mitigation would not be constructed.

5.3.9.2 Remaining TSA – Fritchie FS Brackish Marsh Project

Direct and Indirect Impacts
Cutterhead dredges and backhoes would be the primary pieces of equipment used for construction of Fritchie brackish marsh project. Additional construction equipment could include hydro-axes, gyro-tracks, mulchers, dump trucks, slurry pumps, marsh tracked vehicles and barge mounted equipment. These pieces of equipment exceed noise levels above 55 dBA. See Appendix B Table B-17 for list of equipment and associated dBA. Noise levels may result in wildlife temporarily avoiding the project area during construction; however, movement of equipment during construction would result in the same avoidance behaviors from wildlife species. Noise levels quickly drop off once a buffer is established between the noise source and the receptor (e.g. vegetation). As such, any wildlife in the adjacent habitats should be largely undisturbed by the additional noise from construction of these features. There would be minor temporary impacts to human populations along Salt Bayou and Old Spanish Trail Road which run parallel and adjacent to the Fritchie Brackish Marsh project, because residences could experience higher than ambient noise levels during construction; however these levels would be temporary during the period of construction and would be limited to daylight hours.

Cumulative Impacts
Construction of this project is not anticipated to add significantly to the cumulative effect of noise in the deltaic plain as the Fritchie brackish marsh creation activities would be temporary, along with some other redevelopment, diversion and coastal restoration, and transportation projects (Appendix L). Cumulatively all of these projects produce noise but they would not all be under construction at the same time.

5.3.10 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

5.3.10.1 No Action

Direct, Indirect and Cumulative Impacts
With the No Action plan there would be no direct, indirect, or cumulative impacts to HTRW.

5.3.10.2 Remaining TSA – Fritchie FS Brackish Marsh Project

Direct, Indirect and Cumulative Impacts
With the TSA, the Fritchie brackish marsh project would be constructed. No RECs were identified in the Fritchie brackish marsh project site.

If a recognized environmental condition is identified in relation to the project site, the CEMVN would take the necessary measures to avoid the REC so that the probability of encountering or disturbing HTRW would continue to be low.

5.3.11 SOCIOECONOMICS/LAND USE, ENVIRONMENTAL JUSTICE, TRANSPORTATION, NAVIGATION, AND COMMERCIAL FISHERIES

5.3.11.1 No Action

Direct and Indirect Impacts

Under the no action alternative, socio-economic resources would be expected to continue to change in pace with previous trends. With the No Action plan there would be no direct, indirect, and cumulative impacts to socio-economic, environmental justice, transportation, and navigation resources. Wetland loss, though, will continue under the no action alternative. The loss of fish and wildlife habitat may negatively impact the commercial fishing stock, reducing fishermen's profits. Decreased revenue from the commercial fishing industry could have a negative impact on local economies, affecting the quality of life for residents residing in the project area.

Cumulative Impacts

In the absence of the TSA, other habitat restoration projects would continue to be implemented and provide benefits. Without the added benefit of the TSA, other restoration projects in the area would have a somewhat reduced impact on preventing flooding and wildlife habit restoration. Due to the TSP's relative small contribution to these efforts, residents would most likely not notice any socio-economic effects should the TSP not be implemented.

5.3.11.2 Remaining TSA – Fritchie FS Brackish Marsh Project

Direct and Indirect Impacts

According to 2010 U.S. Census data, there are no residents located within the dredging or placement area boundaries of the brackish marsh project and therefore there are no Environmental Justice communities. There are no commercial/industrial properties, public facilities, or transportation infrastructure within the project boundaries. No impacts to employment, businesses, industry, public facilities and services, community and regional growth, community cohesion, or tax revenues and property values are anticipated to occur with construction of this project. The proposed project does not require any acres of agricultural or forestry land to be converted.

There would be no direct and only minimal indirect impacts to transportation during project construction from heavy vehicle traffic in the vicinity of the restoration site. It is expected that once the necessary construction equipment is on site that no additional transportation impacts would occur until the project construction is complete since borrow would be obtained from Lake Pontchartrain and all construction activities would be within the project site.

The nearest navigable waterways to the brackish marsh project is Salt Bayou and Lake Pontchartrain. There would be no direct impacts to navigation from implementation of the brackish marsh creation project because the dredge pipeline would be floating and submerged in areas along the route to allow for navigation of the waterways. Potential indirect impacts to navigation would be minimal as the project area could be avoided

with minor course corrections. There would be no direct and only minimal indirect impacts to commercial fisheries from implementation of the brackish marsh creation project due to borrow dredging. Indirect impacts would be a result of increased silt disruption around the adjacent area. These would be temporary during the period of construction and minimal as the borrow area makes up a small percentage of a 403,200 acre lake. Positive indirect impacts from the brackish marsh creation include increasing spawning, nursery, forage and cover habitat for commercial fishery resources.

Cumulative Impacts

The cumulative impacts of this project, when added to other past, present, and reasonably foreseeable ecosystem restoration, mitigation or other type projects in the deltaic plain would minimally and temporarily affect socio-economic resources. Due to the size of Lake Pontchartrain (403,200 acres), the relatively small size of the borrow areas, the temporary nature of the borrow activities and the duration of dredging, the brackish marsh creation project would add minimal and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the deltaic plain and would not contribute significantly to cumulative impacts to socio-economic resources in the deltaic plain. Minimal, positive impacts to commercial fishing from the other marsh creation projects will occur as a result of marsh and wetland restoration improving spawning, nursery, forage and cover habitat of important commercial fish species in the deltaic plain. However the positive benefits cannot be considered part of a cumulative impact on this socio-economic resource because mitigation projects replace habitat lost as a result of damage from construction such as HSDDRS. Any resulting benefits to the commercial fishing industry from the brackish marsh creation or the LPV mitigation projects, in theory, replace those lost during levee construction and therefore there are no net cumulative impacts.

Impacts from restoration projects can temporarily disrupt transportation, navigation and commercial fishing in project areas due to construction activities including dredging and material placement in the restoration areas. Land uses such as commercial/industrial properties and public facilities are not normally impacted as restoration projects are typically located in unpopulated areas. Additionally, Environmental Justice issues do not typically arise from the construction of the restoration projects as the mitigation sites are uninhabited.

6.0 MITIGATION

During the plan formulation for any project, adverse impacts to the human and natural environment should first be avoided, then minimized, and lastly, compensated. During the plan formulation for the NFL NOV levee improvements, where possible, adverse impacts were avoided or minimized, however, unavoidable impacts to some habitat types would still occur. These impacts are shown in Table 1. Table 16 lists the twelve components of the mitigation plan and identifies in which section of SEA 543a the discussion of each component can be located. Compensatory mitigation is required for the following habitat types: swamp, intermediate marsh, brackish marsh, saline marsh,

and open water. The planning and environmental compliance for the compensatory mitigation plan is being coordinated with an interagency team comprised of representatives from the CPRA, LDNR, Plaquemines Parish Government, USACE, USEPA, USFWS, and NMFS.

Table 6. Twelve Components of a Compensatory Mitigation Plan

Components	Sections
1. Objectives	The two original NFL EIS and NOV SEIS, EA 537 and EA section 1.2
2. Site Selection	The two original NFL EIS and NOV SEIS, EA 537 and EA 543 and SEA 543a sections 1.1, 1.2, 2.1, 2.2, 2.3, 2.4 and 2.5.
3. Site Protection Instrument	Any private lands within both sites would be acquired in fee, excluding oil and gas with restrictions on the use of the surface. Any land that is owned, claimed or controlled lands by the State or any other nonfederal governmental entity will be brought to the project via an Authorization for Entry. Any Federal lands would be brought to project, whether via a Special Use Permit or otherwise. The non-Federal sponsor would be responsible for operation, maintenance, repair, rehabilitation and replacement of the mitigation site in perpetuity.
4. Baseline Information	SEA 543a section 2.4 and 3.0
5. Determination of Credits	The two original NFL EIS and NOV SEIS, EA 537 section 1.6 and EA 543 and SEA 543a sections 1.7 and 2.5, 2.6.
6. Mitigation Work Plan	SEA 543a section 1.2, 2.4, 2.5, Appendix C, Appendix D
7. Maintenance Plan	SEA 543a sections 2.4, 7.0, Appendix C, Appendix D; also to be outlined in OMRR&R Manual
8. Performance Standards	SEA 543a section 1.2, 2.4, 7.0, Appendix C, Appendix D, and Appendix J
9. Monitoring Requirements	SEA 543a section 2.4, 7.0 Appendix C, Appendix D, Appendix J; also to be outlined in OMRR&R manual.
10. Long-Term Management Plan	CEMVN is responsible for this mitigation project for the duration of the construction phase to verify mitigation success and to complete project features if necessary. The non-Federal sponsor shall be responsible for OMRR&R once the CEMVN deems the construction phase to be complete. The non-Federal sponsor shall be responsible for maintaining the mitigation site in perpetuity. SEA 543a section 2.4, Appendix C and Appendix D
11. Adaptive Management Plan	SEA 543a section 7.0 and Appendix D. In the event monitoring reports submitted to CEMVN reveal that any success criteria have not been met during OMRR&R phase, the non-Federal sponsor, or its assigns after consultation with CEMVN and other appropriate agencies, would take all necessary measures to modify management practices in order to achieve these criteria in the future. If the results of the monitoring program support the need for physical modifications to the project, CEMVN would determine and implement the appropriate corrections in accordance with current authority and budgetary and other guidance, including the potential to consider implementing corrective measures under separate authority.

12. Financial Assurances	Financial assurances are required to ensure that the compensatory mitigation project would be successful. In this case the NFL NOV Project Partnership Agreements between the CPRA of Louisiana and the Federal Government provides the required financial assurance for this mitigation project. In the event that the non-Federal sponsor fails to perform, the CEMVN has the right to complete, operate, maintain, repair, rehabilitate or replace any project feature, including mitigation features, but such action would not relieve CPRA of its responsibility to meet its obligations and would not preclude the US from pursuing any remedy at law or equity to ensure CPRA's performance.

7.0 MITIGATION SUCCESS CRITERIA, MITIGATION PLAN MONITORING AND REPORTING, AND ADAPTIVE MANAGEMENT

An effective monitoring program is required (WRDA 2007, Section 2036) to determine if the project outcomes are consistent with the identified success criteria. The TSA includes the purchase of mitigation bank credits (swamp TSP) and a Corps-constructed project (brackish marsh TSP). Mitigation banks have monitoring obligations built into their binding agreements (MBIs) and permits. These monitoring plans identify success criteria and targets, a general schedule for the monitoring events, and the specific content for the monitoring reports that measure progress towards meeting the success criteria. These plans are reviewed by the Interagency Mitigation Banking Review Team for mitigation banks. In the event that the TSP which consists of the purchase of mitigation bank credits is not implemented, a detailed monitoring plan and adaptive management plan for the next ranked project for that habitat type would be developed with the interagency team.

A Monitoring Plan (Appendix C) has been developed for the brackish marsh TSP (Fritchie FS Brackish Marsh Project). The plan identifies success criteria and targets, a general schedule for the monitoring events, and the specific content for the monitoring reports that measure progress towards meeting the success criteria. Following completion of the design of the Fritchie brackish marsh project and in coordination with the local Sponsor and the Interagency Mitigation Team, the monitoring plan would be adjusted to include actual transects, sampling plot and gage locations, and monitoring frequency. In the event that the swamp TSP of the TSA, which consists of the purchase of mitigation bank credits, is not implemented, a detailed monitoring plan for the next ranked project for that habitat type would be developed with the Interagency team.

The purpose of adaptive management activities in the life-cycle of the project is to address ecological and other uncertainties that could prevent successful implementation of a project. Adaptive management (AM) also establishes a framework for decision making that utilizes monitoring results and other information, as it becomes available, to update project knowledge and adjust management/mitigation actions. Hence, early implementation of AM and monitoring allows for a project that can succeed under a wide range of conditions and can be adjusted as necessary. Furthermore, careful monitoring of project outcomes both advances scientific understanding and helps adjust operations changes as part of an iterative learning process. See Appendix D for the AM Plan.

Each Corps constructed project would have a contingency plan for taking corrective actions in cases where monitoring demonstrates that the mitigation feature is not achieving ecological success in accordance with its success criteria. For the TSP where credits would be purchased from a mitigation bank, the mitigation bank must be in compliance with the requirements of USACE Regulatory Program and its instrument, which specifies the management, monitoring, and reporting required to be performed by the mitigation site. Purchase of mitigation bank credits relieves the CEMVN and NFS of the responsibility for monitoring.

In the event that the TSP which consists of the purchase of mitigation bank credits is not implemented, any of the next ranked projects for that habitat type could be chosen for implementation instead. For any Corps-construction project, the NFS would be responsible for operation and maintenance of functional portions of work as they are completed. On a cost shared basis, USACE will monitor completed mitigation to determine whether additional construction, invasive species control and/or planting are necessary to achieve mitigation success. USACE will undertake additional actions necessary to achieve mitigation success in accordance with cost sharing applicable to the project and subject to the availability of funds. Once USACE determines that the mitigation has achieved initial success criteria, monitoring will be performed by the NFS as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet its intermediate and/or long-term ecological success criteria, USACE will consult with other agencies and the NFS to determine whether operational changes would be sufficient to achieve ecological success criteria. If, instead, structural changes are deemed necessary to achieve ecological success, USACE will implement appropriate adaptive management measures in accordance with the contingency plan and subject to cost sharing requirements, availability of funding, and current budgetary and other guidance.

8.0 COORDINATION AND PUBLIC INVOLVEMENT

8.1 PUBLIC INVOLVEMENT

Public involvement has been sought in planning the mitigation for NFL and NOV impacts. On October 28, 2014 letters were sent by Plaquemines Parish Government (PPG) to property owners in Plaquemines Parish, Louisiana to solicit interest and identify willing sellers of properties for use as mitigation for the NFL NOV project. Additionally, mitigation for NFL NOV impacts was discussed during public meetings held for the NFL EIS and NOV SEIS and mitigation measures were developed from input received during those meetings. This SEA 543a was mailed to the public for 45 day public review and comment period starting October 23, 2019 and available for download on http://www.mvn.usace.army.mil/About/Projects/NOV/.

8.2 AGENCY COORDINATION

Preparation of this SEA 543a has been coordinated with appropriate congressional, Federal, state, and local interests, as well as environmental groups and other interested parties. An interagency environmental team was established for this project in which Federal and state agency staff played an integral part in the project planning and alternative project analysis phases of the project (members of this team are listed in Appendix K). This interagency environmental team was integrated with the CEMVN PDT to assist in the planning of this project and to complete a determination of the potential direct and indirect impacts of the TSA. The PDT for this EA is made up of representatives from CPRA, Plaquemines Parish Government, USFWS, DNR, NMFS, and USACE, and has met regularly since 2011. Preparation of this EA and FONSI was coordinated with appropriate congressional, Federal, state, and local interests, as well as environmental groups, Native American Indian tribes, and other interested parties. The following Federally-recoginzed Tribes and agencies, as well as other interested parties, are receiving copies of this EA:

Alabama-Coushatta Tribe of Texas
Choctaw Nation of Oklahoma
Coushatta Tribe of Louisiana
Chitimacha Tribe of Louisiana
Jena Band of Choctaw Indians
Mississippi Band of Choctaw Indians
Muscogee (Creek) Nation
Seminole Nation of Oklahoma
Seminole Tribe of Florida
Tunica-Biloxi Tribe of Louisiana
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of the Interior, National Park Service
U.S. Environmental Protection Agency, Region VI
U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NMFS
U.S. Natural Resources Conservation Service
Governor's Executive Assistant for Coastal Activities
Louisiana Department of Wildlife and Fisheries
Louisiana Department of Natural Resources, Coastal Management Division
Louisiana Department of Natural Resources, Coastal Restoration Division
Louisiana Department of Environmental Quality
Louisiana State Historic Preservation Officer
Coastal Protection and Restoration Authority Board
Plaquemines Parish
St. Tammany Parish

Since the purchase of mitigation bank swamp credits would occur at existing approved banks, and since permitted banks exist as reasonably foreseeable projects in the FWOP conditions, no new direct, indirect or cumulative impacts to threatened and endangered species or their critical habitat would occur that would require coordination with USFWS or NOAA, NMFS. In addition, a Water Quality Certificate from the State of

Louisiana; public review of a Section 404(b)(1) Public Notice and signature of a Section 404(b)(1) Evaluation; receipt and acceptance or resolution of LDEQ comments on the air quality impact analysis; and receipt and acceptance or resolution of EFH recommendations would not be necessary for implementation of the mitigation bank TSP of the TSA. However, if acceptable bids for the sale of bank credits are not received and USACE determines that the next ranked project for that habitat type in the AEP should be implemented instead of the TSP, the aforementioned coordination with the resource agencies and evaluations, including consistency with the Louisiana Coastal Resources Program (LCRP) and completion of Section 106 consultation, would occur for those projects at that time.

The LDNR reviewed the proposed action for consistency with the LCRP, established under Section 307 of the CZ Management Act of 1972 (16 USC 1451). The proposed action was found to be consistent with the LCRP, as per a letter dated July 10, 2019 (Appendix M).

Section 106 of the NHPA, as amended, requires consultation with the LA SHPO and Federally-recognized Indian tribes. There are eleven Federally-recognized Indian tribes that have an interest in the region. Section 106 consultation has not yet been completed for the remainder of the TSA, the Corps-constructed Fritchie FS Brackish Marsh Project, however, all required coordination will be completed prior to approval of the Project Description Document (PDD) and federal funding for the proposed undertaking.

Coordination with the USFWS on the NFL NOV mitigation has been ongoing since 2008. A draft Fish and Wildlife Coordination Act Report (FWCAR) for the SEA 543a was provided by the USFWS on September 13, 2019. The final FWCAR was provided by USFWS on December 20, 2019. The final FWCAR concluded that the USFWS does not object to the TSA, provided that fish and wildlife conservation recommendations are implemented concurrently with project implementation. A copy of the final report is provided in Appendix M. The USFWS project-specific recommendations for the SEA 543a TSMP are listed below:

Construction of the NFL hurricane protection system resulted in direct impacts to swamp habitat (-33.8 AAHUs), fresh marsh and wet pasture (-53 AAHUs), and brackish, saline and intermediated marsh (-105.6 AAHUs).

The Service does not object to providing improved hurricane protection to Plaquemines Parish, provided the following fish and wildlife conservation recommendations are incorporated into future project planning and implementation of the TSMP.

Recommendation 1: The USACE shall fully compensate for any unavoidable losses to swamp habitat (-33.8 AAHUs), fresh marsh and wet pasture (-53 AAHUs), and brackish, saline and intermediated marsh (-105.6 AAHUs) caused by project construction. All aspects of mitigation planning should be coordinated with the Service, NMFS, the

Environmental Protection Agency (EPA), the Louisiana Department of Natural Resources (LDNR), Coastal Protection and Restoration Authority (CPRA) and LDWF.

CEMVN Response 1: Concur. USACE will mitigate for impacts as described in EA 513, EA 543, EA 565, and SEA 543a for 33.9 AAHUs swamp, 43.4 AAHUs fresh marsh and 106.9 AAHUs of brackish, saline, and intermediate marsh and open water impacts.

Recommendation 2: The Corps should continue to coordinate with NWR personnel during the planning processes. A Special-Use Permit should be obtained prior to any entrance onto the refuge. Coordination should continue until construction of the mitigation project is complete and prior to any subsequent maintenance. Points of contacts for the refuge are Neil Lalonde, Project Leader for the Service's Southeast National Wildlife Refuges Complex and Daniel Breaux (985) 822-2000, Refuge Manager for the Big Branch Marsh NWR.

CEMVN Response 2: Concur. USACE will continue to coordinate with NWR during planning process and construction and obtained a Special-Use Permit on October 29, 2019.

Recommendation 3: Based upon the amount of sand within the filled areas adjacent to the Fritche Marsh site and the lack of significant settlement that has occurred the Service Recommends that an initial target elevation of 2 feet be used.

CEMVN Response 3: USACE developed the target marsh elevation range of 1.0 ft to 1.5 ft NAVD88 for the Fritchie marsh creation project for the 35% design level from professional judgment, assumptions, and limited data for soil conditions and settlement rates for the borrow and the marsh creation area. During the engineering and design phase field data (which includes surveys, borings, etc.) will be collected as well as any available data for surrounding sites including the Zydeco Ridge project would be utilized. Design requirements for the Fritchie marsh creation site (such as max fill elevation) will be revised based on the gathered field data, a Geotechnical analysis, and results from Zydeco Ridge project.

Recommendation 4: We recommend that USACE reinitiate Endangered Species Act (ESA) consultation with the Service to ensure that the proposed project would not adversely affect any federally listed threatened or endangered species or their critical habitat if one of the following conditions occurs; 1) the scope or location of the proposed project is changed significantly, 2) new information reveals that the action may affect listed species or designated critical habitat; 3) the action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat is designated.

CEMVN Response 4: Concur. USACE would fulfill its consultation responsibilities as required under the ESA.

Recommendation 5: Avoid adverse impacts to wading bird nesting colonies and bald eagle nesting locations through careful design of project features and timing of construction. A qualified biologist should inspect the proposed work site for the presence of undocumented wading bird nesting colonies and bald eagle nests within 1,000 feet and 660 feet, respectively, of the work during the nesting seasons (i.e., February 16 through October 31 for wading bird colonies, and October through mid-May for bald eagles). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

CEMVN Response 5: Concur. USACE will carefully design project features, and time construction to implement best management practices to avoid adverse impacts to protected birds and their nests. These are described in SEA 543a and include the following: a qualified biologist would inspect the proposed worksite for the presence of undocumented nests during the nesting seasons (i.e., February 15 through October 31 for wading birds and October through mid-May for bald eagles) prior to construction. To minimize disturbance to nesting birds all activity occurring within 1,000 feet of a rookery or 660 feet of an eagle nest would be restricted to the non-nesting period. During nesting season the no-work distances would be implemented and coordinated with USFWS and LDWF.

Recommendation 6: During marsh creation, colonies containing nesting gulls, terns, and/or black skimmers may nest on newly deposited marsh creation material or retaining dikes; all activity occurring within 650 feet of a nesting site should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present). If time of year restrictions cannot be implemented and the project area is within areas known to be occupied by nesting shorebirds, we recommend that a bird abatement plan be developed in coordination with the Service and the LDWF. The abatement plan should include a monitoring plan including pre-construction and construction monitoring, anticipated abatement procedures, a report outline of daily monitoring and abatement activities, and include a post-construction report.

CEMVN Response 6: Concur.

Recommendation 7: If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary and those results should be forwarded to this office.

CEMVN Response 7: Concur.

Recommendation 8: Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds to the maximum extent practicable

CEMVN Response 8: Concur.

Recommendation 9: Impacts to Essential Fish Habitat (EFH) should be avoided and minimized to the greatest extent possible. For proposed project areas that impact designated EFH habitat, coordination with the NMFS should be conducted.

CEMVN Response 9: Concur. USACE seeks to avoid impacts to EFH and would coordinate with NMFS on any unavoidable impacts.

Recommendation 10: Construction of mitigation or purchasing credit from an approved mitigation bank for all compensatory mitigation should be conducted concurrent with construction of the NOV - NFL projects, to ensure that mitigation obligations are met on behalf of the public interest.

CEMVN Response 10: USACE is attempting to mitigate for wetland and BLH impacts as quickly as possible. USACE formed a PDT of USACE members and other interested state and Federal agencies which have assisted USACE in identifying potential mitigation sites, developing screening criteria to determine the sites that would undergo further engineering as part of the final array, and developing plans to implement and monitor the mitigation projects in the TSA. USACE continues to coordinate with this interagency PDT for this SEA 543a.

Recommendation 11: We recommend that the Corps consider the availability of credits at a bank and within a hydrologic unit when evaluating the mitigation bank alternative to avoid exhausting credits available for individual landowners/permittee within a particular hydrologic unit.

CEMVN Response 11: USACE considered future and presently available bank credits as well as ILF credits within the basin as well as USACE constructed projects. These alternatives were evaluated in an alternatives evaluation process that considered impacts to risk and reliability, environmental, watershed and ecological site considerations, time, schedule, cost effectiveness and other cost considerations.

Recommendation 12: Only USACE approved mitigation banks with perpetual conservation servitudes, within the Basin, currently in compliance with their mitigation banking instrument (MBI) should be considered for purchase of mitigation credits.

CEMVN Response 12: Concur.

Recommendation 13: Further detailed planning of mitigation features (e.g., Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) should be coordinated with the Service, NMFS, EPA,

LDNR, and LDWF, and shall provide them with an opportunity to review and submit recommendations on all work addressed in those reports.

CEMVN Response 13: The USFWS and other resource agencies would be provided an opportunity to review and comment on the proposed mitigation project plans and specifications.

Recommendation 14: Refinement of the mitigation potential as determined by the Wetland Value Assessment (WVA) for CEMVN-constructed projects should be undertaken at the 30, 60 and 90 percent design stages. These refinements should be an interagency task and should utilize the most recent detailed design, geotechnical information, and relative sea level rise rates (RSLR).

CEMVN Response 14: The USFWS and other resource agencies would be provided an opportunity to review and comment on the proposed mitigation project plans and specifications for the 60 and 95 percent levels (30 percent was utilized for alternatives development of SEA 543a).

Recommendation 15: Any proposed change in mitigation features or plans should be coordinated in advance with the Service, NMFS, LDWF, EPA and LDNR.

CEMVN Response 15: Concur.

Recommendation 16: Mitigation success criteria, monitoring and reporting requirements, and adaptive management should adhere to those developed for the Hurricane Storm Damage and Risk Reduction Study (HSDRRS) with any project specific modifications, if needed.

CEMVN Response 16: Concur. Appendices C, D, and J include mitigation success criteria, monitoring and reporting requirements, and adaptive management all developed from HSDRRS projects.

Recommendation 17: The Service encourages the CEMVN to finalize mitigation plans and proceed to mitigation construction so that it will be concurrent with project construction. If construction is not concurrent with mitigation implementation then revising the impact and mitigation period-of-analysis to reflect additional temporal losses will be required.

CEMVN Response 17: Concur.

Recommendation 18: The CEMVN should implement non-point source erosion control measures to protect wetlands and water bodies prior to initiation of construction and maintain during construction.

CEMVN Response 18: Concur. USACE will follow a SWPPP and best management practices.

9.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

There are many Federal and state laws pertaining to the enhancement, management and protection of the environment. Federal projects must comply with environmental laws, regulations, policies, rules and guidance. A 45 day public review and comment period for the draft SEA began on October 23, 2019. Environmental compliance was achieved upon conclusion of the 45-day public review and comment period and approval of the associated Finding of No Significant Impact signed on January XX, 2020.

Executive Order (E.O.) 11988 Floodplain Management
Executive Order 11988 directs Federal agencies to reduce flood loss risk; minimize flood impacts on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by flood plains. Agencies must consider alternatives to avoid adverse and incompatible development in the flood plain. If the only practical alternative requires action in the flood plain, agencies must design or modify their action to minimize adverse impacts. The proposed action represents the least environmentally damaging alternative to accomplish the needed risk reduction system modifications.

Clean Air Act of 1970
The Clean Air Act (CAA) sets goals and standards for the quality and purity of air. It requires the Environmental Protection Agency to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The proposed action project area is located in St. Tammany Parish which is currently in attainment of NAAQS; therefore, a general conformity determination is not required. The Louisiana Department of Environmental Quality is not required by the CAA and Louisiana Administrative Code, Title 33 to grant a general conformity determination.

Clean Water Act of 1972 – Section 401 and Section 404
The Clean Water Act (CWA) sets and maintains goals and standards for water quality and purity. Section 401 requires a Water Quality Certification from the Louisiana Department of Environmental Quality (LDEQ). SEA 543a will be incorporated into LDEQ's administrative record for WQC 110520-01. WQC 110520-01 remains valid for this project, see coordination email in Appendix M.

As required by Section 404(b)(1) of the CWA, an evaluation to assess the short- and long-term impacts associated with the discharge of dredged and fill materials into waters of the United States resulting from this project has been completed (Appendix E). A Clean Water Act Section 404(b)(1) evaluation and public notice were mailed out for public and agency review and comment on October 23, 2019. The 404(b)(1) and public notice is included in Appendix E of this EA 543 and was signed on January 7, 2020 upon completion of public review and comment. One comment from Ecosystem Investment Partners (EIP) dated November 4, 2019 was received requesting withdrawal of the 404

public notice from public review, this comment was considered but the request of withdrawal was not granted. Appendix G contains the EIP comment letter, and the matrix includes a summary of the comments and responses.

Coastal Zone Management Act of 1972
The CZMA requires that "each Federal agency conducting or supporting activities directly affecting the CZ shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs." The CEMVN received a consistency determination C20100384 for the NFL FEIS on January 24, 2011 and C20110045 for the NOV SEIS and April 6, 2011. Coordination with LADNR for modification to CZD was initiated by letter dated May 1, 2019. In their letter dated July 10, 2019, the LADNR determined that the project as proposed is consistent with the Louisiana Coastal Resources Plan and issued CZD C20100384 mod 13 (Appendix M).

Endangered Species Act of 1973
The Endangered Species Act (ESA) is designed to protect and recover threatened and endangered (T&E) species of fish, wildlife and plants. On May 13, 2019, the CEMVN submitted an updated Biological Assessment to USFWS with a determination of "no effect" on the piping plover, the red knot or any listed sea turtles and "not likely to adversely affect" the West Indian Manatee or the pallid sturgeon. The USFWS concurred with CEMVN's determinations on September 20, 2019 and NMFS concurred on October 18, 2019 that the proposed action is "not likely to adversely affect the NMFS ESA-listed species and/or designated critical habitat.

Fish and Wildlife Coordination Act of 1934
The FWCA provides authority for the USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It requires Federal agencies that construct, license or permit water resource development projects to first consult with the USFWS, NMFS and state resource agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. Section 2(b) requires the USFWS to produce a Coordination Act Report (CAR) that details existing fish and wildlife resources in a project area, potential impacts due to a proposed project and recommendations for a project.

The USFWS reviewed the TSA in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 USC 661 et seq.) and provided a draft Fish and Wildlife Coordination Act Report dated September 13, 2019, and a final CAR dated December 20, 2019. This office has concurred with, or resolved, all recommendations contained in the draft CAR, and project-specific recommendations have been addressed in Section 8.2.

Hazardous, Toxic and Radioactive Waste (HTRW)
The discharge of dredged material into waters of the United States is regulated under the Clean Water Act (CWA). In the absence of a known Hazardous, Toxic, and

Radioactive Waste (HTRW) concern, the proposed action would not qualify for an HTRW investigation.

The USACE Engineer Regulation, ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) for Civil Works Projects, states that dredged material and sediments beneath navigable waters proposed for dredging qualify as HTRW only if they are within the boundaries of a site designated by the EPA or a state for a response action (either a removal or a remedial action) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or if they are a part of a National Priority List (NPL) site under CERCLA (NPL is also known as "Superfund"). No portion of the project area proposed for dredging and disposal is included in the National Priority List.

Based upon a review of the NPL and CERCLA action sites, the probability of encountering HTRW in connection with this project is low. The proposed construction and beneficial use/disposal action does not qualify for an HTRW investigation and is evaluated as a water quality issue.

Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA)
The MSFCMA, as amended, Public Law 104-208, addresses the authorized responsibilities for the protection of Essential Fish Habitat (EFH) by NMFS in association with regional fishery management councils. The MSFCMA states that EFH is “those waters and substrate necessary for fish for spawning, breeding or growth to maturity” (16 United States Code [USC] 1802(10); 50 CFR 600.10). The 2005 amendments to the MSFCMA set forth a mandate for the NMFS of the National Oceanic and Atmospheric Administration, regional Fishery Management Councils (FMC), and other Federal agencies to identify and protect EFH of economically important marine and estuarine fisheries. A provision of the MSFCMA requires that FMCs identify and protect EFH for every species managed by a Fishery Management Plan (FMP) 16 USC 1853. NMFS has a “findings” with the CEMVN on the fulfillment of coordination requirements under provisions of the MSFMCA. In those findings, the CEMVN and NMFS have agreed to complete EFH coordination requirements for federal civil works projects through the review and comment on National Environmental Policy Act documents prepared for those projects. SEA 543a was provided to the NMFS for review and comment on October 23, 2019. NMFS sent a comment letter dated December 6, 2019 that stated “NMFS does not object to hurricane protection to reduce risk to life or property, nor do we object to the proposed levee alignments. The proposed brackish marsh mitigation is acceptable, but we do have some concerns and offer solutions to ensure the mitigation is scaled, designed, constructed, and performance is monitored to ensure adequate habitat compensation.” Comments and responses are included in Appendix G and NMFS will continue to be part of the Interagency included in PED discussions and future reviews of plans and specifications and CEMVN concurred with all NMFS technical recommendations for the marsh mitigation project. A specific edit to address these hydrologic design concerns for habitat impacts was made to this final SEA 543a project description in section 2.4.1 Common Elements in the Corps Constructed Project Description (p. 22) has been adjusted to read as follows:

“Elements common to all mitigation projects constructed from open water unless otherwise stated within the specific description are:

• Earthen retention dikes would be mechanically constructed along the perimeter of the proposed mitigation feature.
• The retention dike borrow would be obtained from within or exterior to the mitigation project footprint. Trenasses and dike borrow canals would be constructed to help maintain drainage.”

This fulfills the coordination requirements developed between NMFS and USACE on the fulfillment of EFH coordination requirements of the MSFCMA for civil works projects. Coordination between the agencies and comment letter is included in Appendix G and incorporated into the FONSI.

Migratory Bird Treaty Act
The project area is known to support colonial nesting wading/water birds (e.g., herons, egrets, ibis, night-herons and roseate spoonbills) and shorebirds (terns and gulls). Based on review of existing data, site visits, and with the use of USFWS guidelines, the CEMVN finds that implementation of the proposed action would have no effect on colonial nesting water/wading birds or shorebirds. USFWS and USACE biologists will survey the proposed project area before construction to confirm no nesting activity as suitable habitat and the potential for nesting exist within the project area. If active nesting exists within 1,000 feet (water birds) or 1,300 feet (shorebirds) of construction activities then USACE, in coordination with USFWS, would develop specific measures to avoid adverse impacts to those species. A detailed nesting prevention plan may be necessary in order to deter birds from nesting within the aforementioned buffer zones of the Project footprint in order to avoid adverse impacts to these species. If a nesting prevention plan is necessary, it would be prepared in coordination with USFWS.

Bald and Golden Eagle Act
The Project area is known to support bald eagles. Based on review of existing data, site visits, and with the use of USFWS guidelines, the CEMVN finds that implementation of the proposed actions would have no effect on bald eagles. USFWS and USACE biologists will survey the proposed project area before construction to confirm no nesting activity as suitable habitat and the potential for nesting exist within the project area. If active nesting exists within 660 feet of construction activities CEMVN would coordinate with USFWS to develop avoidance measures. A permit under 50 CFR 22.26 or 22.27 will be required if the project cannot minimize or prevent disturbance of bald eagles.

E.O. 12898 Environmental Justice
USACE is obligated under E.O. 12898 of 1994 and the Department of Defense’s Strategy on Environmental Justice of 1995, which direct Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of Federal actions to minority and/or low-income populations. Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American

Indian/Alaskan Native, Pacific Islander, or some other race or a combination of two or more races. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population. Low-income populations are those whose income is the Census Bureau's statistical poverty threshold for a family of four. The Census Bureau defines a "poverty area" as a census tract or block numbering area with 20 percent or more of its residents below the poverty threshold level and an "extreme poverty area" as one with 40 percent or more below the poverty threshold level. No minority populations are within the project area or would be disproportionately effected by the proposed action.

National Historic Preservation Act (NHPA) of 1966
Congress established the most comprehensive national policy on historic preservation with the passage of the NHPA. In this act historic preservation was defined to include "the protection, rehabilitation, restoration and reconstruction of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, or culture." The act led to the creation of the National Register of Historic Places, a file of cultural resources of national, regional, state, and local significance. The act also established the Advisory Council on Historic Preservation (the ACHP), an independent Federal agency responsible for administering the developing and the implementing regulations of the act (36 CFR 800).

Section 106 of the NHPA requires consultation with the Louisiana State Historic Preservation Officer (LA SHPO) and Federally-recognized Indian tribes. Section 106 cultural resources coordination for the mitigation areas was initiated with SHPO and with Federally-recognized Tribes, in letters dated October 23, 2019. Required determinations of National Register-eligibility and findings of effect will be accomplished, and coordination of results with the SHPO and Federally-recognized Tribes will be completed prior to approval of the Project Description Document (PDD) and federal funding for the proposed undertaking.

Tribal Consultation:
It is the policy of the federal government to consult with Federally-recognized Tribal Governments on a Government-to-Government basis as required in EO 13175 ("Consultation and Coordination with Indian Tribal Governments;" U.S. President 2000). The requirement to conduct coordination and consultation with federally recognized Tribes on and off of Tribal lands for actions that have the potential to significantly affect protected tribal resources, tribal rights, or Indian lands finds its basis in the constitution, Supreme Court cases, and is clarified in later planning laws.

In accordance with CEMVN's responsibilities under NEPA, NHPA, and E.O. 13175, CEMVN offered the following Federally-recognized Indian tribes the opportunity to review and comment on the proposed action: Alabama-Coushatta Tribe of Texas, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Muscogee (Creek) Nation, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and Tunica-Biloxi Tribe of Louisiana. At this time, no effects to tribal resources, rights, or lands is anticipated by

implementing this action. USACE distributed the SEA 543a on October 23, 2019 for review. The results of the Section 106 process will augment this determination. Any conditions will be documented in the PDD and federal funding for the proposed undertaking.

10.0 CONCLUSION

CEMVN has assessed the environmental impacts of the recommended TSA on relevant resources in SEA 543a. The TSA recommended plan would have only temporary short-term impacts to wetlands and other surface waters, threatened and endangered and protected species, wildlife, fisheries, aquatic resources, water quality, EFH, recreation, air quality from heavy equipment operations during construction; construction noise; and transportation impacts from transporting construction equipment and hauling materials to/from the construction site. Implementation of the TSA could have a direct impacts on undiscovered cultural resources in the marsh creation area or borrow area, however any discoveries would be coordinated with the SHPO and Federally-recognized Tribes. The completed marsh mitigation would provide more productive fishery habitat and could produce more recreational fishing and hunting opportunities. Recreational boaters, commercial fisheries are not expected to be impacted because the pipeline and dredging will not restrict navigation and can be avoided with minor course corrections. Impacts to camps along Salt Bayou Road will be minimal as the pipeline will be placed along the southern shore of Salt Bayou. There would be no impacts to HTRW, Environmental Justice communities, prime and unique farmland or aesthetics. There would be no impacts to employment, businesses, industry, public facilities and services, community and regional growth, community cohesion, agriculture or forestry properties, or tax revenues and property values.

Indirect impacts to water quality would be a result of increased silt disruption around the adjacent area. These would be temporary during the period of construction and minimal as the borrow area makes up a small percentage of a 403,200 acre lake. Positive indirect impacts from the brackish marsh creation include increasing spawning, nursery, forage and cover habitat for commercial fishery resources.

Constructing the TSA recommended plan includes purchasing mitigation bank credits that would offset the loss of 33.9 AAHUs of swamp impacts within the Basin. Since the purchase of mitigation credits would occur at existing approved mitigation banks, and because permitted banks exist as reasonably foreseeable projects in the FWOP conditions, no new direct or indirect impacts to any relevant resources would be incurred from the purchase of these credits for the NFL NOV mitigation. The TSA also proposes mitigation for marsh at the tentatively selected Fritchie Brackish Marsh project site to mitigate for intermediate, brackish, and saline marsh and open water impacts to meet 100% of the need for these habitat types.

11.0 PREPARED BY

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12.0 REFERENCES

Abadie, S.W., C.G. Brantley, S. Mickal, and S. Shively. 2000. “Distribution of the Manatee, (*Trichechus manatus*), in the Lake Pontchartrain Estuarine System. Basics of the Basin Research Symposium.

Alperin, Lynn, 1983. History of the Gulf Intracoastal Waterway. Navigation History NWS-83-9, National Waterways Study, U.S. Army Engineer Water Resources Support Center, Institute for Water Resources. Available on the Internet. http://www.gicaonline.com/media/about/alperin.pdf

American Canal Society, 2012a. Empire Lock, Plaquemines Parish, Louisiana. Retrieved March 20, 2012 from http://www.americancanals.org/Data_Sheets/Louisiana/Empire Lock.pdf

American Canal Society, 2012b. Gulf Intracoastal Waterway in Louisiana. Retrieved March 20, 2012 from http://www.americancanals.org/Data_Sheets/Louisiana/Gulf ICWW.pdf

American Canal Society, 2012c. Harvey Lock, Jefferson Parish, Louisiana. Retrieved March 20, 2012 from http://www.americancanals.org/Data_Sheets/Louisiana/Harvey Canal and Lock.pdf

Bahlinger, K., 1994. Annual Monitoring Report Hammock Lake Brush Fences (TV02a) 1994. Coastal Protection and Restoration Authority (CPRA).

Barras, J.A. 2009, Land area change and overview of major hurricane impacts in coastal Louisiana, 2004-08: U.S. Geological Survey Scientific Investigations Map 3080, scale 1:250,000, 6 p. pamphlet.

Behrens, E., 2019a. Draft No Action Alterative Documentation. Email to Christina Saltus, Lauren Wilkinson, and Amanda Landry. 11 January 2019.

Behrens, E., 2019b. Draft No Action Alterative Documentation. Email to Christina Saltus. 22 January 2019.

Coastal Protection and Restoration Authority (CPRA), 2010. Louisiana Coastal Impact Assistance Plan, Louisiana, Version 3.0. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA.

CPRA, 2012. Fiscal Year 2013 Annual Plan: Integrated Ecosystem Restoration and Hurricane Protection in Coastal Louisiana. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA. Available on the Internet. http://sonris-www.dnr.state.la.us/dnrservices/redirectUrl.jsp?dID=4379789

CPRA, 2013. Coastal Protection and Restoration Authority Quarterly Progress Report, October 2013, Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA.

CPRA, 2014. Coastal Protection and Restoration Authority, Ongoing Protection and Restoration Project Summaries, Appendix A. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA. http://coastal.la.gov/wp-content/uploads/2014/01/Appendix_A-Project_Summaries_20140218.pdf

CPRA, 2017a. NOV mitigation FWOP CPRA Project Construction Status. Email to Christina Saltus, R. Wager, and J. Wyble. 24 April 2017.

CPRA, 2017b. Mississippi River Water Reintroduction into Bayou Lafourche – BLFWD Factsheet. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA. https://cims.coastal.louisiana.gov/outreach/ProjectView.aspx?projID=BA-0161

CPRA, 2017c. 2017 Coastal Master Plan Attachment A1: Projects to be in 2017 Future Without Action (FWOA). Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA. file:///E:/ERDC_Workspace/Projects/2019/MVN/NOVMitigation/NoAction/References/CPRA_FWOP_2017_cAttachment-A1_FINAL_03.30.2017.pdf

CPRA, 2017d. Louisiana Comprehensive Master Plan for a Sustainable Coast. Baton Rouge, LA. pp 92 http://coastal.la.gov/our-plan/2017-coastal-master-plan/ or http://coastal.la.gov/wp-content/uploads/2017/04/2017-Coastal-Master-Plan_Web-Book_CFinal-with-Effective-Date-06092017.pdf

CPRA, 2017e. FW: BA-85 Information Request – Status of St. Charles Parish Hurricane Protection Levee, Email to Christina Saltus, Devyani Kar (CPRA), and Carla Chiasson (St. Charles Parish Government). 4 May 2017.

CPRA, 2017f. Fiscal Year 2017 Annual Plan: Integrated Ecosystem Restoration and Hurricane Protection in Coastal Louisiana. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA. http://cims.coastal.louisiana.gov/RecordDetail.aspx?Root=0&sid=18713

CPRA, 2018. Fiscal Year 2019 Annual Plan: Integrated Ecosystem Restoration and Hurricane Protection in Coastal Louisiana. Coastal Protection and Restoration Authority of Louisiana. Baton Rouge, LA. http://coastal.la.gov/wp-content/uploads/2017/04/FY-2018-Annual-Plan_Web-Book_ProjectionsFY18-FY20.pdf

Couvillion, B.R.; Barras, J.A.; Steyer, G.D.; Sleavin, William; Fischer, Michelle; Beck, Holly; Trahan, Nadine; Griffin, Brad; and Heckman, David, 2011, “Land area change in Coastal Louisiana from 1932 to 2010: U.S. Geological Survey Scientific Investigations Map 3164, scale 1:265,000, 12 p. pamphlet.

Data USA. https://datausa.io. Accessed 4 April 2017.

Environmental Law Institute, 2010. “In-Lieu Fee Mitigation: Model Instrument Language and Resources”, Environmental Law Institute, Washington D.C. accessed from https://ribits.usace.army.mil/ribits_apex/f?p=107:27:5755459758102::NO:RP:P27_BUTTON_KEY:10

Erwin, P., 2018a. LPV question in NOV environmental mitigation SEA 543a. Email to Christina Saltus. 29 November 2018.

Erwin, P., 2018b. LPV mitigation project status. Email to Christina Saltus. 21 December 2018.

Fonseca, Holly, 2013. BA-85 St. Charles West Bank Hurricane Protection Levee. Email to Christina Saltus, Will Norman, and Dona Ours, 3 December 2013.

Gulf of Mexico Fishery Management Council (GMFMC) 1998 Generic Amendment for Addressing Essential Fish Habitat Requirements in the Following Fishery Management Plans of the Gulf of Mexico. Available from Gulf of Mexico Fishery Management Council, 3018 U.S. Highway 301 North, Suite 1000, Tampa, FL 33619.

Haigler, Pate, 2011. Future park projects (JLNHPP). Email to Angela Minton, Carol Clark, Clay Carithers, and Lance Hatten, 01 May 2011.

Harper, Timothy, 2012. Lafitte Tidal Protection Surplus 2007 projects. Email to Christina Saltus, 9 April 2012.

I49 International Coalition, 2018. I-49 Louisiana Progress. Accessed 18 December 2018. Retrieved from http://www.interstate49.org/index.php?page=louisiana

Landry, A., 2019a. Plaquemines and NOV mitigation status. Email to Christina Saltus and Laura Wilkinson. 3 January 2019.

Landry, A., 2019b. LPV Task force guardian mitigation status. Email to Christina Saltus and Laura Wilkinson. 3 January 2019.

Louisiana Department of Wildlife and Fisheries. 2005. Louisiana Department of Wildlife and Fisheries (LDWF) 2004-2005 Annual Report. Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA. 58 pp.

McMenis, James, 2012 East of Harvey Canal Interim Hurricane Protection. Email to Christina Saltus, 4 April 2012.

Miller, Brad, RE: TE-111 state surplus Valentine to Larose Levee. Email to Christina Saltus, 24 March 2014.

Minton, Angela, 2011. FWOP WBV status. Email to Christina Saltus, Elizabeth Behrens, and Clay Carithers, 23 May 2011.

National Park Service www.nsp.gov Accessed 31 March 2017

Neyland, R. and H.A. Meyer. 1997. "Species diversity of Louisiana chenier woody vegetation remnants. J. Torrey Botanical Soc. 124: 254-261.

O'Cain, Keith, 2012. Personal Communication, Jean Lafitte National Historical Park and Preserve Shoreline Protection, 17 March 2012.

Plaquemines Parish Government. Plaqueminesparish.com. Accessed 30 March 2017

Plaquemines Port. www.portofplaquemines.com. Accessed 30 March 2017

Powell, J.A. and C.R. Taylor, eds. 2005. Sirenews: Newsletter of the IUCN/SSC Sirenia Specialist Group. Number 44. October.

Rawls, John and D.B. Lee 2009. Cultural Research and Field Investigations of Areas with the Mississippi River Delta Region, Davis Pond Freshwater Diversion Project, Channel Restoration and Stone Weir Construction, Cypress Lumber Canal and Lake Cataouatche, St. Charles Parish, Louisiana. Earth Search, Inc.

Saint Charles Parish Government, (2013, November 25). West Bank Hurricane Protection Levee Updates. Retrieved from http://www.stcharlesparish-la.gov/index.aspx?page=957

Saint Charles Parish Government (SCPG), 2018. (2018, February 23). West Bank Hurricane Protection Levee Updates. Accessed November 14, 2018. Retrieved from http://www.stcharlesparish-la.gov/Home/Components/News/News/10852/2487?utm_content=buffer4a0a8&utm_medium=social&utm_source=facebook.com&utm_campaign=buffer

Scallan, Matt, 2010. "St. Charles Parish applies for permit for second phase of west bank hurricane levee." The Times-Picayune. 18 February 2010: Nola.com. Web. 9 May 2011.

Schiltz, Greg, 2011. St. Charles Parish Levees. Email to Christina Saltus, 20 May 2011. Schiltz, Greg, 2012. Personal Communication. St. Charles Parish Non-federal Levees. 27 March 2012.

Somers, Bretton, L, Freeman, K. Ellzey, D. Barnes 2011. Phase I Cultural Resources Survey of New Orleans to Venice Federal Levees, Plaquemines Parish, Louisiana. Gulf South Research Institute.

Soraghan, E., 2018. WBV levee status question in NOV environmental mitigation SEA 543a. Email to Christina Saltus and Tutashinda Salaam. 29 November 2018.

Southeast Louisiana Flood Protection Authority West (SLFPW), 2012. MRL/WBV Levee Construction. E-mail to Christina Saltus, 27 March 2012.

U.S. Army Corps of Engineers (USACE), 1985. Larose to Golden Meadow, Louisiana, Hurricane Protection Project. Final Supplemental Environmental Impact Statement. New Orleans District, New Orleans, Louisiana.

USACE. 1987. Online version of "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. Accessed February 2009 from http://www.mvn.usace.army.mil/ops/regulatory/wlman87.pdf.

U.S. Army Corps of Engineers (USACE), 1995. Lake Salvador Shoreline Protection Project, Jean Lafitte National Historical Park and Preserve, Barataria Preserve Unit, Jefferson Parish, Louisiana - Environmental Assessment 231. New Orleans District, New Orleans, Louisiana.

U.S. Army Corps of Engineers (USACE), 2000. Davis Pond Freshwater Diversion Project. New Orleans District, New Orleans, Louisiana.

U.S. Army Corps of Engineers (USACE), 2004a. The Mississippi River and Tributaries Project. Retrieved April 25, 2017 from http://www.mvd.usace.army.mil/About/Mississippi-River-Commission-MRC/Mississippi-River-Tributaries-Project-MR-T/

U.S. Army Corps of Engineers (USACE), 2004b. Lake Salvador Shoreline Protection Project, Jean Lafitte National Historical Park and Preserve – Environmental Assessment 395. New Orleans District, New Orleans, Louisiana.

U.S. Army Corps of Engineers (USACE), 2009. "Plaquemines Parish Hurricane Risk Reduction." Riverside 2009 Special Edition. 12pp.

U.S. Army Corps of Engineers (USACE), 2011a. Final Environmental Impact Statement New Orleans to Venice, Louisiana, Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana. Vicksburg District, Vicksburg, Louisiana.

U.S. Army Corps of Engineers (USACE), 2011b. Final Supplemental Environmental Impact Statement New Orleans to Venice Federal Hurricane Protection Levee, Plaquemines Parish, Louisiana. Vicksburg District, Vicksburg, Mississippi.

USACE, 2012a. Unpublished. West Bank and Vicinity Hurricane Protection Project Implementation of Previous Authorized Mitigation Plans – Supplemental Environmental Assessments 498. New Orleans District, New Orleans, Louisiana.

USACE, 2012b. Factsheet: LPV HSDRRS Environmental Mitigation. Bayou Sauvage Refuge Protected Side Intermediate Marsh and Bottomland Hardwood Wet. Accessed on December 12, 2018. https://www.mvn.usace.army.mil/Portals/56/docs/HSDRRS/Mitigation/BS-PS-IM-BLHW-LPVMitigation.pdf

USACE, 2012c. Factsheet: LPV HSDRRS Environmental Mitigation. Bayou Sauvage Refuge Flood Side Intermediate Marsh Restoration. Accessed on December 12, 2018. https://www.mvn.usace.army.mil/Portals/56/docs/HSDRRS/Mitigation/BS-FS-BM-LPVMitigation.pdf

USACE, 2012d. Factsheet: LPV HSDRRS Environmental Mitigation. Milton Island Flood Side Intermediate Marsh. Accessed on December 12, 2018.

https://www.mvn.usace.army.mil/Portals/56/docs/HSDRRS/Mitigation/MiltonIMLPVMitigation.pdf

USACE, 2012e. Factsheet: WBV HSDRRS Environmental Mitigation. General Impacts – Jean Lafitte Marsh. Accessed on December 20, 2018. https://www.mvn.usace.army.mil/Portals/56/docs/HSDRRS/Mitigation/WBV-Jean_Lafitte_MARSH_FACTSHEET.pdf

USACE, 2012f. Factsheet: WBV HSDRRS Environmental Mitigation. Park/404c Impacts – Jean Lafitte Marsh. Accessed on December 20, 2018. https://www.mvn.usace.army.mil/Portals/56/docs/HSDRRS/Mitigation/WBV-PARK_MARSH_FACTSHEET%20.pdf

USACE, 2012g. Factsheet: WBV HSDRRS Environmental Mitigation. Park/404c Impacts – Jean Lafitte Bottomland Hardwood Wet. Accessed on December 20, 2018. https://www.mvn.usace.army.mil/Portals/56/docs/HSDRRS/Mitigation/WBV_PARK_BLH_FACTSHEET.pdf

USACE, 2013. Programmatic Individual Environmental Report PIER 36, Lake Pontchartrain and Vicinity (LPV) Hurricane and Storm Damage Risk Reduction System (HSDRRS) Mitigation. New Orleans District, New Orleans, Louisiana.

U.S. Army Corps of Engineers (USACE), 2015. Final Environmental Assessment and National Historic Preservation Act Assessment of Effects, West Bank and Vicinity Hurricane and Storm Damage Risk Reduction System Mitigation, Jefferson Parish Louisiana, PIER 37, Tier 1. New Orleans District, New Orleans, Louisiana.

USACE, 2016a. Bayou Sauvage, Turtle Bayou, and New Zydeco Ridge Restoration Projects. St. Tammany and Orleans Parishes, Louisiana Programmatic Individual Environmental Report (PIER) 36, Supplement 1, SEA546. New Orleans District, New Orleans, Louisiana.

USACE, 2016b. Supplemental Programmatic Individual Environmental Report Mitigation for Protected Side Bottomland Hardwoods Dry, West Bank and Vicinity Hurricane and Storm Damage Risk Reduction System, Jefferson Parish Louisiana, SPIER 37a. New Orleans District, New Orleans, Louisiana.

U.S. Army Corps of Engineers (USACE), 2017a. NFL NOV Mitigation FWOP Flood/nav Construction Status. E-mail to Christina Saltus, C. Burdine, L. Wilkinson, and K. Wagner. 26 April 2017

U.S. Army Corps of Engineers (USACE), 2017b. Personal Communication, Elizabeth Behrens West Bank and Vicinity Mitigation Tentative Selected Plans Project Construction Status, 28 April 2017

USACE, 2018a. Inner Harbor Navigation Canal Lock Replacement. Accessed on December 11, 2018. https://www.mvn.usace.army.mil/About/Projects/IHNC-Lock-Replacement/

USACE, 2018b. Morganza to the Gulf. Accessed on December 11, 2018. https://www.mvn.usace.army.mil/Portals/56/docs/PD/Projects/MTG/117.pdf

United States Census Bureau. https://factfinder.census.gov/ Accessed 27 March 2017

USDA – NASS, Census of Agriculture 2012. https://www.agcensus.usda.gov/publicaitons/2012/ Accessed 4 April 2017

U.S. Department of the Interior (USDOI), 1991. Natural Resources Damages Agreement, Restoration Project for Lake Salvador Louisiana, 4 February 1991 Oil Discharge.

U.S. Department of Transportation (USDOT), 2008. I-49 South Route US90 Raceland to the Westbank Expressway, Jefferson, Lafourche, and St. Charles Parishes, Louisiana – Record of Decision. FHWA-LA-EIS-07-01-F.

U.S. Government Printing Office (GPO), 2011. Intent to Prepare a Draft Supplemental Environmental Impact Statement for the Larose to Golden Meadow Hurricane Protection Project, Post-Authorization Change Study, in Lafourche Parish, LA. Federal Register 76 (26 August 2011): 53424. Print.

U.S. Geological Survey, 1994. Hydrologic Unit Maps, Water Supply Paper 2294.

Urban, D., 2018. Southeast Louisiana Urban Flood Control Project (SELA) construction status. Email to Christina Saltus and H. Wagner. 21 December 2018.

Valk, Diana, M. Handly, K. Lockerman 2011. Cultural Resource Investigation for the Non-Federal Levees Project, West Bank of the Mississippi River, Plaquemines Parish, Louisiana. New South Associates and URS-Baton Rouge.

Visser, J.M., Sasser, C.E., Chabreck, R.H., and Linscombe, R.G., 1998 Marsh and Vegetation Types of the Mississippi River Deltaic Plain: Estuaries, v. 21. P. 818-828.

Wells, Douglas C., S.A. Hahn, T.H.G. Hahn III 2009. Cultural Resources Survey and Testing of Items Related to the West Bank and Vicinity Hurricane Protection Levees, Jefferson, Orleans, Plaquemines, and St. Charles Parishes, Louisiana. Coastal Environments, Inc.

Wilson-Prater, Tawanda, 2013. Larose to Golden Meadow Status. Email to Christina Saltus, H. Wagner, and L. Wadsworth, 4 December 2013.